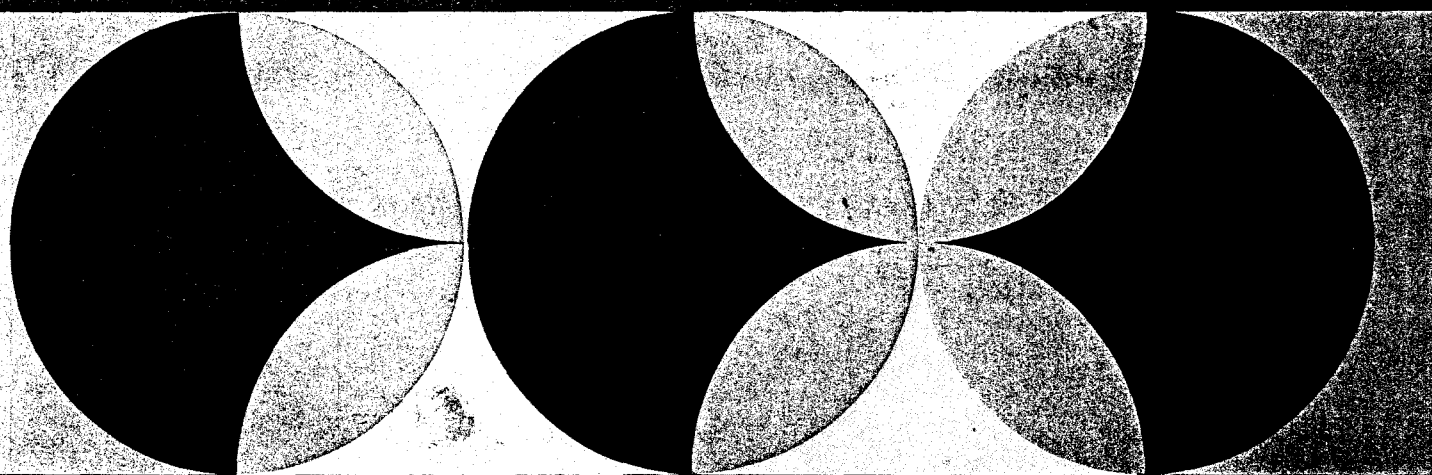


# **THE DETERMINANTS AND CONSEQUENCES OF POPULATION TRENDS**

**New Summary of Findings on Interaction  
of Demographic, Economic and Social Factors**

**VOLUME I**



**UNITED NATIONS**



# DEMOGRAPHIC PUBLICATIONS OF THE UNITED NATIONS

SELECTED LIST, JULY 1973

## Studies of population trends and problems

- The Determinants and Consequences of Population Trends: New Summary of Findings on Interaction of Demographic, Economic and Social Factors* (Volume I). English (French, Russian and Spanish in press). ST/SOA/SER.A/50. Sales No. E.71.XIII.5. *Volume II. Index and Bibliography*. ST/SOA/SER.A/50/Add.1. Sales No. 71.XIII.6.
- \* *The Aging of Populations and its Economic and Social Implications*. A world-wide survey and analysis of aging, its causes and consequences. English, French, 168 pp., \$1.75. ST/SOA/Series A/26. Sales No. 56.XIII.6.
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- \* *Foetal, Infant and Early Childhood Mortality. Vol. I. The Statistics. Vol. II. Biological, Social and Economic Factors*. English, French. Vol. I: 137 pp., \$2.00. Vol. II: 44 pp., \$0.75. ST/SOA/Series A/13 and Add.1. Sales Nos. 54.IV.7 and 54.IV.8.
- \* *The Mysore Population Study*. Report of a field study of interrelationships of demographic, economic and social factors in Mysore State, India. English. 443 pp., \$4.50. ST/SOA/Series A/34. Sales No. 61.XIII.3.
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- World Population Prospects As Assessed in 1968*. Population projections to 2000 for world regions and to 1985 for each country. English, Russian (French and Spanish in press), 167 pp., \$2.00. ST/SOA/Series A/53. Sales No. 72.XIII.4.

## Reports on methods of demographic analysis and projections

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- Manual VI: Methods of Measuring Internal Migration*. English, French, Russian, Spanish. 72 pp., \$1.50. ST/SOA/Series A/47. Sales No. 70.XIII.3.
- Manual VII: Methods of Projecting Households and Families*. English (French, Russian and Spanish in press). 108 pp., ST/SOA/Series A/54. Sales No. 73.XIII.2.

\* Out of print. Available for reference in depository and other libraries which receive United Nations material.



Department of Economic and Social Affairs

POPULATION STUDIES, No. 50

# **THE DETERMINANTS AND CONSEQUENCES OF POPULATION TRENDS**

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**VOLUME I**



**UNITED NATIONS**  
New York, 1973

## NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

Geographical areas for which statistical data are presented in this publication conform to the official country nomenclature used by the United Nations at mid-1971, when the first part of the study went to press; it has not been possible, therefore, to take into account the changes in the list of countries or in their official names, decided by the Secretary-General at a later date.

This study is published in two volumes. Volume I contains chapters I to XVII, the text of the study, and volume II the bibliography, author and subject indexes and an annex.

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## PREFACE

The first edition of *The Determinants and Consequences of Population Trends* was published in 1953<sup>1</sup> in response to a recommendation of the Population Commission at its fourth session<sup>2</sup> that the Secretary-General should survey the existing scientific studies concerning the relationships between population trends and economic and social factors and prepare a summary of the findings of such studies with special reference to problems of economic development. In recommending that a revised edition of this study should be prepared, the Population Commission noted that the original study had proved to be a highly useful summary of facts, theories and analyses which was now in need of updating in order to take account of the results of new research and advances in knowledge of the demographic, economic and social interrelationships which had taken place since 1953.<sup>3</sup>

In the early stage of the revision of this study, numerous specialists in various fields of demography and related disciplines were invited to prepare papers in their areas

of specialty which served as background papers for the discussions at the World Population Conference, 1965. A list of these background papers and their authors is given in the annex, which appears in volume II. These papers provided a starting point for the drafting of many of the chapters of the present work. They were revised and expanded by the United Nations Secretariat with the assistance of some of the specialized agencies, the regional economic commissions, the United Nations demographic training centres, and various consultants. In order to ensure that the revised edition would reflect studies carried out in all parts of the world and take account of differing points of view, the United Nations enlisted the co-operation of five demographic research institutions in reviewing drafts of chapters, recommending additional bibliography and, in some cases, providing English or French summaries of studies published in languages with which the Secretariat was not well equipped to deal. These co-operating institutes included the following: Central Statistical Board, Council of Ministers of the Union of Soviet Socialist Republics, Moscow; Demographic Research Centre of the Institute of Social Sciences, Belgrade; Institut national d'études démographiques, Paris; Institute of Population Problems, Tokyo; and Office of Population Research, Princeton, New Jersey.

<sup>1</sup> United Nations publication, Sales No. 53.XIII.3.

<sup>2</sup> *Official Records of the Economic and Social Council, Ninth Session, Supplement No. 7.*

<sup>3</sup> *Ibid.*, *Thirty-first Session, Supplement No. 3*, para. 18; *ibid.*, *Thirty-fifth Session, Supplement No. 2*, para. 52.

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### EXPLANATORY NOTES

The following symbols are used in the tables in this publication:

Three dots (...) indicate that data are not available or are not separately reported.

A dash (—) indicates that the amount is nil or negligible.

A blank in a table indicates that the item is not applicable.

*Developing regions* include Africa, Asia except Japan, Latin America except Temperate South America, and Oceania except Australia and New Zealand.

*More developed regions* include Japan, Europe, Temperate South America, Northern America, Australia and New Zealand, and the Union of Soviet Socialist Republics.

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### FOOT-NOTE REFERENCES

Foot-note references include author's last name, title or partial title and year of publication only. Complete references are given in the Bibliography in volume II, which is alphabetically arranged by author.



## Chapter I

### INTRODUCTORY BACKGROUND

1. The present study, like the first edition of *The Determinants and Consequences of Population Trends*,<sup>1</sup> is conceived as an analytic inventory of existing knowledge and hypotheses concerning the factors affecting population trends and the influence of these trends upon economic and social conditions. By reviewing relevant literature in demography, economics, sociology, geography, history and other related fields, the new edition aims at synthesizing the findings of major research on population change throughout the world and on its economic and social correlates.

2. The period between the publication of the first and present editions of this study was marked by a vast upsurge in demographic literature, reflecting a number of developments. Most important, spectacular changes in demographic trends were taking place—the foremost being the sharp acceleration of world population growth. At the same time a wealth of new demographic data were becoming available, even for areas for which such data had previously been lacking, and the development and improvement of techniques for estimating demographic measures from defective data contributed to a better knowledge of demographic conditions and trends in these areas. The new demographic trends stimulated greater interest in population matters and provided a challenge both to scholars and those concerned with policy matters; as a result, great efforts were expended to analyse the causes and consequences of the new developments and their policy implications, including programmes and actions required, or considered desirable, for modifying these trends.

3. The revision of *The Determinants and Consequences of Population Trends* was undertaken at a time when the United Nations was becoming increasingly involved in the population field and when important debates and decisions on population and corresponding economic and social policies were being held in the parliamentary bodies of the United Nations. Critical changes were taking place in attitudes towards population matters and new kinds of policies were being developed by a number of Governments. This was also a time when there was a growing recognition of the important role of population in economic and social development. The bringing together of the findings of major research in this area, it was hoped, would be of assistance to Governments and international bodies in formulating appropriate policies and programmes to speed the development process. It was considered that such a summary would be useful both for the development of policies designed

to influence population trends, as well as for the formulation of economic and social programmes designed to take account of the consequences of a growing population. With respect to the latter aspect, it is clear that the size of the population, its rate of growth, and its composition and geographical distribution are important factors in determining present and future needs of a country in such areas as education, housing, health services, food supply, and the like, as well as its productive capacity. Effective planning to provide full employment and a growth in labour productivity requires a knowledge of the present size and composition of the labour force and its prospective changes. In order to make forecasts in all of these areas, knowledge is required of the factors influencing population trends, and application of the projections in appropriate development measures requires an understanding of the probable economic and social effects of population change. In addition, concern that rapid population growth might hamper development efforts has led numerous Governments to adopt policies aimed at influencing their birth rates. For such policies to be effectively implemented, knowledge of the factors affecting human reproductive behaviour is essential.

4. Some of the major developments in the field of population which have occurred since the publication of the first edition of the present study are further elaborated below.

#### A. The widening compass of population research

##### 1. IMPROVEMENTS IN STATISTICAL DATA

5. Major changes in the political map of the world occurred after 1945 with the emergence of new national sovereignties in many parts of the world. This circumstance in itself called for improvements in basic information and statistics concerning all aspects of life in the newly independent nations. As part of the efforts to improve national statistical systems, the United Nations enlisted the co-operation of Governments in carrying out the first world census programme around 1950; this was followed by similar programmes in 1960 and 1970.

6. The progress made in the statistical documentation of the world's population can be assessed from two analyses undertaken in 1960 and 1970, respectively.<sup>2</sup> Of the four population giants—China, India, the Union of Soviet Socialist Republics and the United States of

<sup>1</sup> United Nations publication, Sales No. 53.XIII.3.

<sup>2</sup> United Nations, *Demographic Yearbook, 1960 ...* (1961), pp. 1-12; ———, *Demographic Yearbook, 1970 ...* (1971), pp. 1-10.

America, which together contain nearly one half of the world's population—all except China had censuses around 1960 and 1970. Excluding these four countries, it was found that for the countries which make up the remainder of the world, data based on censuses accounted for 78 per cent of their combined population in 1959, and for 90 per cent in 1969. Notable progress in census-based estimates occurred in Africa and Asia during this interval. After weighing the possible sources of error in current population estimates, it was suggested that the absolute range of error in the estimated world population totals might have been about 111 million in 1959 and 113 million in 1969. In relative terms, however, this error range decreased from 3.8 per cent in 1959 to 3.1 per cent in 1969. The largest source of error continued to be an uncertainty of information concerning the population of China.

7. Efforts to develop or improve vital statistics systems have been successful in some developing countries, but in general such systems are still far from being adequate to provide reliable estimates of birth and death rates in the world's less industrialized areas. Around 1965, complete birth registration statistics were available for countries containing about 35 per cent of the world's population; for the less developed regions, the comparable figure was estimated to be only 5 per cent.<sup>3</sup> Of the world's four most populous countries, only the Union of Soviet Socialist Republics and the United States of America maintain reliable statistics of births and deaths. For an increasing number of developing countries lacking reliable vital statistics, estimates based on sample surveys or derived from census data have become available in recent years. The extent of improvement in the availability of data is suggested by the fact that, whereas a 1957 study of the United Nations<sup>4</sup> gave registered or estimated birth rates for only five countries in Africa and fourteen in Asia, the United Nations study published in 1972 included such data for thirty-three countries in Africa and twenty-nine in Asia.<sup>5</sup>

8. Population registers established in a number of countries have proved to be a useful source of data, in particular for measuring migration volumes. National sample surveys have come into frequent use, either to supplement data obtained from population censuses, or to provide a substitute for census or vital registration data when the latter are lacking or deficient. Many of these surveys have focused on investigations of the labour force and have contributed to an improved knowledge of employment and unemployment conditions, particularly in pre-industrial societies.

## 2. EXPANSION OF DEMOGRAPHIC RESEARCH

9. Along with the improvement of statistical information on the population, two major features of demographic

<sup>3</sup> United Nations, *Interim Report on Conditions and Trends of Fertility ...* (1972), table 1, p. 58. See also United Nations, *Demographic Yearbook, 1969 ...* (1970), p. 1.

<sup>4</sup> United Nations, *Report on the World Social Situation ...* (1957), pp. 6-9.

<sup>5</sup> United Nations, *Interim Report on Conditions and Trends of Fertility ...* (1972), table 1, p. 58.

research during the past two decades call for comment. The first is the rapid growth and diversification of research, leading to a high degree of specialization among the individual branches of demography, such as fertility research, urban studies etc.<sup>6</sup> The second feature is a gradual change in the orientation of demographic research. Already in the early 1950s there was a growing interest among demographers in economic and social aspects of demographic change. At the close of the 1954 World Population Conference, the president of the International Union for the Scientific Study of Population, Mr. L. Hersch, stated: "Even now, however, the Conference may lay claim to certain rather substantial accomplishments. It has in various ways brought to light the multitude and variety of the links between demography and social phenomena in general and has thus at long last broken through the narrow circle of pure demography and the scientific isolationism so dear to the demographers of the nineteenth and the early twentieth centuries."<sup>7</sup> Another important change occurred in the early 1960s when demographic research became increasingly influenced by the gradual emergence of government policies. This new trend manifested itself first in a response to a growing demand for demographic analysis and projections needed in economic and social planning. Gradually, research underpinning the formulation of population policies attracted the attention of scientists and technicians, for it became evident that comprehensive international and national development programmes require that policies designed to influence population trends be included as a major component. The United Nations has played a role in this new development through its efforts to assist Governments with studies that would contribute either to the formulation of policies or to the implementation of adopted policies.

## 3. IMPROVEMENTS IN METHODOLOGY AND TECHNIQUES

10. Some of the major advances in demography since the 1950s have taken place in the area of methodology and techniques. More refined analytical tools have recently appeared in every field of demography. The revitalization and further development of stable population theory and the variety of methodological techniques derived therefrom proved to be a turning point in demographic analysis, as methodological progress was followed by practical applications. Thus, the demographic models developed in the early 1950s made possible a systematic analysis of the effects of different fertility and mortality levels on the age structure of the population and led, *inter alia*, to a better understanding of the causes of ageing of the population than had been possible previously. The extension of stable population analysis to the economically active population has provided a con-

<sup>6</sup> In 1953, when the first edition of *The Determinants and Consequences of Population Trends* was published, the authoritative bibliography, *Population Index*, published by Princeton University's Office of Population Research, contained a total of 2,236 listings for the year. By 1971 the number of entries in *Population Index* had grown to more than 3,700. In 1953 the various books and articles listed in this bibliography were grouped under only eleven main subject headings, whereas in 1971 nineteen main headings and about seventy subheadings were identified.

<sup>7</sup> United Nations, "Closing of the Conference" (1955), p. 181.

venient means for assessing the effects of different fertility and mortality levels operating through the age structure, as well as of different patterns of age-specific activity rates on total activity rates, dependency ratios, labour force replacement rates etc.

11. Stable and quasi-stable population analysis as well as other techniques are now widely applied in estimating basic demographic variables for countries with inadequate data. Among the techniques used, particularly with respect to data for African countries, are those involving the analysis of retrospective data on numbers of children ever born and numbers surviving; another is the method of "reverse-survival" of census-age data to derive birth-rate estimates.

12. Improved methodology for reconstructing demographic measures for early periods has contributed to progress in historical demography. For example, it has been possible to estimate long-term mortality trends extending from the middle of the nineteenth century for European countries and for some countries of overseas European settlement.

13. Multiple decrement life tables, which combine mortality rates with other demographic or socio-economic characteristics, have come into wider use. In particular, various types of nuptiality tables and working life tables have proved to be useful tools for analysis in their respective areas, and school-life tables and migration expectancy tables have shown much promise.

14. The techniques of population projection have been further advanced in the last two decades. Not only has the method of component projection replaced less adequate methods, but there has been an extension of the scope of projections to cover the different sectors or socio-economic categories of the population. Thus, there has been a trend towards providing a co-ordinated system of projections in such areas as labour force, rural and urban population, agricultural and non-agricultural population, school enrolment and households and families.

15. The development of mathematical demography has made notable progress. Advanced statistical and mathematical techniques have found their uses in model building and in research on the interaction between demographic, economic and social change. The utilization of matrix algebra and Markov chains to represent complex demographic phenomena has been facilitated by the advent of electronic computers. Large-storage computers have made possible the construction of highly complicated micro-simulation models which can include a large number of demographic and socio-economic variables and can ascertain their intricate mutual interrelationships.

16. In the area of fertility studies, greater use has been made of the cohort method of analysis; new methods have been developed for analysing distributions of births by birth order and parity progression ratios have been constructed for calculating birth probabilities. Progress has been made in determining fecundability periods of women with greater precision so as to improve the accuracy of calculations of pregnancy and birth probabilities. The possibilities have been explored of predicting actual future family size from desired family sizes reported

by couples. Intensive studies in the area of family planning have brought into widespread use KAP surveys for investigating the extent of knowledge, attitudes and practices concerning birth control. The multiple decrement life table approach has been applied in attempting to measure the use-effectiveness of various contraceptives for estimating births averted by various family planning methods. Path analysis, used earlier in social mobility studies, has been applied in studying the effects of family planning programmes on fertility.

17. The development of theoretical frameworks for the study of demographic phenomena has contributed to more systematic analyses in certain areas. For example, the analysis of factors affecting fertility has been facilitated by the use of a framework of intermediate variables through which social variables operate. Efforts have also been made to develop a commonly accepted framework for studying the effects of economic and social factors and their interaction on individual family choices concerning family size. Frameworks for migration analysis have also been proposed, but partly because of the many diverse types of migration and the complexity of migratory movements—which involve determinants at both the points of origin and destination—no particular framework has come into general use. In another area of demography, the further refinement of the concept of the "life cycle of the family" has provided a basis for more comparable research on changes in the size and structure of families and for studies of household income and expenditure; of particular interest is its application in studies of the dynamics of family building.

#### 4. NEW DEMOGRAPHIC TRENDS

18. The period between 1950 and 1970 saw the world's population growing at an average rate of 1.9 per cent annually—more than twice the rate of growth experienced during the first half of the twentieth century. This greatly accelerated growth of world population is the outstanding demographic fact of the past two decades. As table I.1 shows, an upturn in the rate of population growth occurred in the more developed as well as the less developed regions during the recent period, though it was far more spectacular in the latter. This trend, which was already becoming apparent at the time the first edition of the present study was published, was verified by the results of the 1960 round of censuses. As a result of the revelations of the 1960 censuses, a number of Governments found that their populations were growing faster than they had expected and they realized that this rapid growth might adversely affect economic and social progress and the improvement of levels of living.

19. Successful campaigns against disease had reduced mortality even in those areas of the world where, until recently, population growth had been held in check by high death rates. By the 1960s, according to United Nations estimates, crude death rates had fallen to about 9 per 1,000 population in the more developed regions and to about 17 in the developing regions—about half as high as the levels estimated for the first half of the twentieth century in both sets of regions (table I.2). While

TABLE I.1. TOTAL POPULATION ESTIMATES AND ANNUAL RATES OF INCREASE FOR THE WORLD, DEVELOPING AND MORE DEVELOPED REGIONS, 1900-1950

Major area	Total population (millions)			Average annual rate of increase (percentage)	
	1900	1950	1970	1900-1950	1950-1970
World total .....	1,650	2,486	3,631	0.8	1.9
Developing regions .....	1,077	1,628	2,541	0.8	2.2
More developed regions ....	573	858	1,090	0.8	1.2

SOURCE: Compiled from United Nations, *The World Population Situation in 1970* (1971), table 1, p. 4.

TABLE I.2. ESTIMATED AND CONJECTURED AVERAGE ANNUAL BIRTH RATES, DEATH RATES AND RATES OF NATURAL INCREASE FOR THE DEVELOPING AND MORE DEVELOPED REGIONS OF THE WORLD, 1900-1970  
(Rates per 1,000 population)

Period	Developing regions			More developed regions		
	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase
1900-1950 .....	41	32	9	26	18	8
1950-1960 .....	43	22	21	22	10	12
1960-1970 .....	41	17	24	20	9	11

SOURCE: United Nations, *The World Population Situation in 1970* (1971), table 3, p. 7.

birth rates showed a long-term descent—although with some fluctuations—in the more developed regions, those in the developing regions continued at a high level, with the result that the recent acceleration of population growth experienced in these countries is without precedent in the world's history.

20. While previously it had been possible to deduce only that fertility was high in the non-industrialized regions of the world, the improved estimates which have recently become available suggest surprisingly wide variations in fertility levels among the different geographical regions and subregions. Thus, fertility levels in these countries are now known to be more diverse than was formerly presumed. There is little indication as yet that fertility is falling in the most populous countries of the developing regions, although China—which lacks adequate data—may be an exception. Clear downward trends have appeared rather recently in certain other countries in the Chinese culture zone in Asia, as well as among small island populations in the Caribbean area and elsewhere. In the industrialized countries, the 1950s had seen some upturn of the birth rate, particularly in the areas of overseas European settlement. In the 1960s, however, birth rates receded in most of these areas, and the range of variation of birth rates in the industrialized countries became rather narrow.

21. Among the significant features of recent mortality trends has been a rise in death rates among middle-aged or older men in some highly industrialized countries. In these countries, where mortality had already reached low levels and infectious diseases had been brought completely under control, cardio-vascular diseases have become the most important cause of death. In some of the same countries, where infant mortality had also reached low levels, there has been a slackening in the rate of its further

decline. Meanwhile, striking declines in infant deaths have been recorded in certain developing countries, so that by the late 1960s, there was some overlapping of rates between developed and developing countries. This trend has brought into question the dependability of the infant mortality rate as an indicator of social and economic development. Most assessments of recent mortality decline in developing countries have attributed the causes mainly to advances in the control of disease and the development of health services rather than to improvements in economic conditions. Thus, it is generally concluded that the linkage between the level of economic development and the level of mortality has been weakened. This is not to deny, however, that important differences still exist in mortality conditions in different parts of the world. In fact, such differences exist even among the less developed regions and it is particularly in Africa that average life expectancy still lags disturbingly far behind the levels achieved elsewhere.

22. Next to the general acceleration of world population growth, probably the most significant demographic trend in recent years has been that of rapid urbanization. During the 1950s the urban population of the world was estimated to be growing at an average rate of 3.4 per cent per year and in developing regions it grew by about 4.7 per cent annually. While a large proportion of this growth could be attributed to the high rate of natural increase, migration from rural areas was also an important factor. In fact, in developing countries, as in most parts of the world, migration from rural to urban areas has become the predominant form of migratory movement. In developing countries much of this movement takes place because of unfavourable rural conditions and continues despite frequently high levels of unemployment in the cities.

23. Considerable changes have occurred in the volume and nature of international migration currents during the 1950s and 1960s. While the traditional streams of Europeans to overseas settlement areas have continued, the volume was considerably reduced from that of earlier peak periods. Meanwhile, however, important new currents have appeared, such as the movements from Southern Europe, North Africa and Turkey to Northern and Western Europe; from the British Commonwealth to the United Kingdom; and from Latin America to Northern America. Most of these movements have resulted from a geographic re-distribution of comparative economic opportunities. In a significant policy change, the major immigration countries of Northern America and Oceania have replaced ethnic criteria for immigrants with specifications as to desired skills—a shift which has had noticeable effects on international migrant flows. The phenomenon of the “brain drain”, whereby rich countries have been able to attract intellectual manpower from the less developed countries, has come into prominence as a problem to which solutions are still being sought.

#### 5. IMPROVED KNOWLEDGE OF INTERRELATIONSHIPS BETWEEN POPULATION AND ECONOMIC AND SOCIAL FACTORS

24. Recent literature has provided a better factual basis for understanding some of the important relationships between demographic, economic and social factors. Various studies have established that correlations exist between certain factors, though they often permit no conclusions concerning cause-effect relationships. The findings of some of these studies have suggested hypotheses—still to be tested—concerning the factors affecting demographic variables and the influence of population trends on economic and social conditions.

25. One such example is provided by studies which have examined the correlations between fertility levels in developing countries and indicators of their social and economic development. The findings of these studies have led to the development of the “threshold” hypothesis, which holds that improving economic and social conditions are not likely to have much impact in bringing down fertility in developing countries until a certain threshold level of development is achieved; but once such a level of development is attained, fertility is likely to decline spontaneously and decisively. Deviations from this pattern have been observed in certain circumstances, however, such as the cases where fertility has tended to be positively correlated with rises in the level of living. Recognizing the complex character of these relationships, various scholars have attempted to further elaborate upon or modify the threshold hypothesis.

26. Some of the new facts brought out by studies of fertility levels and trends in developing countries have led to a reappraisal of the theory of demographic transition, particularly with respect to its applicability in predicting the course of fertility change in developing countries. While this theory was based on events which occurred in the now industrialized countries, it is recognized that there was considerable variability in the demographic response to economic and social change in these coun-

tries and that it has not been possible to determine the precise relationship of particular economic and social changes to fertility decline. Observations of certain conditions and trends among the presently developing countries—such as periodic fluctuations in the birth rate, the existence of fertility differentials apparently unrelated to economic and social conditions and the failure of fertility to decline in some countries which have experienced considerable economic progress—suggests the complexity of the processes of change and the inadequacy of any simple model to explain them.

27. Various socio-economic theories have been advanced in recent years in attempts to provide explanations of family-size choices at the individual household level. Some of these have relied mainly on economic considerations, such as income, the marginal utility of children and costs of children including costs of opportunities foregone by parents, while others have given greater emphasis to factors of a more sociological nature, such as income relative to social status and individual preferences and tastes. Further interdisciplinary research in this area may reasonably be expected to lead to refinements of these theories and to a more generally accepted framework for socio-economic analysis of fertility.

28. While, as mentioned above, mortality levels in many developing countries have been sharply reduced by the application of health measures and modern medical techniques, a number of studies have suggested that further declines may depend more on economic and social development and that the less industrialized countries are not likely to achieve the very low levels of mortality prevailing in the most advanced countries without progress in raising general levels of living. In the more developed countries, studies continue to provide evidence of the influence of social class on mortality, but such differences appear to have narrowed drastically where general mortality has reached a low level.

29. A wealth of new literature has analysed different aspects of internal migration and population redistribution within metropolitan regions of different countries. Some of these studies have provided insight into the interrelationships between these demographic processes and industrialization and economic development. Empirical data confirm a general positive relationship between industrialization and urbanization, but the association is not a simple one. The findings suggest that the relation between urbanization and industrialization may be different at different levels of development and that countries with similar urbanization levels may differ with respect to their stage of industrialization. In particular, various studies have shown that recently in the less developed countries urbanization has outpaced industrialization, with the result that many of these countries are considered to be “over-urbanized” in relation to the industrial employment opportunities they are able to provide.

30. Improved knowledge of the relationship between population growth and economic growth has become especially urgent since the Governments of developing countries, which have accorded a high priority to economic advancement, are currently faced with more massive population growth than has been experienced at any

previous stage of history in any part of the world. Recent demographic literature clearly reflects this concern; in fact, there has been a decided decline in the number of studies considering the possible economic effects of a declining population—a preoccupation of industrialized countries in the 1930s—and an upsurge in those examining the probable effects of rapid population growth on the development efforts of agricultural countries. Analytical studies, models and projections have shown that the rapid population growth in developing countries may impose a heavy burden on society. A rapid increase in numbers implies an accelerated growth of virtually all needs and there is no reason to assume that the larger number will by itself increase the productive capacity sufficiently to compensate for the faster growth of population. Under the assumptions of most analytical studies and models, growth of income would be faster, the slower the growth of population. These findings, however, are not completely corroborated by the available empirical findings. Country data show no consistent association between the rate of growth of population and the rate of growth of total product during the 1950s and 1960s. The fact that many developing countries have achieved substantial growth of total product, and even gains in *per capita* product, indicates that rapid population growth does not preclude economic improvement. While the rate of population growth may not be one of the predominant factors determining the rate of economic growth, there appears to be a consensus that high population growth rates have held back advances in levels of living and have caused a widening of the income gap between developed and developing countries.

#### 6. NEW CONCERN WITH POPULATION POLICY

31. Among the most significant phenomena of the 1960s was the proliferation of national population policies that reflected the concern of Governments with the consequences of accelerating population growth.<sup>8</sup> In the 1930s when questions of population had also commanded much attention, it was the fear of declining population in the industrialized countries that provided cause for alarm.

32. In the early 1950s economic development for the world's less advanced agricultural countries became an accepted goal in the international community. The late 1950s saw a reconsideration of the role of social factors in human development, leading to an international consensus of opinion that social policies ought to be an integral part of national development policies. The second half of the 1960s introduced another dimension of the development process, namely the inclusion of population and population policies. Acceptance of this demographic component of development gained momentum and, by 1970, Governments of countries having more than half of the world's population had declared themselves in favour of policies aimed at influencing population growth. Government action in this field was accompanied by intensive study on the part of technicians of the means

<sup>8</sup> There are at present a few developing countries of sparse population where population increases are considered desirable to reduce overhead costs of certain infrastructure investments, if not also for other reasons.

of implementing official policies, and much attention was devoted, for example, to problems related to the organization, equipment and administration of large-scale family planning programmes.

33. While it is perhaps premature to speculate about the consequences of this new emphasis on population policies, it seems clear that there is a new awareness in the world of the important role of population factors in development, and that there has been a gradual change in opinion and in basic philosophy with respect to population questions. Appreciation of the significance of the population changes that are expected to occur during the next decades has stimulated scientists to promote relevant research needed to deal with the problems these demographic trends are likely to raise. While many of these problems call for an intensification of economic and social development programmes, it seems likely that the further development and refinement of population policy will become a feature of planning in both developed and developing countries during the coming decades.

#### 7. THE DEVELOPMENT OF DEMOGRAPHY AS A SCIENTIFIC DISCIPLINE AND ITS RELATION TO OTHER DISCIPLINES

34. In spite of the early scientific efforts of demographic pioneers, such as Graunt and Petty, and the early interest of economists in population matters, progress was not continuous. Like the other social sciences, demography has tended to develop, at least in part, in response to existing conditions or problems and thus progress was uneven. The emphasis given during the nineteenth century to mathematical, biological or other aspects of population trends hampered the formation of consistent and integrated theories in relation to which applied research could unfold. The largely statistical orientation of population studies in the beginning of the twentieth century was encouraging, though insufficient. Thus, many components of this scientific discipline remained to be established in order to make demography a partner of other sciences on an equal footing.

35. Several important steps in this direction occurred during the 1950s and 1960s. The propositions of the demographic transition were reconsidered, causes of rapid population growth were studied, and partial theories were offered to explain the variables affecting fertility, the process of urbanization and the like. New concepts and terminology were introduced into the study of population. Development of a standard terminology by the International Union for the Scientific Study of Population culminated in the publication of the *Multilingual Demographic Dictionary*,<sup>9</sup> thus reinforcing the international character of population studies. In the early 1950s there were only three specialized technical periodicals on demography, but by the late 1960s their number had grown considerably. National and international conferences, and particularly the 1954 and 1965 World Population Conferences, have stimulated the integration of international experience and international theoretical approaches into a more systematized body of knowledge. Gradually, demography became institutionalized as an academic

<sup>9</sup> United Nations, *Multilingual Demographic Dictionary* . . . (1958).



discipline in a number of universities and autonomous institutes. By the early 1970s there were a number of national demographic research institutes dedicated to impressive programmes of research in general or specialized areas of demography.

36. The teaching of demography at many universities was another factor which contributed to its development as a science. According to a UNESCO study,<sup>10</sup> in the early 1950s demography was taught in most parts of the world either as a part of demographic statistics, or as a subordinate field either within the departments of sociology or economics. Currently there are several countries in which demography has become a major subject of post-graduate courses leading to higher degrees.

37. Recognition of the interdisciplinary character of population phenomena and the growing interest in their study has led to new orientations in a number of scientific disciplines. The study of population within economics, neglected for a number of decades, has undergone a renaissance. In relation, particularly, to the problems of economic development of the third world and to development planning, population has become a prominent subject area within economics. A number of topics, such as population and development, manpower studies, the economics of fertility, and more comprehensive economic-demographic models, were developed in an attempt to better understand the interrelationships between population trends and economic growth.

38. Sociology, which in some countries had paid significant attention to demography, recently has been influenced by new tendencies in population studies. Family formation and fertility became a subject area of great interest, as did the interrelations between population change and social change in the broadest sense. Sociology has also contributed substantially in the fields of urbanization, migration and patterns of spatial population distribution. Social psychology, psychology and other behavioural sciences have discovered a new area of research in the complex and intricate set of questions connected with family planning, the reproductive behaviour of individuals and the social standards or cultural norms governing the behaviour of individuals.

39. Population geneticists were encouraged to pursue the study of human populations by a number of questions raised by biologists in demographic terms. In addition, reproductive physiology made a significant contribution to a better understanding of the reproduction of human populations. Applied research led to significant improvements in contraceptive technology and opened new perspectives towards more rational regulation of human fertility.

40. Even in some areas in which population had traditionally been regarded as a marginal subject, it has been receiving greater attention during the past two decades. Regional studies and city planning gave increasing emphasis to the study of the geographic distribution of population and of movements between rural and urban areas. Significant research has been initiated in such an

unexpected area as population and law in an attempt to examine the effect of legislation and legal institutions on population in general, and on the practice of birth control in particular. More recently, ecology and environmental science has focused on population questions with the aim of elucidating such basic issues as the effect of population growth on environmental factors, or in an attempt to promote policies necessary to prevent pollution.

41. With the growing importance of population in the social sciences in general, there has been a new trend in those disciplines which include an implicit humanistic orientation. Increasingly, questions have been raised of human rights and the status of women, particularly in connexion with the question of fertility regulation. Increased emphasis has also been given to those aspects of population trends which are international by their character and consequently affect the international political order. In a comprehensive reappraisal, which appears to challenge all the premises and guiding hypotheses relative to population growth, there are also new attempts to scrutinize the most fundamental relationships between population growth, economic development, social and environmental change and other factors ultimately affecting the well-being of nations and individuals. A number of hypotheses have been proposed, although there are still no comprehensive philosophical or ethical studies relative to this complex and delicate area.

## 8. GAPS IN KNOWLEDGE

42. The studies and research summarized in the present volume show the impressive growth of knowledge about human population and related social and economic problems in the past two decades. As a result of this expanding knowledge, nations have initiated new policies and programmes which are perhaps more enlightened than those of the past. Despite significant advances, however, the knowledge of population and its economic and social correlates is still deficient. On the occasion of the first World Population Conference in 1954, attention was called to the different dimensions of the gaps which still existed in the knowledge of demographic, economic and social interrelationships. These included the inadequacy of statistical data; the over-simplification or obsolescence of demographic theory; the limited ability to predict demographic consequences of particular economic and social changes, and even less ability to predict economic and social consequences of population change, or to trace a sequence of interrelated demographic, economic and social changes.<sup>11</sup>

43. These gaps, which existed in the 1950s, are only partly filled by the findings of recent research. Imagination and vision have not yet penetrated into the intricate web of individual and socio-cultural behaviour to determine the basic nature of their interactions with economic growth and social progress. The statistical data which are indispensable for analyses and conclusions are still inadequate for large areas of the world. It is not known to what extent generalizations based on empirically

<sup>10</sup> United Nations Educational, Scientific and Cultural Organization, *Demography ...* (1957).

<sup>11</sup> United Nations, "Economic and social implications ..." (1955), p. 176.



established facts in some areas of the world can serve as assumptions and hypotheses for far-reaching conclusions in other areas for which facts have not yet been established. The recent valuable contributions to demography and related sciences have given new insight into some crucial aspects of demographic, economic and social interplay, but have also led scholars to be aware of the still considerable shortcomings of knowledge.

44. These deficiencies in knowledge are found in all the major areas of demographic, economic and social relationships. While a systematic assessment of gaps in knowledge has not been possible in the present study, some examples may illustrate the nature of the problems that still remain. It has not been possible, for instance, to determine the relative influence of different economic and social factors which contributed to the long-term decline of fertility in the now industrialized countries. Nor have satisfactory explanations been found for the fact that fertility differences exist among the developing countries that do not appear to be related to the level of economic development. The conditions conducive to fertility decline in developing countries are not known with sufficient precision. For example, what kind and how much education is required to initiate important changes in attitudes towards family size and motivation with respect to reproductive behaviour? Through what processes does such change operate to influence individual motives in this sphere? Can couples be successfully motivated to adopt small-family patterns in the absence of a significant measure of other social change in the society? Another area requiring much further research is the development of methods for measuring the contribution of family planning programmes to fertility decline. The economic benefits of such programmes in relation to their costs is likewise an insufficiently explored subject at present.

45. While there are thus many serious gaps in knowledge still remaining with respect to the factors affecting fertility, this field has been much more intensively studied in recent years than other branches of demography, owing to its key role in determining future trends of population growth. In comparison with the recent attention given to fertility analyses, certain other aspects of population change have been relatively neglected. This applies in particular to the study of nuptiality, the processes of family and household formation, and to certain aspects of mortality. One of the main obstacles to improvement in the forecasting of probable future mortality trends is the poor quality of information on cause of death, even for the more developed countries. The relationship between infant mortality and fertility has not been very well established. Satisfactory methods for measuring health and morbidity have not yet been developed, and therefore no assessment is possible at present of the comparative general health status of different populations. With respect to mortality trends in developing countries, there are hypotheses, but no firm evidence, as to how far mortality decline might proceed through the application of modern technology alone in the absence of significant improvement in the level of living.

46. Migration statistics being among the most deficient of demographic data, no sound basis exists for determining the annual net balances of international migration

in many countries. While the majority of modern migrations have their roots in economic causes, there have been few attempts to assess the net effect of economic costs and benefits accruing to countries of immigration and emigration. Although the "brain drain" has been a much discussed phenomenon of the post-war period, its impact on the development efforts of those countries which have lost substantial numbers of their highly qualified personnel through migration has not yet been adequately appraised.

47. While the effect of demographic trends on economic development is a subject of much concern, the relationship is a complex one involving so many interdependent factors that it has not proved possible to isolate the demographic influences. Because of the key role of productivity in economic development, further research on the relationship of population size, its rate of growth and structure to the various determinants of productivity, assumes special importance. However, systematic study of the relationship of demographic trends to the many factors influencing productivity—for example, methods of production, specialization and economies of scale, skills of the labour force, advances in technology etc.—is not yet far advanced. Likewise, relatively few hypotheses and models have been established to explain the inter-relationships among population, education and economic development.

48. While there have been a number of attempts to study the effects of rising income and education on labour force participation, these relationships require further exploration. Whether the labour force is likely to expand or contract during periods of economic depression and what effect economic development is likely to have on the size of the female labour force are also far from clear. There are theories, but little empirical evidence, of the relationships of age of workers to the efficiency of the labour force. No satisfactory methods have yet been developed for measuring invisible underemployment arising from inadequate earnings or underutilization of a worker's skills.

49. These are but a few examples of the still remaining gaps in demographic knowledge. A comprehensive inventory of these gaps and lacunae remains to be drawn up and programmes of research developed with the aim of further reducing the areas of ignorance. Such programmes must take into account the present state of knowledge as well as the prospects for development of various disciplines concerned with population. For instance, aspects of population trends which might lead to international consensus regarding future national and international policies clearly deserve much attention. Another area worthy of high priority is the question of coordinating population policies considered desirable for the general welfare with individual aspirations and ideals with which the former may be in conflict. This is an interdisciplinary concern, involving also the active engagement of the political sciences.

50. The basic question of the interaction between science and government will, no doubt, affect the future of demography and related disciplines. A number of pertinent questions come to mind. Is the scientific community ready to make the necessary efforts to facilitate the development of appropriate policies by Governments?

Are the Governments ready to consider the advice of experts while evolving and developing their national policies? Have individual nations and the international community reached the stage of maturity which enables them to consider and decide upon the vital issues of the world *sine ira et studio*? The answers to these questions may determine whether the future progress which can be expected in view of the experience of the last two decades is accelerated or retarded.

## B. Organization of the study

51. The organization of the revised edition of *The Determinants and Consequences of Population Trends* differs substantially from that of the 1953 edition and reflects some of the major developments in the field of population described earlier in this chapter. At the beginning of the volume, chapters on the history of world population growth, population theory, fertility and mortality follow along the lines of the earlier edition. In a departure from the previous edition, international migration has been separated from internal migration; trends in the former, as well as their causes and consequences are discussed in chapter VII, while the latter is one of a number of major subjects discussed in chapter VI.

52. The revised edition contains new chapters dealing respectively with demographic aspects of modern economic growth, demographic considerations in planning and population policies—all subjects which have come into prominence in the past two decades. The crucial relationship between food supply and population is the subject of a separate chapter in this volume, whereas in the earlier edition it was included in a chapter on the relationship between population and resources in general. A separate chapter in the present study is also devoted to the findings of demographic studies on families and households, a previously neglected area of research. In recognition of the increasing importance of urbanization as a demographic phenomenon and the vast expansion of relevant literature, this subject, which received relatively little attention in the 1953 edition, is discussed extensively in chapter VI. Several different types of demographic—economic relationships which were discussed in different chapters in the first edition, have been brought together

in chapter XIII of the new edition; this chapter treats the subjects of demographic aspects of savings, investment, employment and productivity. While other important aspects of population change and their implications undoubtedly merited consideration for inclusion in the present study, there are inevitable limits to such a publication and certain subjects originally scheduled for coverage had to be omitted.

53. A summary such as that provided in the present study, covering a broad range of subject matter, cannot include mention of all relevant books and articles on each of the topics discussed. It has been the aim to include references to a selection of studies, which in so far as possible, would be representative of works carried out in all parts of the world and of differing points of view. Despite the special efforts which were made to ensure a fair representation of works in all languages (as detailed in the preface to this volume), it is acknowledged that this goal has not always been attained. The sources cited in each chapter reflect the range of material available to the United Nations Secretariat and to the individual authors who collaborated with the United Nations in the preparation of the texts. Undoubtedly many scientific works of merit have escaped attention. In cases where numerous studies dealt with the same subject, examples have been selected to illustrate the principal findings. In such cases the choice of examples is not to be construed as an expression of judgement as to the relative value of different works.

54. In the preparation of the present volume, some older material in the 1953 edition had to be eliminated in order to make room for more recent studies. Since the present volume was in preparation for a number of years, some chapters were completed much earlier than others. Hence, mention of works completed in very recent years occurs with greater frequency in those chapters which were last to be completed.

55. Throughout the study an effort is made to distinguish between conclusions that are generally accepted and based on well-established facts and those partly dependent upon authors' interpretations of facts, or containing a large element of opinion. Where the findings of different studies are in conflict, an attempt has been made to present the different points of view impartially.

## Chapter II

### HISTORY OF WORLD POPULATION GROWTH

1. In the scale of the hundreds of millions of years through which range speculations as to the beginnings of various expressions of life, man has but recently appeared. According to one representation, if these aeons were transposed to the relative time span of one year, the appearance of *Homo sapiens* would take place at approximately 2000 hours on the last day of the year, with the neolithic age beginning slightly less than five minutes before midnight.<sup>1</sup>

2. A continuous average increase of slightly less than 0.02 per cent per year would have produced the present population of the world from two dozen individuals a hundred thousand years ago. It is certain, however, that the secular trend of man's increase at no time proceeded at a constant rate, but was interrupted by periods of decline and at other times quickened its pace. It is in the modern period that the highest rates of growth have been sustained, with marked acceleration evidenced only in the twentieth century. It is likely that to the more than 3,000 million inhabitants of the earth in 1960, approximately 600 million, or roughly twice the number thought to have been in existence at the beginning of the Christian era, will be added in the succeeding decade. Although even at the present date the estimated numbers of inhabitants of large parts of the world are seriously questioned and for the remote past they are necessarily afflicted with greater uncertainty, the probable orders of magnitude shown in table II.1 give some indication of the dramatic multiplication of mankind.

3. Man's mastery of the often hostile physical elements of his surroundings permitted his existence as a species in the first instance, and his propagation in the second. His evolution has been a response primarily to the necessity to satisfy basic needs: food, shelter, clothing. As their acquisition increased his comfort and security and a surplus afforded opportunities for the cultivation of abilities and talents, aspirations were refined. An increasing ramification gradually appeared in the social structure, the element which promises today to become of surpassing import with the gain in control over the economic mechanism.

4. In the distant past, an improved food supply that alleviated malnutrition and lessened the incidence of famine is generally credited with having given an impetus to the first slow increment of the earth's inhabitants. Conversely, an expanding population could impel a community to improve methods for its sustenance.<sup>2</sup> The

TABLE II.1. CONJECTURES OF HISTORICAL POPULATION GROWTH

Date	Population (millions)	Average annual increase (per cent) since preceding date <sup>a</sup>	Approximate number of years required for population to double at given rate
B.C.			
7000-6000 .....	5-10		
A.D.			
1 .....	200-400	0.0	
1650 .....	470-545	0.0	
1750 .....	629-961	0.4	173
1800 .....	813-1,125	0.4	173
1850 .....	1,128-1,402	0.5	139
1900 .....	1,550-1,762	0.5	139
1950 .....	2,486	0.8	86
1960 .....	2,982	1.8	38
1965 .....	3,289	2.0	35

SOURCES: see paragraphs 11, 30 and 56, and table II.4 below; estimates for 1950, 1960 and 1965 from United Nations, *World Population Prospects as assessed in 1968* (to be issued as a United Nations publication) (1970).

<sup>a</sup> Rates for periods prior to 1960-1965 are calculated on the basis of population at mid point of range.

beginning of the trend of increasing numbers early in the modern period has been linked to the initiation of social and economic advance. While in modern times the severity of the challenges to population growth has moderated, the complexity of factors affecting demographic trends has increased. To answer the many questions concerning these trends, a greater interdisciplinary co-operation among scientists has been recommended.<sup>3</sup> In attempting to outline the historical pattern of world population movements, this chapter draws upon the limited statistical data that have been compiled, in many instances not designed for demographic purposes. Where these data were lacking or patently inadequate, the work of archaeologists, anthropologists, geographers, economists, historians and numerous scholars in related fields has been the basis of deductions and amplifications.

#### A. Palaeolithic to early historic period

5. Palaeontology and archaeology are the principal contributors to the study of earliest man, more significantly since the introduction of carbon-dating, the technique which in many instances is able to reinforce estimates

<sup>1</sup> Nougier, *Géographie humaine préhistorique* (1959), pp. 14-15.

<sup>2</sup> Boserup, *The Conditions of Agricultural Growth* (1965), p. 75.

<sup>3</sup> See Eversley, "Population, economy and society" (1965), pp. 23-26; Laslett, "Introduction: the numerical study of society" (1966), pp. 1-13.

of the chronology of prehistoric events where long lapses of time are in question. Another method of arriving at inferences about the nature of prehistoric life is by the investigation of primitive societies extant, such as is conducted by anthropologists. Dating of geologic strata and deductions as to geographic conditions are further aids to understanding influences on the development of early populations.

6. Climate has been said to have exerted a major fundamental influence on human development.<sup>4</sup> During the course of the millions of years required for the evolution of the primates, it appears that man emerged as the dominant species during the geologic period of the Pleistocene, which began about 600,000 years ago. The greatest of the four separate glaciations which characterized this period covered about one third of the earth's land surface with ice at its most extensive phase.

7. The first stone-age industry was the means of at once increasing primitive man's food supply. The prolongation of life which resulted was not the only factor in increasing the population. It has been postulated that important to man's development into a single species was the quicker multiplication of the more successful types and the probability that they absorbed rather than extinguished rival species.<sup>5</sup> Leakey sees a more significant effect of the lengthened life span as permitting favourable mutations in the species to be reproduced at an accelerated rate.<sup>6</sup>

8. Ancestors of modern man seem to have become distinct from other lines of hominoids at least some 12-14 million years ago.<sup>7</sup> Skeletal remains considered as belonging to the genus *homo* approximately one-half million years old have been discovered in Java, China and other parts of Asia, and in Europe.<sup>8</sup> The oldest of such remnants, found at Olduvai Gorge in Tanganyika in association with stone tools and dating from about 1 million years ago, give weight to theories that it was in Africa that near-man advanced to the status of man by fashioning tools to a set and regular pattern.<sup>9</sup> Man's essentially biologic evolution may have been virtually completed at least 100,000 years ago. Around 50,000 years ago, following the gradual extinction of various collateral lines, such as Neanderthal man, *Homo sapiens* became established as a single species.<sup>10</sup> His evolution thereafter proceeded along cultural paths.

9. In addition to fashioning tools, man early mastered the use of fire, which further extended the range of his diet and habitation, encouraged closer group life and later made metallurgy possible. Hearths uncovered by archaeologists give evidence that the hunting and gathering

economy did not necessarily demand perpetual migration. Governed by a first principle of settlement geography, primeval man would have located where water and natural shelter were provided and food could be found within a convenient radius, thus becoming part of a community, of "a biologic and social group, clustering about hearths at the point of least transport, holding a collecting territory for its exclusive use, and relocating itself as infrequently as necessary".<sup>11</sup> The long period of infantile helplessness and maturation encouraged a more sedentary way of life. Children in such an economy were more of a handicap than in an agricultural economy and there are indications that infanticide was widely practised.<sup>12</sup> There is no sign of promiscuous mating; for economic reasons, monogamy was apparently the rule.<sup>13</sup> Remnants of the oldest known dwellings, uncovered at Vestonice in Czechoslovakia, show they were constructed and inhabited in the course of the upper palaeolithic period.<sup>14</sup>

10. Nevertheless, migration in small bands long predominated over settlement as a population characteristic and, as adaptation to changing conditions permitted, palaeolithic man spread over Africa and Eurasia. It is believed that humans first appeared in America as immigrants, crossing over a presumed land bridge at the present Bering Strait in the neighbourhood of 20,000 years ago,<sup>15</sup> possibly during one of the periods when climatic conditions were less severe in northern latitudes than they are now.

11. Throughout the world, desert and recurring ice conditions isolated some groups for millennia. The density of these primitive hunting and gathering peoples varied widely according to different conditions. When Australia was first settled by Europeans in 1788, the aboriginal population is estimated to have been about 300,000 with densities of from 2.5 to 5 persons per square kilometre in the favourable coastal or river-valley areas and about 1 person per 80 to 100 square kilometres elsewhere.<sup>16</sup> When purchased by the United States, Alaska had an average population density of approximately 1 person per 65 square kilometres, while that of the Northwest Territories was about 1 person per 500 square kilometres. Conditions in those areas and the most severe in late glacial Eurasia may have been roughly analogous.<sup>17</sup> It is reasonable to assume greater densities in more southerly regions, particularly in Eurasia. In the presumably highly favourable conditions of the Egyptian region of the Nile, a population of 20,000 at the most

<sup>4</sup> Huntington, *Civilization and Climate* (1924), p. 3; George, *Introduction à l'étude géographique* ... (1951), pp. 37-53.

<sup>5</sup> Oliver and Fage, *A Short History of Africa* (1962), p. 18. The authors suggest that accentuation of less fundamental differences may account for various racial types.

<sup>6</sup> Leakey, *The Progress and Evolution* ... (1961), p. 6.

<sup>7</sup> Simons, "The early relatives of man" (1964), p. 50; also his "Some fallacies in the study ..." (1963), pp. 879-889.

<sup>8</sup> Hawkes, "Prehistory" (1965), pp. 34-62.

<sup>9</sup> Leakey, *The Progress and Evolution* ... (1961), p. 37.

<sup>10</sup> Washburn, "Tools and human evolution" (1960), pp. 63-75.

<sup>11</sup> Sauer, *Agricultural Origins* ... (1952), p. 12.

<sup>12</sup> Bates, "Human ecology" (1953), p. 707.

<sup>13</sup> Hawkes, "Prehistory" (1965), p. 128.

<sup>14</sup> *Ibid.*, p. 134.

<sup>15</sup> Müller-Beck, "Paleohunters in America ..." (1966), p. 1,207, places the occurrence of this event from about 26,000 to 28,000 years ago.

<sup>16</sup> Mulvaney, "The prehistory of the Australian aborigine" (1966), p. 84. The author reasoned that the lack of tusked animals and scarcity of fine-grained rock were limitations on the tool industry and therefore on securing the abundance of food that would support a growing population, p. 85. Kroeber, *Anthropology* ... (1948), p. 390, has suggested a density of twenty-five persons per hundred square kilometres for the hunting-gathering areas along the Pacific coast of North America from Alaska to California.

<sup>17</sup> Hawkes, "Prehistory" (1965), p. 120.

has been suggested for the end of the palaeolithic period.<sup>18</sup> That number in the cultivated area of the United Arab Republic around 1960 would amount to an average of approximately 1 person per 2 square kilometres. It has been estimated that about 50 million square kilometres of the earth were usable as the Pleistocene was ending, and that on an average at least 5 square kilometres per person were required to sustain the human population. This has suggested a maximum world population of 10 million,<sup>19</sup> with the possibility that it was as low as 5 million.

12. Analyses of fossil remains confirm that the life of prehistoric man was short and frequently ended in violent death. Those who lived in a harsh environment died younger; those in more favourable circumstances lived longer. Physical environment alone, however, did not cause early death; cultural factors also played a part, and the observation that "one of the main causes of death of early man was his being killed by his own fellow-man"<sup>20</sup> likely had relevance throughout prehistory. The possibility is entertained that duration of life may have lengthened slightly in the neolithic age,<sup>21</sup> when food was more plentiful, although in an agricultural society famine and epidemic more often than war caused sudden peaks in the death rate.

13. Few skeletons of infants have been found preserved from early periods, but it is believed that infant and child mortality was extremely high. The slight evidence available suggests that most adult deaths occurred between ages twenty to thirty years, with women dying at a younger age than men as a rule. Some studies have led to estimated crude death rates ranging from 50 to 80 per thousand in the palaeolithic period, and a life span for men about 20 per cent longer than that for women.<sup>22</sup> It appears that this sex-differential in mortality was general almost until the modern era.<sup>23</sup> Conclusions that survivors to adult ages rarely attained the age of fifty may find some support in findings at the excavated Anatolian neolithic village of Çatal Hüyük. Remnants of food, artifacts and build-

ings dating from the sixth millennium indicated a high degree of accomplishment, and the human skeletons were those of a healthy population; nevertheless the life-span of the inhabitants was short.<sup>24</sup> It has been tentatively suggested that even in the Iron Age in France, average expectation of life at birth was no more than ten to twelve years, which would have required crude birth rates to be over eighty per thousand if the population were to survive.<sup>25</sup> It seems that mere maintenance of the species in normal conditions would have required a minimum of three female births per woman attaining her reproductive period, given the following assumptions: a mean expectation of life of twenty years, infant mortality of about two thirds and, of the hypothetical total of six births, the survival to adult years of one female capable of bearing children. In actuality, the reproduction rate would have had to be well above this level to offset losses during periods of greater-than-usual hardship.

14. The level of mortality, governed in the past by the degree of hardship in living conditions and to a great extent in recent times by the improvement of conditions directly related to health, has been emphasized by some as the primary determinant of population increase or decrease.<sup>26</sup> The birth rate is given equal weight by others, who consider that even in early times indications of fertility control by means of abortion, sexual taboos and marriage customs signified a modification of attitudes favouring maximum child bearing.<sup>27</sup> The concept of fertility as a demographic variable, not a biologic constant, would therefore seem to have applicability throughout all times.<sup>28</sup> Fecundity may be viewed in a similar light, considering the effect of individual differences with respect to the number of years reproductive capacity is effective, its rate of diminution, and the instances of total infecundity.<sup>29</sup> It is generally concluded that there has been no change in the basic fecundity of the human species. However, the possibility of a greatly varied incidence of infanticide should be included in these considerations.

15. The evolution from a hunting and gathering economy has been accomplished in perhaps only the last 1 or 2 per cent of the duration of human existence by even the most advanced of today's societies. During a geologic period of extreme instability of climate and also of extreme simultaneous climatic contrast, modes of securing subsistence were spread by migration of peoples and cultural diffusion, and adapted to conditions in

<sup>18</sup> Oliver and Fage, *A Short History of Africa* (1962), p. 26.

<sup>19</sup> Bates, *Prevalence of People* (1955), p. 27.

<sup>20</sup> Weidenreich, "The duration of life of fossil man in China..." (1939), p. 43; cited in Bates, "Human ecology" (1953), p. 707.

<sup>21</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale...* (1968), p. 19. The authors refer to Dzierzkraj-Rogalski, "La durée de la vie humaine..." (1957).

<sup>22</sup> Acsádi, "Economic factors of the population growth..." (1965), pp. 2, 4, 5; Acsádi and Szabady, *Földünk lakossága* (1957), pp. 10-11, 41-43. See also Laughlin, "Eskimos and Aleuts..." (1963), pp. 633-645. The frailty of conclusions based on prehistoric skeletal remains is discussed by Henry, *Commentaire* [to Nougier, "Essai sur le peuplement..."] (1954), pp. 272-274.

<sup>23</sup> Goldstein, "Some vital statistics..." (1953), pp. 3-4, found that skeletons, dating from about A.D. 800 to 1700 of American Indians, whose culture was comparable to those of earlier stone-age peoples in other regions, indicated an average life span of thirty-one years for one group of 767 individuals and forty-three years for 587 from another locality. In so far as could be determined, males generally outlived females. A study by Jones, "The demography of the Australian aborigines" (1965), pp. 232-245, finds a reversal in this sex-differential for present-day Australian aborigines. Living under immeasurably more favourable conditions than their remote ancestors, they show an estimated expectation of life at birth of 50 for males and 50.7 for females.

<sup>24</sup> Mellaart, *Çatal Hüyük...* (1967), particularly p. 225.

<sup>25</sup> Nougier, "Essai sur le peuplement..." (1954), p. 267. It was noted that death rates may have been lower in the preceding neolithic era.

<sup>26</sup> Thompson, "The spiral of population" (1956), p. 975.

<sup>27</sup> Durand, "World population..." (1958), pp. 31-32.

<sup>28</sup> Taeuber, "Future population trends..." (1966), p. 192.

<sup>29</sup> Briefly stated, "fertility" refers to procreative performance, "fecundity" to procreative potential. This difference is discussed in detail in chapter IV. Bourgeois-Pichat includes a consideration of fecundity in his "Social and biological determinants..." (1967), pp. 160-163, and finds wide variations in fertility a characteristic of pre-modern societies.

widely separated locations.<sup>30</sup> While the earliest stone-age industry was probably of African origin, it appears that its subsequent development and the related cultural expansion, as interpreted from artifacts and drawings on cave walls, apparently received the greatest impetus in the Mediterranean region, and South and East Asia.<sup>31</sup>

16. The first great economic revolution—the development of agriculture and the domestication of animals—ushered in the neolithic age.<sup>32</sup> Present knowledge places its origin in the hills of South-West Asia about 10,000 years ago, following the final retreat of the glaciers and the cessation of the pluvial periods. There was a significant change in the physical environment at this period. Prairies south of the Mediterranean and in South-West Asia became more desiccated and were traversed by great rivers and interspersed with oases. The wind-swept interior plains became hard grass lands; great forests spread across much of Europe, northern Asia and North America. Although almost nothing is known of the beginnings of this “neolithic revolution”,<sup>33</sup> there is some conviction that it was preceded by changes not only in the natural conditions of the environment, but in the level of culture as well.<sup>34</sup> No evidence has yet been uncovered to support the hypothesis that there may also have been a separate point of origin in South-East Asia,<sup>35</sup> but the later innovation of agriculture in Middle America seems to have taken place independently.<sup>36</sup>

17. One of the earliest agricultural settlements yet uncovered, Jarmo in Iraq, dating from about 7000 B.C., appears to have had about 150 inhabitants. Estimated average population density for the settled portions of the area, about 10 per square kilometres, has remained roughly the same to the present day.<sup>37</sup> This more seden-

tary way of life and greatly augmented food supply at once encouraged increases in populations which had heretofore had only a precarious tenure on existence.<sup>38</sup> When densities grew beyond the carrying capacity of the site, the excess numbers formed new settlements flourishing first in the Fertile Crescent;<sup>39</sup> their probable size has been put at from 200 to 500 inhabitants.<sup>40</sup>

18. There was a further diffusion of agriculture and the industries it stimulated and supported into the Near East, Central Asia, Africa, and Europe along the sea coasts and deep into the continent by way of such river valley systems as the Dnieper, the Danube, and the Rhone. By about 1500 B.C. in Europe, only the northern forest of the Scandinavian peninsula and the Russian forest and *tundra* remained untouched by it. Its effect on human multiplication is suggested in a study based on archaeological evidence for the area comprising present-day France. A maximum of 50,000 inhabitants was estimated in the final stage of the palaeolithic period, followed by decline until the beginning of the neolithic age. By the fourth millennium, the first agriculturists and forest-dwellers possibly numbered one-half million; in the next thousand years, growth to five million is considered plausible.<sup>41</sup> Clusters of dwellings uncovered in the Danubian culture region suggest villages in the range of 200-600 inhabitants, settlements representing “a quite revolutionary growth . . . where only a few tiny bands of hunters had previously roamed”.<sup>42</sup>

19. Increasing complexity was expressed in political organization, new institutions, a stratified society.<sup>43</sup> Advances in agriculture and related technology produced food surpluses sufficient to maintain communities of those who did not grow their own food and therefore could specialize in other activities.<sup>44</sup> The social structure of the first small towns in the fertile alluvial plain of Mesopotamia lent itself to economic development,<sup>45</sup> which in this locale took the form of large-scale irrigation and flood-control systems that made possible vastly greater crop

<sup>30</sup> Sauer, “The agency of man . . .” (1956), pp. 51-54. Hulse succinctly summarizes the historic significance of migration in stating that men everywhere tend to spread their genes, their ideas and their artifacts, given the opportunity, and that none of these are transmitted by telepathy. Hulse, “Comment” [on Newman, “A trial formulation . . .”] (1958), p. 41.

<sup>31</sup> Leakey, *The Progress and Evolution . . .* (1961), p. 10.

<sup>32</sup> Cipolla, *The Economic History . . .* (1967), p. 18.

<sup>33</sup> Childe, *Man Makes Himself* (1965), uses this term in the sense that certain conditions, as the culmination of a gradual process, were analogous to those of the “Industrial Revolution” in Europe, i.e., in particular, a sudden increase in population (see chapter V).

<sup>34</sup> Braidwood, “The agricultural revolution” (1960), p. 134, giving weight to cultural development, states that there was not a significant change in climate in the area where farming appears to have originated. Sauer, “The agency of man . . .” (1956), p. 56, sees the origins of planting and domestication in a previous sedentary society, having a surplus and leisure. See also Vidal de la Blache, *Principes de géographie humaine* (1948), pp. 74-111; Brunhes, *La géographie humaine* (1956), pp. 300-310.

<sup>35</sup> This hypothesis is discussed in von Wissmann *et al.*, “On the role of nature . . .” (1956), pp. 285-286, with particular reference to the investigations of Smolla.

<sup>36</sup> MacNeish, “The origins of new world . . .” (1964), pp. 29-37, dates domesticated food c. 6700 B.C., domesticated animals c. 3400 B.C., as well as the first fixed settlements, in the valley of Tehuacán in Mexico where there is the longest known record of continuous occupation in the New World.

<sup>37</sup> Braidwood, “The agricultural revolution” (1960), pp. 136, 138-143. Other discoveries of this period are Jericho—see Kenyon, *Archaeology in the Holy Land* (1960)—and Çatal Hüyük in Anatolia—see Mellaart, *Çatal Hüyük . . .* (1967).

<sup>38</sup> Mumford, *The City in History . . .* (1961), p. 11, suggests “... the extra security . . . the relief from forced fasting, that long-proved diminisher of sexual appetite, may have given to sexuality . . . an early maturation . . . a potency it perhaps lacked in the anxious, often half-starved life of hunting and collecting peoples”.

<sup>39</sup> Childe, *New Light on the Most Ancient East* (1952), pp. 122, 232-233. The author dates this early growth about 4000 B.C.

<sup>40</sup> Adams, “The origin of cities” (1960), p. 154.

<sup>41</sup> Nougier, “Essai sur le peuplement . . .” (1954), p. 269.

<sup>42</sup> Childe, *The Prehistory of European Society* (1958), p. 50. The author states that the colonization of this vast central European territory was accomplished by reason of the fertility of the peasants and an economy principally dependent upon vegetable crops which quickly exhausted the soil. The villagers were then forced to move to a new site when all plots within walking distance were rendered infertile, pp. 49-53.

<sup>43</sup> Sjöberg traces the development of urbanism in the context of cultural analysis. See his “The origin and evolution of cities” (1965), pp. 25-39; also *The Pre-industrial City* (1960).

<sup>44</sup> This feature is generally accepted as the prime criterion for the differentiation of rural and urban sectors of society. See Davis, “The origin and growth of urbanization . . .” (1955), pp. 429-430.

<sup>45</sup> Childe, *New Light on the Most Ancient East* (1958), pp. 118-119. It is inferred from the prominence of the temple in very early sites that religious beliefs and ceremonies were under the control of full-time priests, who required the support of the farmers.

yields. It is widely held that the collective activity required in the regulation of water and soil resources enlarged the political, economic and cultural base and provided for an accelerating human multiplication at a high density level.<sup>46</sup> By about 4000 B.C., what has been termed the second great revolution in human culture, the "urban revolution", had begun, described as "... an expression more of changes in man's interaction with his fellows than ... with his environment".<sup>47</sup> It apparently began more or less simultaneously in two oases—the Lower Nile region and Lower Mesopotamia—marking the end of a passage of 3,000 or 4,000 years in which "the life of man had changed more radically than in all of the preceding 250,000 years".<sup>48</sup> Recent discoveries indicate that the Harappan civilization flourished concurrently with the Sumerian and the early Egyptian, and that it extended far beyond the Indus valley, even reaching the present border between Iran and Pakistan, the Himalayas to the north and along the west coast of India to the Gulf of Cambay north of modern Bombay.<sup>49</sup> Somewhat later, the Hwang Ho (Yellow River) Valley provided the early centre of expanding civilization in China, and in the first millennium, Mayan civilization emerged in Middle America.

20. Conjectures as to the size of early cities cover a wide range. Where archaeologists have been able to gauge the area of ancient sites and the type and proximity of dwellings, an assumed average density may indicate the number of inhabitants. Estimates of the labour required to erect the characteristic monumental structures, written records on clay tablets and extent of cemeteries are among the clues considered in dispelling some of the mystery. The city-states of Sumer were an outgrowth of the need to administer its system of irrigation agriculture, and those with a situation favourable to commerce and industry expanded accordingly. Recent excavations at Uruk suggest a population of 50,000 about 2500 B.C.<sup>50</sup> Remains of the great capital city of Ur suggest that the built-up area may have comprised a population of around

200,000 early in the second millennium,<sup>51</sup> while the uncovering of a provincial city of that time indicates it had about 9,000 inhabitants.<sup>52</sup> Thebes, as the capital of Egypt, could have had around 225,000 inhabitants about 1600 B.C.<sup>53</sup> However, for this initial period of urban development it has been judged that the number of cities did not increase significantly and that in general their size remained in the scale of 2,000 to 20,000 inhabitants until well into the first millennium.<sup>54</sup> One reason for this lack of growth may have been the static condition of technology until after iron first came to be used in the Near East, about 1300 B.C.<sup>55</sup>

21. In the ancient domains, technical and economic advance included the development of metallurgy, the introduction of writing systems, and the elaboration of handicraft, commerce and the division of labour. More complex political systems and new modes of construction were also introduced. The relation of city-centred civilizations and the more primitive farming societies remains obscure. Technical advances presumably were complementary in these societies, stimulating the growth of population both in the urban civilizations and in rather distant primitive communities.<sup>56</sup> Thus, a fairly continuous area of increasing population density extended across North Africa and Southern Europe, and Southern Asia and in isolated areas of Eastern Asia as well. There were, nevertheless, great regional differences, accentuated by frequent calamities, warfare and shifting centres of political control. These trends reached temporary culminations in the Seleucid and Sassanid Empires in Persia, Asoka's Empire in India, the Han Empire in China and in the Roman Empire in the Mediterranean basin, all within a few centuries before or after the beginning of the Christian era.

22. Where the frontiers of agricultural society were not marked by forest but by steppe or desert, the consolidation and expansion of farming communities gave rise to pastoral nomadic societies, notably in central and South-West Asia and North Africa. Recurrent invasion by such nomads and by forest dwellers constituted a persistent pressure on the early empires of antiquity, and strong frontier tensions of this kind remained a slowly diminishing check to the expansion of settlement, and probably of population growth, until recent history.<sup>57</sup>

<sup>46</sup> Wittfogel has estimated that in the 3,000-4,000 years prior to the growth and expansion of population associated with the Industrial Revolution, 60 to 70 per cent of the world's population lived under conditions shaped by hydraulic civilizations. See Thomas, ed., *Man's Role* ... (1956), p. 418. See also Adams, "The origin of cities" (1960), p. 157; Woolley, "The beginnings of civilization" (1965), pp. 415 ff.

<sup>47</sup> Adams, "The origin of cities" (1960), p. 153. Childe places this event in a unilinear historic development, *Man Makes Himself* (1965). Wittfogel, "The hydraulic civilizations" (1956), pp. 152-164, first classifies societies as based on rain, small-scale or large-scale irrigation agriculture, the latter associated with the first major Eastern civilizations. Adams, "The origin of cities" (1960), p. 157, suggests that border disputes between neighbouring communities dependent on irrigation agriculture drew people together in offensive or defensive concentrations. See also his *The Evolution of Urban Society* ... (1965). Mumford, *The City in History* ... (1961), pp. 29-39, presents the concept of an "urban implosion", a gathering in a limited area of many heretofore scattered and unorganized functions.

<sup>48</sup> Braidwood, "The agricultural revolution" (1960), p. 148.

<sup>49</sup> Dales, "The decline of the Harappans" (1966), pp. 92-100. See also Woolley, "The beginnings of civilization" (1965), pp. 395-397, 451-458.

<sup>50</sup> Adams, "The origin of cities" (1960), pp. 160, 166.

<sup>51</sup> Kramer, *The Sumerians, Their History, Culture and Character* (1963), pp. 88-89.

<sup>52</sup> Woolley, "The beginnings of civilization" (1965), p. 428. This author considers the possibility of a population of 360,000 for Ur about 1700 B.C. D'iakonov, *Obshchestvennyi i gosudarstvennyi stroi* ... (1959), estimates 100,000 inhabitants for ancient Lagash.

<sup>53</sup> Davis, "The origin and growth of urbanization ..." (1955), p. 431.

<sup>54</sup> Mumford, *The City in History* ... (1961), p. 62.

<sup>55</sup> Davis, "The origin and growth of urbanization ..." (1955), p. 431.

<sup>56</sup> A requirement of fifty to ninety farmers to support one man in a city has been suggested, *ibid.*, p. 432. According to Thompson, "The spiral of population" (1956), pp. 970-986, every change in man's techniques of production and in social organization affecting his ability ... to use his labour effectively, "favoured an increase in his numbers as long as he accepted a subsistence, or near-subsistence, level of living as his inevitable lot", pp. 970-971.

<sup>57</sup> Lattimore, *Studies in Frontier History* ... (1962), pp. 24-26, 141-154, 256-258, 484-488, 495-496, 503-506.



23. Thus, prehistoric and early historic developments resulted in the emergence of what could be viewed as four major types of economic regions in the world with their related demographic features:

(a) Associated city-centred, agrarian and commercial civilizations occupying the Mediterranean basin, extensive areas in Eastern Asia, and an independent zone of similar character in Middle America;

(b) Adjacent regions of village economy, extending into more isolated regions and including woodlands, of Northern Europe and Asia and to a lesser degree in the western hemisphere;

(c) Nomadic and semi-nomadic areas in inner Asia, bordering steppe lands and, to the south, the Sahara-Arabic belt;

(d) Hunting, gathering and fishing economies of tribal societies in Africa south of the Sahara, Oceania and most of North and South America.

### B. Population of the ancient world

24. Large parts of the world's population were subject to some forms of partial census enumeration near the beginning of the Christian era, but the information gleaned from such censuses is of limited value. For most regions, of course, this kind of information is lacking. Modern investigators must, therefore, rely on summary figures and estimates in ancient manuscripts; on inferences from archaeological evidence; on records of such things as grain imports, taxes, and military forces; or on some combination of such sources in the context of other historical information.

25. More plentiful sources of information and close studies made of them permit clearer discernment of trends for Europe and the Mediterranean region at this time. Indications are that by this period a decline in the free population of Greece was already established. In some of the Greek states after the age of Pericles this was probably due initially to war losses, epidemics, and migration to other regions. Later decline must be interpreted as resulting from the avoidance of marriage, avoidance of child-bearing within marriage, and exposure of infants.<sup>58</sup> A similar tendency, perhaps less extreme in degree, characterized later Roman society. The prevalence of slavery should also be noted as an inhibiting factor to population increase. Segregation of the sexes and high mortality prevented procreation among this appreciable class of society.

26. Roman censuses, taken for administrative purposes, were most frequently concerned only with citizens. Sometimes only adult males were included; in other

TABLE II.2. ESTIMATED AREA AND POPULATION OF THE ROMAN EMPIRE, A.D. 14

	Area (thousands of square kilometres)	Population (thousands)	Persons per square kilometre
<i>Total Empire</i> .....	3,340	54,000	16
<i>European part</i> .....	2,231	23,000	10
Italy.....	250	6,000	24
Sicily .....	26	600	23
Sardinia and Corsica ..	33	500	15
Narbonensis .....	100	1,500	15
Three Gauls .....	535	3,400	6.3
Danube .....	430	2,000	4.7
Greece .....	267	3,000	11
Spain .....	590	6,000	10
<i>Asiatic part</i> .....	665.5	19,500	30
Province of Asia .....	135	6,000	44
Rest of Asia Minor ...	413	7,000	17
Syria .....	109	6,000	55
Cyprus .....	9.5	500	52
<i>African part</i> .....	443	11,500	26
Egypt .....	28	5,000	179
Cyrenaica .....	15	500	33
Province of Africa ....	400	6,000	15

SOURCE: Beloch, *Die Bevölkerung der griechisch-...* (1886), p. 507.

circumstances, all household members except children.<sup>59</sup> In 1866, Beloch presented estimates of the area and population of the Empire which show a total of 54 million persons at the death of Augustus in A.D. 14, as given in table II.2. Estimates of later students range from 50 to 70 million, with upward revision of Beloch's estimate generally favoured.<sup>60</sup> More recently, the hypothesis of 100 to 110 million has been seriously considered.<sup>61</sup> Walek-Czernecki concluded that the population of Egypt must have been around 8 million in the Ptolemaic era and perhaps as high as 9 million in the first century A.D.<sup>62</sup> French historians have since concluded that Beloch's estimates for the area which is now France were too low.<sup>63</sup> Cavaignac, adjusting the records used by Beloch for an assumed omission of children, estimated 80 million persons in the Empire at the time of Augustus. He further estimated an increase to 150 million by A.D. 180.<sup>64</sup> Although Cavaignac's conclusions have not been generally accepted by other competent students, it is widely agreed that the total population of the Empire increased during the first two centuries after Augustus.<sup>65</sup>

<sup>59</sup> Landry, *Traité de démographie* (1949), pp. 14-32.

<sup>60</sup> Boak, *Manpower Shortage* ... (1955), p. 5; see also Russell, "Late ancient ..." (1958), p. 7.

<sup>61</sup> Pareti, *The Ancient World* ... (1965), p. 820.

<sup>62</sup> Walek-Czernecki, "La population de l'Egypte ancienne" (1938), p. 13.

<sup>63</sup> Landry, *Traité de démographie* (1949), p. 53. Nougier suggests 8.5 million for France in the second century A.D.; see his "Essai sur le peuplement ..." (1954), p. 262.

<sup>64</sup> Cavaignac, "Notes de démographie antique" (1935), pp. 8-9.

<sup>65</sup> Under Augustus, according to Nilsson, *Imperial Rome* (1962), p. 330, every noble Roman aged 25 to 60 was required by law to be married or betrothed; married men were given preference for state office, and the parents of three or more children received special distinction.

<sup>58</sup> Bérard, "Problèmes démographiques dans l'histoire ..." (1947); Landry, *Traité de démographie* (1949), pp. 44-47. The historian Polybius observed, "... the whole of Greece has been subject to a low birth-rate and a general decrease of the population" and attributed this condition to men's having "fallen into such a state of pretentiousness, avarice and indolence that they did not wish to marry, or, if they married, to rear the children born to them, or, at most as a rule, but one or two of them ...". Polybius, *Histories* (c. 140 B.C.; 1927 ed.) vol. 6, bk. 36, p. 385. Wolfe, however, doubted that this statement, even if true of the "urban bourgeoisie", was true of the behaviour of the "miserable country folk". See his "The economics of ..." (1932), p. 36.

27. There are references to censuses in Chinese histories for several centuries before the Christian era, but the totals given are subject to wide and inconclusive interpretation. The avoidance of enumeration was often politic, as where the consequences concerned taxation or military service. Statistics dating from A.D. 2 have been profitably analysed in spite of their many deficiencies, such as the exclusion of non-Chinese, nobles, slaves, and inmates of monasteries and the tendency to overlook women and girls. For this year, an estimate based on the number of households arrived at a population of 71 million for a China corresponding roughly to the present boundaries.<sup>66</sup> No allowance was made for omission of households or of the non-Chinese population, and a higher total is entirely plausible.

28. No extensive census enumerations appear to have been made in ancient India. For Asoka's Empire at the beginning of the third century B.C., figures of 200 to 400 million have been advanced.<sup>67</sup> It seems impossible to place much reliance on any specific estimate of total population in India at this early date, but it is known that large portions of the Indian subcontinent were already well developed.

29. For other parts of the world, no conjectures based on contemporary records seem possible. This deficiency is most serious in West and South-East Asia, where civilization was well advanced. In Northern Europe, sub-Saharan Africa, Northern Asia, Japan, the Americas and Oceania the evidence points to relatively sparse habitation in neolithic and bronze age conditions for some parts, but society in much of the regions was at the pre-agricultural stage.

30. On the basis of these estimates and considerations, it may be proposed that the world population was probably between 200 and 400 million at the beginning of the Christian era.

### C. Population trends: ancient to modern times

31. In the first millennium of the Christian era there was no sustained increase in the population of the old centres of civilization, but wide fluctuations, with occasionally very heavy losses. The population of the Roman Empire may have remained fairly constant until near the end of the fourth century, with divergent trends in different parts of the Empire. There was a slow increase of the dense population in the centres of ancient civilization (Asia Minor, Egypt and Syria) but likely a decrease in the western provinces racked by economic and political crises and barbarian invasion.<sup>68</sup> A repetition of tribal migrations and vast movements of nomadic populations again had a powerful impact on Eurasian demographic history.

32. The fifth century saw the collapse of the Western Roman Empire when it was completely overrun by Germanic tribes. It was in this century also that the Huns swept into Europe as far as France, a few centuries after their incursions into China and India. The Arabs began

their expansion in Asia, Africa and parts of Southern Europe with the rise of Islam in the seventh century, and in the thirteenth century, the pressures of the Mongol Empire, extending from China to Russia, were felt as far west as Poland and Hungary. There were also invasions into Europe by the Magyars in the ninth century and aggressive expansion by the Vikings. These continual shifts of population reflected widespread hardship and political instability. Among the numerous principalities of India, "... a king was normally at enmity with his immediate neighbours ...",<sup>69</sup> while for the peasant, the great enemy was drought. The introduction of Moslem rule by Turks brought not only religious strife, but added to the convulsions of rising and falling dynasties. The evidence of setbacks in China's growth have likewise been attributed in large measure to the disruption attendant upon dynastic successions.

33. Following the decline of Roman authority in the west, the destruction and depopulation caused by barbarian invasions were most intense in certain frontier regions, notably in Dacia (the lower Danubian region). In contrast, to a large extent barbarians were absorbed into the more firmly established populations of Italy, Spain, and Narbonese Gaul (part of southern France), without severe disruption of economic processes, according to one view.<sup>70</sup> Interpretations of economic history indicate to others, however, severe depression; communication and commercial channels were disrupted, the fields deserted and cities contracted.<sup>71</sup> These conditions were seen as arising not so much out of political disintegration, but rather from an aggravation of weaknesses inherent in the economic base of the former empire: lack of technical advance, relative low population density in the hinterlands of the small cities, and a consumer segment composed of the very wealthy living on the produce of their own estates and the very poor barely subsisting.<sup>72</sup> The institution of slavery, a deterrent to economic as well as population growth, persisted during the greater part of this millennium and even longer in the Mediterranean zone of Moslem expansion. Military captives augmented the slave population, and the slave traffic included the sale of children. Serfdom also contributed a restraining effect on demographic growth, with its limitations on the peasants' freedom to move, to marry and to control the disposition of their children.<sup>73</sup> To these adverse economic and social factors and the added devastation in the Mediterranean basin of the plagues of the sixth century were attributed the principal cause of the demographic decline.

34. After the turn of the millennium, an economic and demographic upsurge was in evidence in most of Europe. Between the eleventh and thirteenth centuries, numerous new communities emerged in Western and Eastern Europe. Signs of urban revival were already

<sup>69</sup> Moreland and Chatterjee, *A Short History of India* (1953), p. 119.

<sup>70</sup> Beloch, "Die Bevölkerung Europas ..." (1900), pp. 406-407.

<sup>71</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale* ... (1968), pp. 60-61.

<sup>72</sup> Lot, *The End of the Ancient World* (1953), pp. 72-75, 78-80.

<sup>73</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale* ... (1968), p. 66.

<sup>66</sup> Durand, "The population statistics ..." (1960), p. 221.

<sup>67</sup> Nath, *A Study in the Economic Condition* ... (1929), p. 118.

<sup>68</sup> Beloch "Die Bevölkerung im Altertum" (1899), pp. 510-513.

evident in Italy by the eighth century, and by the twelfth and thirteenth centuries the cities, particularly in the north, had begun to expand beyond their old Roman walls.

35. The population of Italy fluctuated within a narrow range, and by the thirteenth century was slightly above 8 million, according to one author,<sup>74</sup> indicating a recovery to near Imperial Roman levels. With continuing fluctuations and slow increase, it has been considered probable that a level of about 11 million was reached by 1560, where it likely remained until the beginning of the eighteenth century.<sup>75</sup> Conditions in Spain during the Middle Ages, such as frequent changes of territory, the invasion and settlement by the Moors, and almost continual warfare, make it difficult to come to a conclusion about the size of the population during that period. Ten million has been estimated at the end of the fifteenth century and, after a drastic decline, somewhat over ten million at the end of the eighteenth century.<sup>76</sup>

36. Farther north, fragmentary evidence suggests that recovery and growth were faster. Levasseur raised Beloch's estimate of 5.7 million for the population of Roman Gaul to about 8 million and assumed a similar figure for the time of Charlemagne.<sup>77</sup> An analysis of a hearth count in the year 1328 provides a benchmark for French demographic history from which one author concluded that the population in the territory corresponding to Roman Gaul was then considerably over 20 million.<sup>78</sup> This estimate has been found implausibly high by many French scholars, one reason being that the resulting population density of 40 per square kilometre could not have been supported by the French economy at that time.<sup>79</sup> Nevertheless, substantial growth since Roman days was certain. The population was thereafter greatly decreased by one third to one half because of famine, the Black Death and the Hundred Years War in the course of the fourteenth and fifteenth centuries. Gains in the sixteenth century were checked by the religious wars (1565-1580).

37. Archaeological evidence for the population in Britain of Roman times has led to estimates of between 0.5 million and 1.5 million inhabitants.<sup>80</sup> The great survey of 1860, recorded in the Domesday Book, is the first substantial basis for estimates. A total of about 1,100,000, approximately equivalent to the "medium" estimates for Roman times, is indicated.<sup>81</sup> Monastic records and other local evidence point to a threefold or

fourfold increase in the next 250 years. Subsidy Rolls of 1377 originating in the poll tax levied to finance participation in the Hundred Years War provide another benchmark and, after consideration of the evidence of plague mortality, a pre-plague estimate for 1348 of 3.7 million or more is obtained.<sup>82</sup> Life-table methods show a decrease of 40 per cent from 1348 to 1377, and another decline of approximately 25 per cent by the first decade of the fifteenth century which may have reduced the population to about 2,100,000. The evidence then shows a slow increase to about 3,200,000 in 1545.<sup>83</sup>

38. The most rapid increases of population in Europe during the mediaeval period took place north of the Alps and west of the Carpathians, where the enlargement of forest clearings and the extension of agriculture provided an economic basis for the support of additional people.<sup>84</sup> An increase has been assumed for Germany from 2 or 3 million in Caesar's time to some 12 million at the beginning of the fourteenth century.<sup>85</sup> The general expansion of the sixteenth century was notable in this region after set-backs from plague in the preceding century. Likewise, in the seventeenth century the general stagnation in much of Europe was pronounced in the German states, which suffered severe losses from the Thirty Years War (1618-1648), possibly as many as 40 per cent of the inhabitants.<sup>86</sup> For the present area of Czechoslovakia, an estimate of about 0.5 million inhabitants has been given for the fifth century. Around the middle of the seventeenth century, after drastic reductions resulting from the Thirty Years War and emigration, its population may have been close to 3 million. A population of 6.3 million has been estimated for 1787.<sup>87</sup>

39. The eastern branch of the Slavic nations in East-central Europe grew and extended their area of habitation into the Russian plain.<sup>88</sup> Uralis estimated the population of Russia, after the occupation of the forest zone by Slavs, as 8.6 million persons at about A.D. 1000.<sup>89</sup> Estimates based on the census by Peter the Great in 1724 indicate a population of about 18 million within his realm.<sup>90</sup> The steppe zone, south and east of this area, was still occupied by nomadic tribes.

40. The population of the Near East fluctuated around a fairly constant level during most of the mediaeval period, but there were sharp localized reverses resulting from the destruction or out-movement of population, notably in Mesopotamia, Persia, and Turkestan.<sup>91</sup> The great irrigation system east of Baghdad ceased to function by the end of the twelfth century and depopulation

<sup>74</sup> Russell, "Late ancient ..." (1958), p. 109.

<sup>75</sup> Landry, *Traité de démographie* (1949), p. 55.

<sup>76</sup> Vandellos, "La evolución demográfica ..." (1934), pp. 180-190.

<sup>77</sup> Levasseur, *La population française* (1889), pp. 100-101.

<sup>78</sup> Lot, "L'état des paroisses ..." (1929), pp. 296-304.

<sup>79</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale* ... (1968), pp. 89-92.

<sup>80</sup> Collingwood, "Town and country ..." (1926), p. 276; Usher, "A new estimate ..." (1930); Wheeler, "Mr. Collingwood and Mr. Randall ..." (1930); Collingwood, *An Autobiography* (1939), p. 135.

<sup>81</sup> As with most such early household counts, the choice of a multiplier is critical; assuming that there were five persons to a household, a figure of 1.35 million has also been derived.

<sup>82</sup> Russell, *British Medieval Population* (1948), p. 246.

<sup>83</sup> *Ibid.*, p. 235.

<sup>84</sup> Usher, "The history of population ..." (1930), pp. 130-132.

<sup>85</sup> Landry, *Traité de démographie* (1949), p. 55; in agreement with Beloch.

<sup>86</sup> Franz, *Der dreissigjährige Krieg* ... (1961), p. 47.

<sup>87</sup> Czechoslovakia, Vydala ústřední správa geodézie a kartografie, *Atlas obyvatelstva ČSSR* (1962), pp. 24-25.

<sup>88</sup> Kyuchevsky, *Kurs russkoy istorii* (1937), pp. 19-20.

<sup>89</sup> Uralis, *Rost naseleniya v Evrope* ... (1941), p. 89.

<sup>90</sup> Lorimer, *The Population of the Soviet Union* ... (1946), p. 10. See also Kabuzan, *Narodonaselenie Rossii* ... (1963).

<sup>91</sup> Usher, "The history of population ..." (1930), p. 118.

followed. In the fourth century, the eastern region of the Roman Empire is believed to have had a larger population than its counterpart in the west, increasing to about 30 million by the middle of the sixth century.<sup>92</sup> A factual basis for estimating the population of the Byzantine Empire is almost non-existent, but it seems indisputable that demographic decline accompanied the economic reverses, pestilence and wars of its last centuries. However, under early Ottoman rule there was at least vigorous urban growth; Istanbul is thought to have grown from 100,000 to 700,000 in the century between 1478 and 1580.<sup>93</sup> There is no adequate basis for assuming a distinct trend for the area as a whole, but for the end of the sixteenth century a total of 16 million has been proposed for the European and Asian parts.<sup>94</sup>

41. There has been agreement that India's population was probably about the same at the beginning of the modern period as it had been two thousand years earlier. After periods of some increase, calamities of one form or another wiped out a large part of the population, leaving the long-run trend more or less stationary<sup>95</sup> (see table II.3).

42. Advanced and likely populous civilizations were formed and destroyed in other parts of Asia, in Cambodia, for example, and in Ceylon, which has been described as a demographic prototype of South Asia. Architectural ruins and interpretation of the ancient writings suggest a sizable population supported by irrigation agriculture; a possible maximum between 7 million and 8 million has been hazarded from calculations of probable rice-paddy production in early times.<sup>96</sup> Apparently, high fertility offset high mortality and population and resources maintained a favourable balance over many centuries, with irrigation agriculture reaching its highest development in the twelfth century.<sup>97</sup> Thereafter, neglect of the irrigation works, possibly as a result of foreign invasion and internal strife, undermined the economic foundation of the civilization. Numbers were greatly reduced by malaria and other diseases, as well as by famine. No official basis for an estimate prior to 1789 is available, for which date a total of 1.8 million has been given.<sup>98</sup>

43. Only for China is there a more or less continuous record which shows fluctuations that Chinese tradition and modern scholarship alike have interpreted as related to dynastic growth and decay. According to Chen's interpretation, the beginning of a new dynasty was ordinarily followed by a period of peace and order, of cultural development and population growth. As time went on, the increasing density of population exceeded

TABLE II.3. ESTIMATED POPULATION IN SELECTED ASIAN COUNTRIES: ANCIENT TO EARLY MODERN PERIOD

<i>Dynasty and selected years</i>	<i>Year or period</i>	<i>Population (millions)</i>	<i>Year or period</i>	<i>Population (millions)</i>
		<i>China<sup>a</sup></i>		<i>India-Pakistan</i>
		A.D.	B.C.	
Western Han . . . . .	2	71	300 <sup>b</sup>	100-140
			A.D.	
			1600 <sup>c</sup>	110
Eastern Han . . . . .	88	43	1750 <sup>d</sup>	160-214
	156	62		
			<i>Japan<sup>e</sup></i>	
Sui . . . . .	606	54	A.D.	
T'ang . . . . .	705	37	859-922	3.8
	755	52	990-1080	4.4
			1185-1333	9.8
Sung . . . . .	1014	60	1573-1591	18.0
	1103	123	1750	26.0
Ming . . . . .	1393	61		
Ch'ing . . . . .	1751	207		

<sup>a</sup> Durand, "The population statistics . . ." (1960), p. 249. Ping-ti Ho estimates about 65 million for late fourteenth century, 130 million c. 1500 and 150 million c. 1600; Ho, *Studies on the Population* . . . (1959), p. 264.

<sup>b</sup> Nath, *A Study in the Economic Condition* . . . (1929), p. 117.

<sup>c</sup> Datta, "A re-examination of Moreland's estimate . . ." (1960), p. 182. Moreland, *India at the Death of Akbar* . . . (1920), pp. 9-22, arrived at an estimate of 100 million; Davis suggests 125 million, *The Population of India* . . . (1951), p. 24.

<sup>d</sup> Durand, "The modern expansion . . ." (1967), p. 138.

<sup>e</sup> Ishii, *Population Pressure* . . . (1937), pp. 3-7.

the development of improved farming techniques and gradually the struggle for existence was intensified. Then came a period of famine and pestilence with a consequent reduction in population.<sup>99</sup> Lattimore, in interpreting the sequence of population change, emphasized the importance of migratory invasions by nomads from inner Asia into Chinese agricultural societies at times of internal confusion.<sup>100</sup> A summary of estimates is given in table II.3. In broad outline, the course of Chinese population is seen as coinciding roughly with contractions and expansions assumed to have occurred in Europe, especially after the first millennium, with a tendency for Chinese populations to be some fifty per cent larger.

44. In Japan, agriculture seems to have been practised for more than two thousand years preceding the modern period, but neolithic conditions persisted in the north of the country until the end of the first millennium A.D. On the basis of records of land distribution, Japanese scholars have prepared the estimates given in table II.3, which show a substantial growth in the Middle Ages. By the end of the seventeenth century, population may have grown to 25 million.<sup>101</sup>

45. On the basis of urban data, the population of Egypt has been put as low as 2.7 million at the time of the Arab conquest,<sup>102</sup> and under Turkish rule some centuries later it again suffered a drastic decline.<sup>103</sup> An estimate

<sup>92</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale* . . . (1968), p. 78.

<sup>93</sup> Barkan, "Quelques observations . . ." (1955), p. 292.

<sup>94</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale* . . . (1968), p. 85.

<sup>95</sup> Nath, *A Study in the Economic Condition* . . . (1929), p. 117, "the population of the country as a whole did not vary greatly between the early Hindu period and the first advent of the Mohammedans, and it may be supposed to have lain roughly between the . . . limits [of] 100 to 140 million".

<sup>96</sup> Sarkar, *Demography of Ceylon* (1957), pp. 1, 6, 11, 18.

<sup>97</sup> Taeuber, "Ceylon as a demographic laboratory . . ." (1949), p. 296.

<sup>98</sup> Sarkar, *Demography of Ceylon* (1957), p. 22.

<sup>99</sup> Chen, "Population in modern China" (1946), p. 4.

<sup>100</sup> Lattimore, *Inner Asian* . . . (1940), pp. 279-334.

<sup>101</sup> Taeuber, *The Population of Japan* (1958), pp. 14, 20.

<sup>102</sup> Russell, "Late ancient . . ." (1958), p. 91.

<sup>103</sup> Beloch, "Die Bevölkerung im Altertum" (1899), p. 506.

of 2.5 million has been given for the end of the eighteenth century and only in the course of the nineteenth century did it attain levels comparable to those of the Ptolemaic Empire.<sup>104</sup>

46. For sub-Saharan Africa, demographic evidence is absent and even circumstantial historical information has been assembled only recently. The formation of the Sudanic states before the end of the first millennium and the emergence of extensive flows of trade constitute presumptive evidence of at least local increases.<sup>105</sup> Between the thirteenth and fifteenth centuries, signs of settlement and prosperity multiplied in East Africa, and to the west the Guinean states emerged. Exploration by Portuguese navigators in the first half of the fifteenth century opened about 4,000 miles of African coast, from the Senegal River to Angola, where trading centres for the overseas slave traffic were established. The first exports went to Europe in small numbers and then, after the discovery of the Americas, across the Atlantic in increasing volume.<sup>106</sup> The slave trade did not reach significant proportions until the seventeenth century, when of the untold numbers captured, almost three million Africans are thought to have survived the rigours of captivity and transport to be landed in the Americas. This traffic in itself need not have resulted in depopulation in West Africa, but with the added effects of social and political disorganization, especially in later periods, such may have been the consequence. Losses in more sparsely populated East Africa would seem to have been disastrous.<sup>107</sup> In the longer run, however, it is believed that large migrations into Eastern and Southern Africa ultimately produced substantial settlement there. The overseas shipment of human cargo lasted for more than four centuries (1442-1880), for "... local African custom, the profits of the trader, the needs of the planter, and the barrenness of Negro women under slave conditions, all combined to impose the need for continued importation of Negroes to supply a labour market always being depleted".<sup>108</sup> Although no pretension to accuracy can ever be made, a conjecture of the number captured has been as high as 20 million. It has been further estimated that perhaps only one third of those captured survived to be placed on sale in the New World.<sup>109</sup>

<sup>104</sup> Issawi, "Population and wealth ..." (1956), pp. 690-691.

<sup>105</sup> Ibn Battuta, visiting the Mali Empire in the fourteenth century, noted its agricultural and commercial prosperity, and the ease and safety of travel. See Oliver and Fage, *A Short History of Africa* (1962), p. 89.

<sup>106</sup> Tannenbaum, *Slave and Citizen* ... (1947), pp. 14-16. The European slavers' activities were confined to the ports; their supply from the interior was totally controlled by the Blacks for three centuries. Slavery in Africa was part of the cultural scene, but its conditions were not to be compared to the harshness of those which existed in the Americas; see Elkins, *Slavery* ... (1963), pp. 95, 96.

<sup>107</sup> Oliver and Fage, *A Short History of Africa* (1962), pp. 120-122.

<sup>108</sup> Tannenbaum, *Slave and Citizen* ... (1947), pp. 14, 36. On the average, an African slave was expected to survive about eight years on a Brazilian plantation; Furtado, *The Economic Growth of Brazil* ... (1963), p. 46.

<sup>109</sup> Tannenbaum, *Slave and Citizen* ... (1947), p. 29. The author briefly refers to early records of numbers of African slaves in Europe and the Americas at different dates, and the extent and implications of this traffic as a commercial venture; see pp. 5-20, 30-38.

47. In the Americas, European conquest led to native depopulation, particularly drastic in what is now Latin America. The indigenous population had remained sparse in most of North America, but in Middle and South America and in Mexico the practice of sedentary maize agriculture and the urban, metal-using cultures of the Aztecs, the Incas and the Chibcha had favoured population growth for some centuries and supported sizable agglomerations. The population of the Caribbean, numbering hundreds of thousands in the pre-Hispanic period, disappeared within a few decades following the Spanish conquest. For central Mexico, comprising about 25 per cent of the present-day area of the country, a decline from around 25 million in 1519 to slightly over 1 million near the end of the century has been suggested, with a recovery to about 3.7 million by 1793.<sup>110</sup> Rosenblat arrives at approximately 3 million for this date, and in general takes issue with the methods of Borah and Cook in obtaining estimates.<sup>111</sup> In South America, especially in the Andean regions, infectious diseases of European origin are believed to have spread even in advance of the Conquest and within a short time after that event to have reduced a population of many millions to a much smaller size. Willcox's estimate of 12 million for Latin America in 1650 (with which Carr-Saunders agreed, but which Willcox later revised to 7 million) may represent a mere fraction of a previously much larger population.<sup>112</sup> The figure of one million for North America at that date is generally accepted.

48. In summary, it appears that following the stagnation of the Dark Ages, there were beginnings of expansion of population in the period A.D. 1000-1650. Growth in Europe shifted from the Mediterranean area of antiquity to the north-west and notably to the central and eastern regions of active colonization. Growth was probably substantial in China, greater in the south than in the north as heretofore, and in Japan. India seems to have remained unchanged, as did Africa where it is believed that there were gains in the east and south balanced by losses in the west. Western Asia experienced decline, and a burgeoning indigenous American population was cut back drastically by disease and despair following European conquest.

<sup>110</sup> Borah and Cook, *The Aboriginal Population* ... (1963), pp. 4, 88; tribute records were studied as the source of these estimates. The figure of 25.2 million is based upon a family size of 4.5. A possible family-size factor of 3.5 would give a total population of 20 million; one of 5.0, 28 million. From various interpretations of other aspects of the material, the range would be 18.8 million to 26.3 million. The authors calculated the population to be about 6.3 million in 1548. See also their *The Population of Central Mexico in 1548* ... (1960) and Cook and Simpson, *The Population of Central Mexico* ... (1948), p. 38.

<sup>111</sup> Rosenblat, *La población de América en 1492* ... (1967), p. 26.

<sup>112</sup> Willcox, "Increase in the population ..." (1931), p. 62; and his *Studies in American Demography* (1940), pp. 37-38. Carr-Saunders, *World Population* ... (1936), p. 30. The population of pre-conquest Latin America remains a subject of much controversy. Rosenblat proposes about 12.5 million for 1492: *La población indígena* ... (1954), vol. 1, p. 102. Chaunu, "La population de l'Amérique indienne ..." (1964), p. 117, on the basis of estimates for central Mexico in Borah and Cook, *The Aboriginal Population* ... (1963), would at least double the figure of 40 million which was rejected by Rivet as too high; see Rivet, *Les origines de l'homme américain* (1957).

49. Such declines in mortality as occurred were not sustained for a significant length of time; increased density brought about by more prosperous conditions carried with it greater vulnerability to epidemic disease. The most severe scourges were the Plague of Justinian and the Black Death. The first apparently spread from a source in the hinterland of South-West Asia throughout the world, from A.D. 542 to the end of the century. Estimates have been given that half the Byzantine Empire was destroyed by A.D. 565, and that the total cost to the world was 100 million persons. The Black Death reached Europe in 1346, probably from Central Asia, and has been described as the most frightful pandemic ever to afflict mankind.<sup>113</sup> Even before the appearance of this scourge, however, an upsurge in European population growth had slowed.<sup>114</sup>

50. During these centuries, periods of famine, pestilence and war alternated with recovery in most areas, with consequent slow net population increase for some. In the century following the Plague, recovery seems to have been most rapid in Italy,<sup>115</sup> but for many regions there is evidence of great contraction, abandonment of homesteads and villages and of labour shortage.<sup>116</sup> There was resumption of demographic growth by A.D. 1500 and, in general, the sixteenth century was one of expansion, notably in the German frontier regions. Although fertility was generally high, it cannot be assumed that it was at a maximal "natural" level. As discussed in chapter IV, the postponement of marriage reduced fertility considerably below its highest potential in Europe; in all parts of the world sexual taboos, extended periods of lactation and abortion are assumed in different measure to have restrained reproduction, and resort to infanticide and abandonment of infants was a further deterrent to population growth.

51. The relationship between population growth and economic development was complex. Population increases seem to have induced migration and conquest but colonization also provided the opportunity to multiply, and the sustained movements in population seem to have been responses to conditions that favoured peaceful extension of cultivation and commerce. The uniformities sometimes observed in the movements of population in different regions raise the question whether climatic change, affecting harvests, and autonomous variations in the intensity of epidemic diseases were factors which decisively affected demographic growth.<sup>117</sup>

52. The estimates of world population at the middle of the seventeenth century, referred to in section E below, remain indications of the order of probable magnitude rather than measurements. They cannot be used to test propositions about the dynamics of population growth, but the impression that world population in 1650 had

not yet doubled its size in the early years of the Christian era is compatible with the view that the rate of expansion was lower in this period than in the preceding several thousand years.

#### D. Population growth in the modern period

53. Early in the modern period in Europe, the nation-state as a political entity had evolved, with an administrative machinery adaptable to a vast expansion of commerce and the exploitation of overseas settlement. The new mercantilist policy included in its body of theory expressions by some writers on the benefits of a numerous population (see chapter III, section B). Recognition of the utility of statistical data for many activities of government fostered speculation as to the number of a country's inhabitants. Prompted by the vagaries of current speculation, John Graunt attempted a more careful estimate of the population of England and Wales, published in 1662.<sup>118</sup> Various suppositions concerning size of populations were examined by Riccioli, who produced in 1661 what was perhaps the first considered attempt to estimate the population of the world.<sup>119</sup> Later, partial enumerations and estimates for limited areas were undertaken, and even a few counts of whole populations attempted. An instance of the latter was the series of house-to-house counts of all inhabitants in the colony of New France, that taken in 1665 probably being the first total census ever accomplished. The first total national population census in continental Europe was completed in Sweden in 1749, but it was not until 1801 that France and England overcame resistance to a similar undertaking. The newly established United States of America included a provision in its Constitution for decennial censuses and promptly conducted the first in 1790.<sup>120</sup>

54. Such early endeavours and subsequent progress in more precise population accounting, including registration of vital statistics, were principally confined to areas of European settlement. In China, systems of registration designed to serve various purposes over the centuries have been subject to a number of interpretations as sources of population totals.<sup>121</sup> Early Japanese counts were not preserved and the practice was gradually abandoned. A resumption of national census-taking in the eighteenth century was not representative of the total

<sup>113</sup> See Hirst, *The Conquest of Plague* ... (1953), pp. 10-16.

<sup>114</sup> Helleiner, "Europas Bevölkerung und Wirtschaft ..." (1954), pp. 254-269.

<sup>115</sup> Cipolla *et al.*, "Rapport collectif" (1950), pp. 69-71.

<sup>116</sup> Abel, *Die Wüstungen des* ... (1955).

<sup>117</sup> See, for example, Utterström, "Climatic fluctuations and population ..." (1955); see also Le Roy Ladurie, "Climat et récoltes ..." (1960), pp. 458-465, and his "Histoire et climat" (1959).

<sup>118</sup> The work of Graunt and his followers, who introduced quantitative research methods, named "political arithmetic", in estimating population numbers, is discussed in chapter III, section B.

<sup>119</sup> See Willcox, "Increase in the population ..." (1931), vol. 2, pp. 44-49, for a brief evaluation of this and other contemporary estimates for the world.

<sup>120</sup> For a brief account of early censuses, see Wolfe, "Population censuses before 1790" (1932).

<sup>121</sup> An examination of official population records beginning 1368 is discussed in Ho, *Studies on the Population* ... (1959), pp. 3-100. Perhaps the most comprehensive record, the *Pao-chia* of the Ch'ing dynasty (1644-1912), is described in detail by Hsiao, "Rural control in nineteenth century China" (1953).

TABLE II.4. VARIOUS ESTIMATES OF POPULATION OF THE WORLD AND MAJOR REGIONS, 1750-1965

Regions and sources of data	Estimated population (millions)					
	1750	1800	1850	1900	1950	1965
<i>World</i> .....					2,486	3,289
Carr-Saunders .....	728	906	1,171	1,608		
Willcox .....	694	919	1,091	1,571		
Durand—variants:						
Medium .....	791	978	1,262	1,650		
(Low-high) .....	(629-961)	(813-1,125)	(1,128-1,402)	(1,550-1,762)		
<i>Africa</i> .....					217	303
Carr-Saunders .....	95	90	95	120		
Willcox .....	100	100	100	141		
Durand—variants:						
Medium .....	106	107	111	133		
(Low-high) .....	(60-153)	(69-142)	(81-145)	(115-154)		
<i>Asia (excluding Asiatic USSR)<sup>a</sup></i> .....					1,355	1,833
Carr-Saunders .....	475	597	741	915		
Willcox .....	437	595	656	857		
Durand—variants:						
Medium .....	498	630	801	925		
(Low-high) .....	(408-595)	(524-721)	(711-893)	(853-1,006)		
<i>Latin America<sup>b</sup></i> .....					162	246
Carr-Saunders .....	11	19	33	63		
Willcox .....	10	23	33	63		
Durand—variants:						
Medium .....	16	24	38	74		
(Low-high) .....	(12-20)	(20-29)	(34-42)	(71-78)		
<i>Northern America<sup>c</sup></i> .....					166	214
Carr-Saunders .....	1	6	26	81		
Willcox .....	1	6	26	81		
Durand—variants:						
Medium .....	2	7	26	82		
(Low-high) .....	(2-3)	(6-7)	(26)	(82)		
<i>Europe (including USSR)<sup>a</sup></i> .....					572	675
Carr-Saunders .....	144	192	274	423	—	—
Willcox .....	144	193	274	423	—	—
Durand—variants:						
Medium .....	167	208	284	430		
(Low-high) .....	(146-187)	(193-223)	(274-293) <sup>d</sup>	(423-436) <sup>d</sup>		
<i>(USSR)</i> .....					(180)	(231)
Carr-Saunders .....	(...)	(...)	(...)	(...)		
Willcox .....	(...)	(...)	(...)	(...)		
Durand—variants:						
Medium .....	(42)	(56)	(76)	(134)		
(Low-high) .....	(31-52)	(46-66)	(66-85)	(127-140)		
<i>Oceania</i> .....					13	18
Carr-Saunders .....	2	2	2	6		
Willcox .....	2	2	2	6		
Durand .....	2	2	2	6		

SOURCES: Carr-Saunders, *World Population* ... (1936), p. 42. Willcox, *Studies in American Demography* (1940), p. 45; estimates for America have been divided between northern America and Latin America by means of detailed figures presented on pp. 37-44. Durand, "The modern expansion ..." (1967), p. 137. Estimates for 1950 and 1965 from United Nations, *World Population Prospects as assessed in 1968* ...

Note: Because of rounding, the sum of the parts does not exactly equal the total shown in all cases.

<sup>a</sup> Estimates for Asia and Europe in Carr-Saunders' and Willcox's series have been adjusted to include the population of the Asiatic USSR with that of Europe rather than Asia. For this purpose, the following approximate estimates of the population of the Asiatic USSR were used: 1750, 4 million; 1800, 5 million; 1850, 8 million; 1900, 22 million. Durand's estimates for USSR only are shown.

<sup>b</sup> Latin America is distinguished from northern America at the southern border of the United States and comprises Middle America, South America and the Caribbean Islands.

<sup>c</sup> United States, Canada, St. Pierre and Miquelon.

<sup>d</sup> Range exists in USSR component only, shown separately below.



population, but in 1872 effective registration was instituted by the Meiji régime. Reliable censuses date from 1920.<sup>122</sup>

55. To the present time there are large regions of the world where development of demographic statistics has scarcely begun. Demographic historians are uncovering and interpreting an increasing amount of information that gives new insights into population movements throughout the modern period. Nevertheless there remain large gaps that can never be filled, but only bridged by improved conjectures. The estimates prepared by Willcox and by Carr-Saunders for the world and its major regions for the period 1650 to 1900 have received wide acceptance from the time of their first publication in the 1930s,<sup>123</sup> but a reassessment of growth trends has now become profitable. Results of the most recently published study to date<sup>124</sup> are presented with the Willcox and Carr-Saunders estimates in table II.4 for fifty-year intervals from 1750 to 1900.

56. Working back to 1650, Willcox arrived at 470 million and Carr-Saunders 545 million for the total population of the world, and deductions of both authors for the century following imply a net growth rate of three per thousand.

57. A quickening of this modest rate was apparent for the period 1750-1900. Medium estimates for the latest series given in table II.4 furnish a convenient reference point as centres of ranges of low and high variants "... not intended to define absolute limits, but to indicate the width of estimated ranges of relative plausibility without excluding the possibility that the true numbers might have been outside these ranges".<sup>125</sup> It may be observed that estimates in the two earlier series fall within the ranges outlined in the later series in nearly all cases, and when outside it is to a negligible degree. These recent estimates show upward revisions for all regions except Africa in 1900 and Oceania.

58. The magnitude of Asia's population, roughly about two thirds of the world total until 1850, after which it was closer to half, make the disparity in estimates for that region more significant. The principal reason for the variations in Asia is the different evaluations of the conflicting evidence with respect to the population of China. Totals for this country, as a component of the medium estimates for Asia given in table II.4, comprised approximately one quarter of the world total in 1750 and 1900 and one third in 1800 and 1850.<sup>126</sup> Willcox, after examining various Chinese sources and making certain allowances, reached totals for 1650 and 1900

between which he interpolated his series, assuming a constant rate of growth during 1650-1850.<sup>127</sup> Carr-Saunders accepted higher estimates for 1650 and 1900 and then pursued the same method.<sup>128</sup> Durand's estimates for China's population prior to 1900 were based on official sources rejected by both Willcox and Carr-Saunders, while for 1900 he had the 1953 census total on which to base a backward projection at an assumed rate of growth.<sup>129</sup>

59. For Africa, Carr-Saunders made an allowance in his 1850 and earlier estimates for the presumed depopulating effect of the slave trade, while Willcox apparently considered the continental total too uncertain to warrant any change in the estimates until 1900, when he accepted a figure which represented substantial growth. For Africa south of the Sahara, where a foundation for calculations is almost totally lacking, Durand's hypothesis concurred in this pattern of growth, but at a lower level. Wider acquaintance with North Africa recommended its separate treatment; totals for 1750-1900 were obtained by backward extrapolation from a United Nations estimate for 1920.<sup>130</sup>

60. The population enumerations and registration of births and deaths carried out in many parts of Latin America from the colonial period onward had many deficiencies, and recent studies as well as improved population statistics have indicated that too great dependence on these records have produced estimates believed to be considerably understated.<sup>131</sup> Thus, the low variant of the most recent series given in table II.4 somewhat exceeds the estimates of the two earlier series.

61. The closer accord of population estimates for the remaining areas of European settlement is a reflection of the progressive reliability of their statistical data during the period here considered. Carr-Saunders accepted the results of Willcox's thorough examination of the work of scholars concerned with the number of inhabitants of modern Europe.<sup>132</sup> Subsequent advances in this field of investigation have led to estimates which consistently equate the earlier estimates with the low variant shown in table II.4. Upward revision was deemed appropriate for the USSR, as well. When Europe excluding the USSR is considered, the range of plausible estimates narrows appreciably in 1800 and is non-existent thereafter.

62. Emigration from Europe to the New World, beginning modestly in the sixteenth century and swelling

<sup>122</sup> An Imperial decree in A.D. 645, ordering that a census be taken every six years, was followed for about 150 years. Censuses taken in the Tokugawa period excluded large segments of the population and required substantial adjustment for later students to reach approximations of the country's total. Ishii, *Population Pressure* ... (1937), pp. 2, 5-8, 48-56.

<sup>123</sup> Willcox, *Studies in American Demography* (1940), pp. 22-51; these are revisions of previous estimates, published in his "Increase in the population ..." (1931), pp. 33-82; Carr-Saunders, *World Population* ... (1936), p. 42 (for 1650-1933).

<sup>124</sup> Durand, "The modern expansion ..." (1967), pp. 137-138.

<sup>125</sup> *Ibid.*, p. 136.

<sup>126</sup> Medium estimates for China at fifty-year intervals 1750-1950 are (in millions): 200, 323, 430, 436 and 560, *ibid.*, p. 137.

<sup>127</sup> Willcox, *Studies in American Demography* (1940), pp. 35, 48, 532; a thorough discussion of the author's approach to estimating the population of China is given in appendix II, pp. 511-540. It is now apparent that the total for 1650 was based on a misapprehension of the source of the data. Willcox believed it to relate to a count of households when in fact it was concerned with a customary tax assessment which had grown out of an imposition of compulsory labour service on most adult males at an earlier period. See Ho, *Studies on the Population* ... (1959), pp. 24-35.

<sup>128</sup> Carr-Saunders, *World Population* ... (1936), pp. 40-41.

<sup>129</sup> Durand, "The modern expansion ..." (1967), pp. 147-148.

<sup>130</sup> *Ibid.*, pp. 152-153.

<sup>131</sup> *Ibid.*, p. 156. The author cites, in particular, Castro, "El desarrollo de la población ..." (1959), pp. 425-443.

<sup>132</sup> Willcox, *Studies in American Demography* (1940), pp. 22-51, includes comprehensive references to sources.



to large proportions at the beginning of the twentieth century, profoundly altered the map of world population distribution. In spite of the magnitude of the exodus, however, Europe excluding the USSR steadily maintained around 16 per cent of the world's total population as estimated at fifty-year intervals from 1750 to 1950. The principal areas in which the European emigrants settled, the Americas, the Asian part of the Russian Empire and Oceania, experienced rapid growth of population, due to the high rates of natural increase among the migrants and their descendants as well as to the immigration itself. The proportion of the world's total population in areas of European settlement increased from about 24 per cent in 1750 to 28 per cent one hundred years later and to 36 per cent in 1900 and 1950.

63. The movement of Europeans to Africa and Asia has been small relative to the total population, and has been nearly balanced by the migrations of Africans and Asians to the European cultural sphere. The importation of African slaves, it should be noted, added considerably to the population of the Americas until 1850.

64. Incidental to the transfer of populations was the cultural diffusion which modified customary patterns of living. In modern times, improved communications permit on an expanding scale the spread of some factors affecting population trends which was formerly accomplished at a much slower pace by migrations.

## 1. EUROPE

65. In addition to the scattered first attempts at census-taking in the eighteenth and early nineteenth centuries, there were some accountings of the populace for fiscal and administrative purposes covering smaller territories and in cities. These sources, reinforced by deductions from known economic and other related conditions gave the principal indication of population sizes. Ecclesiastical registers of baptisms, marriages and burials have also been a valuable source for demographic analysis, especially when associated with epidemics, crop failures, wars and other historical events.<sup>133</sup> Detailed analyses of fertility and mortality levels have been made from the reconstitution of families over several generations from local parish records by French historical demographers, and similar studies for social classes from the beginning of the sixteenth century have added to this body of knowledge.<sup>134</sup> The development of civil registration on a national scale had its inception in this period, but because of deficiencies, data from this source, for some countries until fairly

<sup>133</sup> See, for example, Mols, "Introduction à la démographie ..." (1954); Meuvret, "Les crises de subsistance ..." (1946); and Eversley, "A survey of population ..." (1957).

<sup>134</sup> See, for example, Fleury and Henry, *Des registres paroissiaux* ... (1956); Gautier and Henry, *La population de Crulai* ... (1958); and Goubert, *Beauvais et le Beauvaisis* ... (1960); Hollingsworth, "The demography of the British peerage" (1964), pp. 29-70; Peller, "Births and deaths among Europe's ..." (1965), pp. 87-100.

recently, are subject to many adjustments and interpretations.<sup>135</sup>

66. During the course of the seventeenth century, Europe had endured a series of disasters—severe cold, crop failures and famine, rebellions and wars, of which the Thirty Years War was one of the most devastating in history. Perhaps the greatest scourge was the Plague, which entirely ceased only in the early part of the eighteenth century. These afflictions did not appear simultaneously nor to the same extent in all areas. Where there was growth in some regions, it was offset by loss in others, so that conclusions as to stagnation in the trend of total European population would seem reasonable.

67. From the beginning of the eighteenth century, there was an amelioration of conditions formerly marked by calamities. As seen by some, at this point domination by nature was modified by increasing and more deliberate control of man over his circumstances, and a period of economic and demographic growth began.<sup>136</sup> Although from country to country the turning point varied, the upward demographic trend was general in most parts of Europe and was to continue at an accelerating rate into the twentieth century. Its initiation is frequently credited to lowered death rates, resulting chiefly from a lessening of peaks of mortality. The disappearance of the Plague from Western Europe, after a final brief outbreak in Provence in 1720, is widely credited with furthering this advance.<sup>137</sup> Increased colonization and expansion of arable land in Eastern and Northern Europe and the beginning of the Industrial Revolution, first in England about 1750<sup>138</sup> and next in other countries of Western Europe, were also major contributory factors. Various opinions as to the effects of the Industrial Revolution on population growth are discussed below.

68. Laslett's careful investigations of conditions in England on the eve of the Industrial Revolution led him to agree with Gregory King's estimate of average expectation of life at birth for both sexes as 32 for England at the end of the seventeenth century.<sup>139</sup> The analysis of parish records by several scholars has given an indication

<sup>135</sup> Methods for the use of early civil and parish registers as maintained in France are given by Fleury and Henry in *Nouveau manuel de dépouillement* ... (1965), superseding their earlier *Des registres paroissiaux* ... (1956). For studies of population trends in various parts of Europe based on parish registers, early censuses and other types of demographic records, see Société de démographie historique, *Annales de démographie historique*, 1965 ... (1966); —, 1966 ... (1967).

<sup>136</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale* ... (1968), pp. 197-198.

<sup>137</sup> Helleiner, "The vital revolution reconsidered" (1965), pp. 85-86. "... perhaps only a society freed from the fear as well as from the material and spiritual consequences of sudden death was able to achieve that high rate of intellectual and technical progress without which population growth could never have been sustained", p. 86.

<sup>138</sup> Although 1750 is generally accepted as marking the advance appearance of the Industrial Revolution, Ashworth states: "It would be truer to say that between 1760 and 1830 many of the essential foundations of an industrial revolution were laid in Great Britain, and that on a very limited part of them a notable structure was erected; but a very large part of the building was left for completion later." *A Short History of the International Economy* ... (1952), p. 19.

<sup>139</sup> Laslett, *The World We Have Lost* (1965), p. 93.

TABLE II.5. EXPECTATION OF LIFE AT BIRTH (YEARS), BASED ON GENERATION LIFE TABLES

Period of birth and expectation of life (years)									
Sources of data	Seventeenth century		Eighteenth century				Nineteenth century		
<i>Family reconstitution</i>									
Genevan bourgeoisie	1600-1649	1650-1699	1700-1749		1750-1799		1800-1850	1850-1899	
Males	30	32	40		46		52	59	
Females	35	39	46		50		53	67	
Peerage	1650-1674	1675-1699	1700-1724	1725-1749	1750-1774	1775-1799	1800-1824	1825-1849	1850-1874
Males	30	33	34	39	45	47	49	52	55
Females	33	34	36	37	46	49	52	58	63
Ruling families	1600-1699		1700-1799				1800-1849		
Males	28		36				52		
Females	34		37				53		
<i>Local populations</i>									
Broek-in-Waterland			1654-1732						
Both sexes			23						
Crulai			1675-1775						
Both sexes			30						
<i>National tables</i>									
England and Wales			1750	1780			1800	1820	1840 1860
Males			...	...			...	...	39.5 42.8
Females			...	...			...	...	42.7 46.5
France									
Males			...	...			...	39.4	38.2 40.4
Females			...	...			...	41.0	41.3 42.7
Netherlands									
Males			...	...			...	...	38.0 40.1
Females			...	...			...	...	39.9 42.9
Sweden			1791-1815						
Males			33.5	34.1	36.3		37.2	41.4	44.3 46.6
Females			36.7	41.8	38.4		40.8	45.3	47.9 49.5

SOURCES: These data were compiled by Glass and Eversley eds., *Population in History* ... (1965), p. 21, from the following sources: Henry, *Anciennes familles genevoises* ... (1956); Hollingsworth, "The demography of the British peerage" (1964); Peller, "Births and deaths

among Europe's ..." (1965); Struyck, *Les œuvres* ... (1912); Gautier and Henry, *La population de Crulai* ... (1958); Delaporte, *Evolution de la mortalité en Europe* ... (1941).

of the progress in extending the life span in succeeding years. While these data, summarized in table II.5 relate to a favoured segment of society, they nevertheless signify a general trend.

69. Where population expanded in an agricultural economy, it is probable that accelerated growth was also due to early marriage and high fertility (as was the case in North America in similar circumstances) as well as less prominent peaks of mortality. The growth of population associated with the rise of manufacturing industry may similarly have been induced by increased economic opportunity and early marriage. This interpretation of the interaction in the process of industrialization of long-term growth in both population and output interjects a modification in the general view that lowered mortality gave the primary impetus to an upsurge in numbers. In the case of Britain, it has been conjectured that for the period beginning with the 1740s, provision for the increasing population derived from growth in output forestalled a rise in the death rate; growth in population, augmenting the labour force, permitted the pace of industrial develop-

ment to keep its momentum, and the accompanying rise in demand and prices was an incentive to expansion and innovation. Greater employment opportunities then encouraged family formation at earlier ages.<sup>140</sup>

70. The sequence of first accelerating, then declining rates of population increase in Europe is explained by the relative timing of the declines in both birth and death rates during the modern era. The sustained excess of births over deaths which had apparently become normal in Europe during the eighteenth century produced moderate population increases over fairly long periods of time in spite of short-term fluctuations in periods of economic prosperity or adversity. This excess was augmented during the nineteenth century as mortality rates dropped while birth rates generally remained high. The downward trend in the birth rate evident by the latter part of the nineteenth century was nevertheless outpaced by falling death rates. Growth was steady, from an estimated average rate of 6.2 per thousand for 1851-1860 to

<sup>140</sup> Deane, *The First Industrial Revolution* (1965), p. 34.

9.9 for 1891-1900,<sup>141</sup> and persisted in the first years of the twentieth century in spite of the swelling stream of overseas emigration.<sup>142</sup> Subsequently, death rates continued on their downward slope, but the fall in European birth rates quickened, with the result that population growth became slower.<sup>143</sup>

71. This pattern is illustrative of the demographic transition from high to low mortality and fertility, in both instances nearly in balance and permitting only slow population growth, if any. In its classic progression, the first stage produced rapid population increase as mortality declined while fertility remained high. In the second stage, the onset of fertility decline accompanied a continued lessening of mortality, but the age-structure established by the first stage was still favourable to high birth rates and a continuation of marked expansion. The transition was completed in the third stage, with birth rates nearer a low level of death rates.

72. The earliest reliable vital statistics for any region have made it possible to trace this transition in the demographic history of the Northern European countries since 1735.<sup>144</sup> During the greater part of the eighteenth century, there were wide fluctuations and great variation among areas, but the long-term trend was one of moderate growth. Trends for this and following centuries are given in table II.6 below. Fertility may have been somewhat lower than the prevailing level in Western Europe, possibly influenced by marriage patterns and some attempt at limitation. From the second half of the century, a slight lowering in the birth rate is indicated. A brief period of higher rates around the middle of the nineteenth century was followed by uninterrupted decline. Mortality rates also seemed to be relatively low at the beginning of the eighteenth century, showed some increase, and between 1750 and 1790 appeared nearly stationary, after which a marked descent continued into the next century. Overseas emigration from Scandinavia became important after the middle of the nineteenth century, but the upward movement of natural increase, begun about 1800 and continuing until the last quarter of the century, had a somewhat stabilizing effect on fluctuations in the growth rate.<sup>145</sup> Thereafter, the fall was more rapid for births than for deaths, and decline continued into the twentieth

TABLE II.6. AVERAGE ANNUAL RATE OF POPULATION GROWTH (PER THOUSAND) IN NORTHERN EUROPEAN COUNTRIES

Period	Sweden	Norway	Denmark	Finland
1735-1800 .....	5	7	3	12
1801-1900 .....	7	9	9	11
1901-1940 .....	6	7	11	9

SOURCE: Gille, "The demographic history ..." (1949), p. 38.

century. Average annual increase rates per thousand for ten-year periods beginning 1850 were 11, 7, 8, 11 and for 1901-1905, 8. For 1931-1940, these rates were: Sweden, 3; Norway, 5; Denmark, 7; Finland, 7.

73. Thus, the modern demographic transition appears to have been first set in motion in Scandinavia and Northern and Western Europe, where there was a general lowering of mortality throughout the nineteenth century, while fertility remained high until the last quarter. England's experience differed somewhat from that of the other countries in that the beginning of sustained population growth is placed at about 1750, concurrent with its modern economic growth. That the downward trend of births began in the last quarter of the nineteenth century appears indisputable, but whether rising fertility or falling mortality determined population increase in the initial stage of the transition is widely discussed.

74. Several scholars have investigated the quality of the data used to calculate birth and death rates prior to the beginning of civil registration in England in 1837.<sup>146</sup> One of these scholars found little significant change in mortality between 1700 and 1821 and terms indications of its fall after 1780 a "statistical mirage". He favours rising fertility from more and earlier marriages, beginning about 1755, as decisive in the expansion of early nineteenth century population.<sup>147</sup> The rise in birth rates from earlier marriage is seen as sustained by improved economic conditions by Habakkuk;<sup>148</sup> others doubt that the drop in age at marriage was sufficient to affect fertility trends substantially. They argue that population increase resulted mainly from reduced death rates, because of improved economic and social conditions rather than advances in therapeutic medicine.<sup>149</sup> This counters a conclusion that medical advances independent of the effect of the Industrial Revolution on the standard of living explain population growth in the mid-eighteenth century.<sup>150</sup>

75. The two most noteworthy exceptions to the general pattern were France and Ireland. The rate of population

<sup>141</sup> Habakkuk and Postan, eds., *The Cambridge Economic ...*, vol. 6 (1965), p. 62.

<sup>142</sup> For the first decades of the twentieth century, a time lag of one or two generations is noted in the decrease in births and deaths from West to East, via North and Central Europe, with the First World War having only a temporary effect. Frumkin, *Population Changes in Europe ...* (1951), p. 13.

<sup>143</sup> The statement of the sequence of events represents the consensus of a number of authors who have examined the available evidence on European population trends during the period in question. See, for example, Carr-Saunders, *World Population ...* (1936), p. 62. See also Habakkuk and Postan, eds., *The Cambridge Economic ...*, vol. 6 (1965), pp. 68-69, and Borrie, *Population Trends and Policies ...* (1948), p. 9, for birth and death rates in European countries.

<sup>144</sup> Gille, "The demographic history ..." (1949), pp. 18-65.

<sup>145</sup> With reference to Sweden, see Thomas, *Social and Economic Aspects ...* (1941), p. 10. Net reproduction rates in the nineteenth century have been computed by Depoid, "Evolution de la reproduction ..." (1941), p. 219; for single years beginning 1751, see Hyrenius, "Reproduction and replacement" (1951), p. 424.

<sup>146</sup> Glass, "Population and population movements ..." (1965), pp. 221-246, who also considers the earlier work of Rickman, Farr, Brownlee and Griffith.

<sup>147</sup> Krause, "English population movements ..." (1963), pp. 588-589.

<sup>148</sup> Habakkuk, "English population ..." (1953), pp. 117-133, and his "The economic history of modern Britain" (1958), pp. 486-501.

<sup>149</sup> McKeown and Brown, "Medical evidence related ..." (1955); McKeown and Record, "Reasons for the decline ..." (1962).

<sup>150</sup> Razzell, "Population change ..." (1965), pp. 312-331. See also Langer, "Europe's initial population explosion" (1963), pp. 4-7.

growth in France, never high in modern times, declined in the nineteenth century from an average of about 5 per thousand for the first two decades.<sup>151</sup> The rate of natural increase, at a similar level at the beginning of the century, fluctuated from mid-century in a steadily declining trend to about zero at the end of the century, followed by a brief increase and then decline for the years before the First World War.<sup>152</sup> This downward trend was attributable to the early decline in fertility which started around the time of the French Revolution, possibly earlier.<sup>153</sup> Genealogies of the French aristocracy reveal that limitation of family size in that group, presumed to have begun in the seventeenth century, led to a sharp drop in marital fertility in the eighteenth. Low net reproduction rates fell further to 1 by 1850, indicating that fertility was barely adequate for replacement. The rate remained below 1 in the last few years of the century and the first half of the twentieth.<sup>154</sup> Regional variations were pronounced, however, and fertility remained high in industrial and very remote areas. Mortality gradually and slowly reached lower levels.

76. In Ireland, the population grew at rates comparable to those of England and Wales between 1780 and the Great Famine of 1846-1847, by which time it had reached about 8 million.<sup>155</sup> The population of the Republic of Ireland in 1861 was 4.4 million; by 1925, it had fallen below 3 million, and has never recovered. The early decrease has been attributed primarily to the effect of the potato famine, which caused excess deaths and stimulated out-migration (see chapter VII, sections A and B). In addition, however, the rate of natural increase was held to a low level by delayed marriage and consequent low fertility.<sup>156</sup>

77. The period of most rapid growth apparently was reached in France and Ireland during the early part of the nineteenth century, in England in the 1870s, in Scandinavia in the 1870s and 1880s and in Germany during the 1890s and 1900s.<sup>157</sup> In Germany, from the middle of the nineteenth century rapid growth was associated with both industrialization in the west and

continuing colonization in the east. According to a study of Northern and Western Europe in the second half of the nineteenth century, net reproduction rates in Prussian agricultural areas were found to be on about the same level with those in industrial areas.<sup>158</sup> This contrasts with the situation in France, where reproduction rates in most rural sectors were rather low.

78. The cycle of rising and falling rates of population increase developed later in Southern and Eastern than it did in Northern and Western Europe, with the period of most growth postponed in various parts until the first, second or third decade of the twentieth century.<sup>159</sup> In Eastern Europe, not including the Soviet Union, the rates of population growth were higher than the general European average throughout the nineteenth century. In the first decade of the twentieth century, crude birth and death rates around 35-40 and 25, respectively, sharply distinguished the countries of this area from Western Europe.<sup>160</sup>

## 2. USSR

79. The only population census in the Russian Empire was taken in 1897, from which has been derived an officially estimated total of 125 million for the present area of the Soviet Union. Taking into account questions of accuracy and adjustments for coverage, the medium estimate of 134 million lies within a range of 127 to 140 million for 1900 (see table II.4). Estimates for the eighteenth and nineteenth centuries are based on enumeration of taxable males and are difficult to interpret for purposes of comparison.<sup>161</sup> Nevertheless, growth rates above those for Europe appear to have been maintained throughout the past 200 hundred years in spite of severe cut-backs at the time of the First World War and a net loss during the Second.

80. The eighteenth century and early years of the nineteenth were marked by a number of wars, followed by relative peace until the Crimean War in 1853-1856. Perhaps the most significant events of the latter half of the century were the abolition of serfdom, accompanying agrarian reform and gradual expansion, and the beginnings of industrial development. Crude birth rates around 50 in European Russia for 1861-1900, declining to about 43 in 1913, were obtained from registers maintained by the Orthodox Church. The death-rate decline was more rapid, from about 37 to 27; the highest rate of natural increase during the period was 17.6 for 1911.<sup>162</sup> After

<sup>151</sup> Landry, *Traité de démographie* (1949), p. 57.

<sup>152</sup> Bourgeois-Pichat, "Note sur l'évolution générale de la population française . . ." (1952), p. 329.

<sup>153</sup> Levy and Henry, "Ducs et pairs . . ." (1960), pp. 815-819. For a study of a similar phenomenon in the Genevan bourgeoisie, see Henry, *Anciennes familles genevoises . . .* (1956), pp. 75-110. In the British aristocracy, on the other hand, marital fertility, noted as exceptionally high beginning about 1760, prevailed at that level for the next hundred years or so; unmistakable decline set in about the middle of the nineteenth century. See Hollingsworth, "A demographic study of the British . . ." (1957), pp. 15-22.

<sup>154</sup> Bourgeois-Pichat, "Note sur l'évolution . . ." (1952), p. 329.

<sup>155</sup> Connell, *The Population of Ireland . . .* (1950), pp. 24-25.

<sup>156</sup> Thompson and Lewis, *Population Problems* (1965), pp. 493-494; Ireland, Department of Industry and Commerce, *Statistical Abstract, 1946* (1947), p. 12; Arensburg, *The Irish Countryman* (1937), pp. 94-99; Aalen, "A review of recent Irish . . ." (1963), p. 75.

<sup>157</sup> Landry, *Traité de démographie* (1949), pp. 177-179; see also Glass, *Population Policies and Movements in Europe* (1940), pp. 28, 270; and his "Changes in fertility in England . . ." (1938), p. 168. In the Netherlands, growth at a high rate continued longer than in neighbouring countries; a peak about 15 per thousand was attained in 1900-1913 and again in 1921-1925.

<sup>158</sup> Wrigley, *Industrial Growth . . .* (1961), pp. 160-162.

<sup>159</sup> Borrie, *Population Trends and Policies . . .* (1948), pp. 8-10.

<sup>160</sup> Chasteland, "La population des démocraties . . ." (1958), p. 80. Rates at this level of mortality occurred in England and France at the beginning of the nineteenth century; similar natality rates about 1810 in England and 1780 in France. See also Kirk, *Europe's Population . . .* (1946); and Notestein et al., *The Future Population . . .* (1944).

<sup>161</sup> For estimates and growth rates, see Uralis, *Rost naseleniia v SSSR* (1966), pp. 9, 15, 17-18. See also Gordon, "Russia's growing population" (1945); Lorimer, *The Population of the Soviet Union . . .* (1946), p. 169; and Sundbarg, *Aperçus statistiques internationaux* (1908). Biraben, "Essai sur l'évolution . . ." (1958), pp. 29-62, estimates the population for the years 1861-1957.

<sup>162</sup> Rashin, *Naselenie Rossii za 100 let* (1956), pp. 150-152, 154-156.

TABLE II.7. RUSSIA: AVERAGE ANNUAL RATES OF POPULATION INCREASE, 1867-1895

Period	Rates of increase (per cent)
1867-1870 .....	1.2
1871-1875 .....	1.4
1876-1880 .....	1.3
1881-1885 .....	1.4
1886-1890 .....	1.5
1891-1895 .....	1.3

SOURCE: Uralnis, *Rost naseleniia v SSSR* (1966), p. 15.

drastic decline during the First World War, the birth rate gradually rose to a peak of 45 in 1927 for the USSR.<sup>163</sup> Thereupon, with greatly increased industrialization and urbanization, steady decline was established. A decline in the rate of growth, from 11 per thousand in the 1920s to 9 in the 1930s, was markedly reversed after the Second World War; a rate of 17 was registered for the 1950s.<sup>164</sup>

### 3. NORTH AMERICA

81. The spectacular growth of North American population after initial settlement by the Europeans was not due primarily to immigration. In that region of almost limitless frontiers, marriage was early and universal and marital fertility extremely high. In Canada, church registration records provide reliable data on population movements in the seventeenth and early eighteenth centuries. The inhabitants of European descent numbered 17 in 1611. By 1763, when Canada was transferred from French to British Government, the total had grown to about 65,000 from an estimated 10,000 original settlers (some of whom located in what is now the north-eastern United States).<sup>165</sup> The first of a series of decennial censuses gave a total of over 2.4 million in 1851, less than 150,000 being of non-European origin. One hundred years later, at 14 million, the population had multiplied more than fivefold. External migration has been a prominent feature of Canadian population history, with heavy in-migration countered somewhat by return-migration and by a gravitation to the United States (see chapter VII, section C). The French Canadian segment, little affected by migration since 1671, has retained its cultural homogeneity to an unusual degree. Despite the heavy volume of in-migration elsewhere, the proportion of Canada's total population in the Province of Quebec has fallen only from 37 per cent in the middle of the nineteenth century to slightly under 30 per cent during the present century.<sup>166</sup> Its increase has come from birth rates among the highest

in the world in earlier times.<sup>167</sup> With reference to the eighteenth century, Henripin has calculated a net reproduction rate of 1.93, amounting to a doubling of the population every thirty years.<sup>168</sup> In recent years, the crude birth rate has exceeded that of any of the more developed countries.<sup>169</sup>

82. The trend of population growth in the United States during the nineteenth century differed from that in Western Europe in three major respects: (a) the rate of natural increase at the beginning of the century was much higher in the United States than in Western Europe; (b) the rate of natural increase declined throughout the century (in contrast to the rising rate in most European countries) because of a steady decline of the birth rate beginning much earlier than in most areas of Europe. The estimated annual numbers of births per thousand women 15 to 44 years old in the United States during the first three decades of the nineteenth century averaged 276, 267 and 250, respectively; they dropped to 208 in 1840-1850, 146 in 1880-1890, and 100 in 1920-1930;<sup>170</sup> (c) heavy immigration prevented a corresponding drop in the rate of total population growth during the first half of the nineteenth century; the population increased between 33-36 per cent in each decade 1790-1860. From 1860 until the outbreak of the First World War, the rate of growth decreased in spite of an increasing volume of immigration. After the First World War, the birth rate and the volume of immigration continued to decrease and the average annual rate of growth declined to 0.7 per cent in the decade 1930-1940 which included years of severe economic depression.<sup>171</sup> This rate climbed further to its highest level in fifty years, 1.6 for the periods 1945-1950 and 1950-1960, ascribable largely to the high birth rate customary in post-war years and to a decided trend in child-bearing at earlier ages. Canadian rates of growth followed a similar course, although markedly higher. Under the impact of heavy immigration, the Canadian peak in the same fifty-year period was 2.8 for 1951-1956, followed by a rate of 2.5 per cent for 1956-1961.<sup>172</sup>

### 4. LATIN AMERICA

83. The beginning of the modern age registered a low point in the population history of Latin America. During the first 175 years of colonization, the hardship of European settlers and African slaves was insufficient to

<sup>163</sup> Uralnis, "Dynamics of the birth rate ..." (1967), p. 232.

<sup>164</sup> United Nations, *Demographic Yearbook, 1960* ... (1961), p. 118, USSR, Tsentralnoe Statisticheskoe Upravlenie, *Narodnoe Khoziaistvo SSSR* ... (1968), pp. 7, 36.

<sup>165</sup> Lower, "The growth of population in Canada" (1962), p. 45.

<sup>166</sup> Canada, Dominion Bureau of Statistics, *Eighth Census of Canada, 1941* (1945), vol. 1, pp. 4-5. The percentage of French origin in all of Canada has remained around 30 per cent for the past 100 years. Biraben, "Le peuplement du Canada français" (1967), p. 137.

<sup>167</sup> Kuczynski, *Birth Registration and ...* (1930), pp. 199-200. According to an analysis of the Roman Catholic population of Quebec, preponderant in that Province, the crude birth rate was generally in the 50s in the eighteenth century. Thereafter, decennial averages were in the 40s until a rate of 39 was obtained for 1921-1925 (34 for 1926-1928).

<sup>168</sup> Henripin, *La population canadienne* ... (1954), p. 74.

<sup>169</sup> Crude birth rates of 30 are given for 1946-1950 and 1951-1955, and of 26 in 1961-1965. Canada, Dominion Bureau of Statistics, *Canada Year Book, 1963-64* (1964), p. 220.

<sup>170</sup> Thompson and Whelpton, *Population Trends in the United States* (1933), p. 310.

<sup>171</sup> United States, Bureau of the Census, *Statistical Abstract* ... (1946), pp. 4, 71.

<sup>172</sup> United Nations, *Demographic Yearbook, 1962* ... (1963), p. 264; ———, *1964* ... (1965), p. 158.

compensate for the drastic depletion in the sixteenth century of the indigenous population and there was general decline.<sup>173</sup> A fairly stabilized demographic situation is believed to have prevailed during most of the remainder of the colonial period. Increases thereafter produced a steadily rising trend in pronounced contrast to the more precipitous downward inclination for North America, as can be seen in table II.8.

84. Growth of the Indian population apparently resumed slowly, estimated by Rosenblat (in millions) at 2.6 in 1825, 13.5 in 1940 and 14.9 in 1950.<sup>174</sup> European immigration and concomitant natural increase contributed substantially to this growth in many countries, notably in Argentina. The importation of African slaves, continuing until the middle of the last century in places, also swelled the numbers of inhabitants.<sup>175</sup> Brazil's population, according to one estimate, doubled between 1800-1850, increased by 149 per cent in 1850-1900 and by 189 per cent in the next fifty years.<sup>176</sup>

85. Among the major regions, Middle and South America currently appear to have the fastest rate of population growth in the world. Separate estimates at fifty-year intervals prepared for four component areas show that Brazil's high growth trend has been pre-eminent during the entire period 1750-1950, slightly exceeding the pace in the Caribbean. Growth elsewhere has been relatively moderate, with Mexico increasing more slowly than the remainder of Latin America.<sup>177</sup>

86. A continuation of very high fertility in nearly all Latin American countries appears from a tabulation of natality rates for the periods 1945-1950 and 1955-1960. Exceptions are Argentina and Uruguay, where crude birth rates are in the low 20s, Cuba in the low 30s and Chile slightly higher.<sup>178</sup> Puerto Rico's rates have also fallen below 30 in recent years (see also chapter IV, table IV.6). The downward trend in mortality, which is expected to continue for some time, will further inflate the already high rates of natural increase unless accompanied by lowered fertility. Rates of natural increase around 35 in the mid-1960s are reliably reported for Costa Rica, El Salvador and Mexico,<sup>179</sup> while estimates for several other countries for 1959-1961 range from around 22, as in the case of Bolivia, where mortality appears to be particularly high, to 35 or above, of which Venezuela is an example.<sup>180</sup> For the region as a whole,

there has been a doubling of the population in the thirty years from 1932 to 1962, when it reached an estimated total of 216 million.<sup>181</sup>

## 5. OCEANIA

87. Extremely high rates of both total and natural increase occurred in Australia and New Zealand in the third quarter of the nineteenth century, due in part to the influence of contemporary immigration and the resulting abnormal age structure of the population. Beginning in the late nineteenth century and through the 1930s, these countries experienced some decline in natural increase resulting from lowered fertility. The years following the Second World War have seen a recovery, as in the case of New Zealand, to a level approximating that of the early years of this century. A level of fertility higher than for most countries of western Europe has been retained while death rates have further decreased from a comparatively low level. With the exception of the war years, immigration has continued on a substantial scale.<sup>182</sup> Since the end of the Second World War, intercensal average rates of increase have ranged from 2.1 to 2.4 per cent *per annum*.<sup>183</sup>

## 6. ASIA

88. The outline of Asian demographic history is defined by that of China, India and Pakistan, which in 1965 accounted for 70 per cent of Asian population, and 40 per cent of that of the world. Beginning about the second quarter, the seventeenth century in China was a period of political and economic dislocation and great peasant rebellions. These wars in their destructive effects have been compared to the Thirty Years War in Europe.<sup>184</sup> After the overthrow of the Ming dynasty in 1644, the new Ch'ing Empire was consolidated only after further warfare, but sometime around 1700 the population may have approximately regained the size it had in 1600, about 150 million. Economic evidence as well as estimates derived from incomplete enumerations and registrations indicate that a period of sustained growth then began which continued into the nineteenth century. Totals have been suggested of 200 million for 1750, 323 million for 1800 and 430 million for 1850. Over the span of this period, therefore, it is likely that the number of inhabitants at least doubled. The rate of growth is conceived of as having slackened in the first half of the nineteenth century.<sup>185</sup> The remainder of the century was marked by the

<sup>173</sup> Davis, "The place of Latin America ..." (1964), p. 22.

<sup>174</sup> Rosenblat, *La población indígena* ... (1954), p. 122.

<sup>175</sup> Brazil's slave population has been put at 1 million in 1800, and about 1.5 million in 1860, according to Furtado, *The Economic Growth of Brazil* ... (1963), p. 127. Starting at the same figure in 1800 as Brazil, the slave population in the United States reached about 4 million, largely through natural increase. Poor diet and more intensive labour contributed to high slave mortality in Brazil, where deaths far exceeded births. This sector therefore was replenished continually by fresh imports. *Ibid.*, p. 129.

<sup>176</sup> Mortara, "The development and structure ..." (1954), p. 122.

<sup>177</sup> Durand, "The modern expansion ..." (1967), pp. 156-158.

<sup>178</sup> United Nations, *Boletín económico de América Latina*, Suplemento estadístico (1962), p. 8.

<sup>179</sup> *Ibid.*, p. 124.

<sup>180</sup> United Nations, *Boletín estadístico de América Latina* (1965), p. 11.

<sup>181</sup> Miró, "The population of Latin America" (1964), p. 19.

<sup>182</sup> Charles, "Population problems in the British ..." (1945), p. 80; Borrie, *Population Trends and Policies* ... (1948), p. 37. See also Borrie and Spencer, *Australia's Population Structure and Growth* (1965), p. 82.

<sup>183</sup> United Nations, *Demographic Yearbook*, 1962 ... (1963), p. 283.

<sup>184</sup> Ho, *Studies on the Population* ... (1959), p. 265.

<sup>185</sup> Durand, "The modern expansion ..." (1967), p. 137. The totals derived from a study of Ch'ing Empire annual population reports lie within ranges estimated at 180-234 million for 1750, 290-360 million for 1800, and 390-480 million for 1850, *ibid.*, p. 138; they are in virtual agreement with the assessments of Ho, *Studies on the Population* ... (1959), p. 270, who also includes a discussion of the source material, pp. 47-64. See also Taeuber and Wang, "Population reports of the Ch'ing dynasty" (1960), pp. 403-417.

ravages of the T'ai P'ing Rebellion (1851-1864) and other upheavals and calamities of such severity that many areas suffered depopulation,<sup>186</sup> and by the end of the century the population size was apparently no larger than it had been fifty years before.

89. This total of 430 million for 1900 has also been calculated as a medium variant within a range of 385-494 million by backward extrapolation from the 1953 census figure of 583 million, assuming an average annual growth rate of 0.5 per cent.<sup>187</sup> The reliability of this census has not been established, but it is generally accepted as the best source for an insight into recent levels.<sup>188</sup>

90. Growth rates over fifty-year periods in the territory of modern India and Pakistan, in contrast to those of China, show a consistent trend of acceleration. The first total count of this area was carried out during 1867-1872, but it is usually assigned to the year 1872. A result of 203 million was officially raised to 233 million to rectify under-enumeration and omissions of area. A later study proposed 255 million as closer to the fact.<sup>189</sup> Estimates for this component included in the medium estimates for Asia in table II.4, at fifty-year intervals beginning 1750, are (in millions): 190, 195, 233, 285 and 434. For 1800 and by extension to 1750, a high variant of 214 million was reached by backward extrapolation from the total of 255 million, mentioned above, at the rate of 0.25 per year. A low variant of 160 million was derived from the application of a constant rate of decennial increase of 5.84 per cent postulated in a recent study.<sup>190</sup> From 1921, there has been a quickening of the upward trend, most pronounced in Pakistan. Adjusted data give intercensal rates of 1.0 per cent for 1921-1931 and 2.2 for 1951-1961 for this country, and corresponding rates of 1.1 and 2.0 for India.<sup>191</sup>

91. In its population growth trend, Japan has differed markedly from its Asian neighbours, both in the historical past and currently. As a frontier island in Asia, it appears to have had a growing population with expanding trade and colonization over a long period prior to its policy of isolation. The Tokugawa period (1600-1868) roughly corresponded with the sealing off of the country from all external relations, and during its early years there was a continuing increase in population. Thereafter, the level appeared to be stabilized according to official records dating from 1726 to 1852. The number of commoners

ranged only between 26.5 million in 1726 to 27.2 million in 1852, with minor fluctuations to a low of 24.9 in 1792 and a high of 27.2 in 1828 as well. An estimate of total population required the addition of the excluded classes—the Imperial household, the nobility, military, and lords and their establishments at one end of the social scale, and those at the bottom of the scale such as beggars, prostitutes, homeless persons—thought by some to approximate 1.5-2.1 million and by others about 4.0 million. This “presumed stability” masked compensating regional variations and fluctuations, however.<sup>192</sup> There is some disagreement among scholars as to the relative importance of deliberate efforts as opposed to natural forces in checking growth in that era. Abortion is known to have been practised in the upper classes, infanticide was more prevalent among the peasants,<sup>193</sup> and famines, epidemics, earthquakes and other calamities were not uncommon.

92. After the Meiji restoration, the first survey, in 1871-1872, indicated a total population of 34.8 million,<sup>194</sup> and in 1920 the first census in the modern sense gave a total of 55.4 million.<sup>195</sup> Compared with other Asian countries, rates of population increase have been low in modern Japan, although not so low as in European countries.

93. According to official statistics, both death and birth rates were low in the 1870s and rose in the early Meiji period. Checking registered age groups by life table survival rates, one author has estimated that both rates were actually considerably higher, the death rate over rather than under 20, and the birth rate around 32 rather than 24. According to him, early Meiji growth was not associated with an increase in births, but with a slight decline in the death rate,<sup>196</sup> yet in 1920, the birth rate was higher than before, and it declined decisively beginning only after 1950. Whatever the course of mortality in the early Meiji period, the decline after 1920 has been rapid and continuous, as registered by a drop in the crude death rate from 25 in 1920 to about 7 in the 1960s.

94. There is general agreement as to population levels for the modern period of Japan at about 30 million for 1750 and 1800, 31 million for 1850, and 44 for 1900. The first increase at these intervals was registered for 1800-1850, an annual average of 0.1 per cent, followed by 0.7 for the next fifty-year period and 1.3 from 1900 to 1950 when the total was 53 million.<sup>197</sup> Like other industrializing societies, Japan has thus undergone a demographic experience involving falling birth and death rates,

<sup>186</sup> See Ho, *Studies on the Population ...* (1959), pp. 236-248.

<sup>187</sup> Durand, “The modern expansion ...” (1967), p. 147.

<sup>188</sup> Taeuber and Wang, “Questions on population ...” (1960), pp. 263-310. Aird, in “Estimating China's population” (1967), pp. 61-72, considers some of the problems presented by recent Chinese population data.

<sup>189</sup> Davis, *The Population of India ...* (1951), pp. 24-48.

<sup>190</sup> Durand, “The modern expansion ...” (1967), pp. 137-138, 148-149. See also Datta, “A re-examination of Moreland's estimate ...” (1960), p. 167. Datta based the rate of 5.84 on increase between 1881-1931. If the period is extended to include the more questionable results of the census of 1871, the rate becomes 5.14 per cent. Other estimates of population in the area of present-day India, and of deaths resulting from seventeen famines occurring in the nineteenth century, are given in Sen Gupta *et al.*, “Estimates of 19th century population ...” (1969).

<sup>191</sup> Gille, “Accélération démographique en Extrême-Orient ...” (1961), p. 643.

<sup>192</sup> Taeuber, *The Population of Japan* (1958), pp. 21-27.

<sup>193</sup> *Ibid.*, pp. 29-30.

<sup>194</sup> *Ibid.*, p. 44. Durand, “The modern expansion ...” (1967), p. 149, reports that the official estimate for 1885 (given as 37.5 million in Taeuber, *The Population of Japan* (1958), p. 46) may be about 1 million too low. Durand cites Japan, Institute of Population Problems, *Meiji Shonen Iko Taisho 9-nen ...* (1962).

<sup>195</sup> United Nations, *Demographic Yearbook, 1962 ...* (1963), p. 272. This total has been adjusted to relate to present territory; in the territory at the date of the census, i.e., including Okinawa, it was 56.0 million, and is given in Taeuber, *The Population of Japan* (1958), p. 60.

<sup>196</sup> Morita, “An estimation on the actual ...” (1963), pp. 48-49, 52.

<sup>197</sup> Durand, “The modern expansion ...” (1967), p. 137.



but its relatively low and controlled fertility at the outset distinguishes its demographic transition from that of most countries.

95. The population of Indonesia was estimated at 77 million for 1950. Official data, even when adjusted for deficiencies, give only an uncertain approximation of population for most years prior to 1961, when 96.3 million inhabitants were counted.<sup>198</sup> Backward extrapolations have been calculated on the assumption of growth rates of 0.2 per cent for 1750-1800 and 1.2 per cent thereafter, giving medium estimates of 12 million in 1750, 13 million in 1800, 23 million in 1850 and 42 million in 1900.<sup>199</sup>

96. For the remainder of Asia, estimated percentage rates of growth have been calculated which assume an unbroken upward trend, a pattern similar to that of India-Pakistan, but at a slightly higher level: 0.1 for 1750-1800, 0.5 for 1800-1850, 0.7 for 1850-1900, and 1.2 for 1900-1950.<sup>200</sup> A high rate of increase for Thailand in the early part of this century has continued on an ascending scale; between the censuses of 1947 and 1960 the population appears to have grown at the average annual rate of 3.2 per cent,<sup>201</sup> as it has for the Philippines between 1950 and 1960.<sup>202</sup> Intercensal growth for the Republic of Korea for 1955-1960 is likewise high, at an annual average of 2.9 per cent. Most recently, the trend of increase appears to have been accelerating. Around 1960, an annual percentage of near 3.2 is thought likely for the Republic of Korea, and as high as 3.5 for the Philippines, at which latter rate the number of inhabitants would double in twenty years.<sup>203</sup> The trend in rates of natural increase in China (Taiwan) may be of more import than the size of the country would warrant if it is indicative of the beginning of deceleration in this part of the world. Fertility declining faster than mortality is reflected in rates of natural increase which fell steadily from 37 per thousand population in 1952 to 27 in 1965 for China (Taiwan).<sup>204</sup>

97. For Iran and South-West Asia, where ancient civilizations had provided for flourishing populations, the demographic history is virtually unknown. However, the known facts of wars, famine and epidemic, and of continuous economic decline over a long period point to causes for a prolonged contraction in numbers of inhabitants. Indications of revitalization appeared in the

nineteenth century, when Iran's numbers increased from a probable 6 million to somewhere in the range of 9-12 million over the 100 years.<sup>205</sup> United Nations estimates show growth becoming more substantial from 1920 on: an estimated 21.5 million inhabitants in 1960 represented an increase of 30 per cent in the preceding decade.<sup>206</sup> For South-West Asia and Iran as a whole, United Nations estimates give average annual growth rates of 1 per cent for the 1920s, increasing to about 1.7 for the 1940s and 2.7 per cent between 1950 and 1960.<sup>207</sup> Iraq's population as traced from 1867-1947 almost quadrupled, from about 1.2 million at the beginning of the period to 4.8 at the end. For 1905-1935 there was a loss of momentum and even slight reversal of the ascending rate in the preceding period, then a resumption of rapid increase.<sup>208</sup> An estimate of 5.1 million is given for 1950.<sup>209</sup>

## 7. AFRICA

98. The demographic situation of North Africa has been similar, in general, to that of Asia. In Egypt, a new cycle of growth from the low level reached under Mameluke chieftains is said to have begun under Mohammed Ali (1805-1848). Unreliable estimates imply that the population doubled during this period. An estimate for 1800 gave the population as about 2.5 million.<sup>210</sup> For 1882, the first census total of 6.8 million has been officially revised to 7.6.<sup>211</sup> The census of 1937 gave a total of 15.9 million and the implied average annual increase for the period is about 12 per thousand. External migration has not been a factor in the growth of Egypt's population. Records since 1934 indicate that crude birth rates between 45-48 have been the rule and that there has been a steady lowering in the crude death rate from about 35 to 20 by 1960. A pre-war level of increase of about 14 per thousand fell during the war, then slowly rose to about 25 by 1959 as a result of decreased mortality.<sup>212</sup> In 1960, 26 million inhabitants were counted.

99. According to official statistics, the Moslem population of Algeria increased from 2.3 million in 1856 to 6.1 million in 1936, at an apparent average annual increase of 12 per thousand. The rate was about 23, however, for the five years preceding 1937, slowed during the war, then reasserted itself and again approximates that level. In Tunisia, recorded rates of growth are lower, markedly so in most recent years, and in Morocco higher, but the pattern has been similar.<sup>213</sup> The following average percentage increases have been used in calculating

<sup>198</sup> See Indonesia, Central Bureau of Statistics, *Statistical Pocket Book* ... (1947), p. 6; Oei, *Niederländisch-Indien* ... (1948). See also Keyfitz, "The population of Indonesia" (1953), p. 643; and de Meel, "Demographic dilemma in Indonesia" (1951); cited in Durand, "The modern expansion ..." (1967), p. 150.

<sup>199</sup> Durand, "The modern expansion ..." (1967), p. 137.

<sup>200</sup> *Ibid.*, pp. 137, 151.

<sup>201</sup> United Nations, *Demographic Yearbook, 1964* ... (1965), p. 164. See also Das Gupta *et al.*, "Population perspective of Thailand" (1965); Bourgeois-Pichat, "An attempt to appraise ..." (1960); Pasukniran, "Prachakorn khong Prathet Thai" (1960); and Gille and Chalothorn, *The Demographic Outlook of Thailand* ... (1963), p. 9.

<sup>202</sup> United Nations, *Report of the Asian Population Conference* (1964), p. 71.

<sup>203</sup> Gille, "Accélération démographique en Extrême-Orient ..." (1961), p. 643.

<sup>204</sup> United Nations, *Demographic Yearbook, 1958* ... (1958), p. 107; ———— 1965 ... (1966), p. 125.

<sup>205</sup> Herschlag, *Introduction to the Modern* ... (1964), p. 134 citing Fateh, *The Economic Position of Persia* (1926), p. 2.

<sup>206</sup> United Nations, *World Population Prospects as assessed in 1968* ...

<sup>207</sup> Rates computed from data in *ibid.* and United Nations, *World Population Prospects* ... (1966), pp. 140-141.

<sup>208</sup> Hasan, "Growth and structure of Iraq's population ..." (1958), p. 340.

<sup>209</sup> United Nations, *Demographic Yearbook, 1966* ... (1967), p. 124.

<sup>210</sup> Cleland, *The Population Problem* ... (1936), pp. 6-7.

<sup>211</sup> Kiser, "The demographic position ..." (1944), p. 385.

<sup>212</sup> El-Badry, "Trends in the components ..." (1965), pp. 144-145. 164. See also Baer, *Population and Society in* ... (1965), pp. 12, 25.

<sup>213</sup> Chevalier, *Le problème démographique* ... (1947), pp. 21-24.



"medium" estimates for North Africa as a whole: 0.2 for 1750-1800, 0.5 for 1800-1850, 1.2 for 1850-1900 and 1.4 for 1900-1950.<sup>214</sup>

100. Lack of statistical data and even of written history have made the size of population of most of Africa south of the Sahara a subject for conjecture until the present day. Widely disparate assessments have been offered by early western explorers, missionaries and officials. The post-war period marks a new era for African demography, although even today the vital statistics of the region are generally not known from comprehensive registration.<sup>215</sup> The extensive migrations of labour which characterize the present transitional phase of African development increase the difficulties of demographic measurement and analysis. Censuses taken in newly independent States represent first attempts at enumeration of total African populations for much of the continent and indicate greater numbers than previously supposed. Estimates are therefore subject to a wide range of possibilities according to various hypotheses about relevant factors.<sup>216</sup>

101. In general, it seems clear that African population has been growing rapidly since the Second World War. Most improvements of available information have led to upward revisions of the estimated growth rate. A rate of 2.4 per cent annually was estimated for all Africa in 1963-1968, the highest regional rate being that in Northern Africa—2.7 per cent.<sup>217</sup>

102. Kuczynski thought that many West African territories had a larger population before European slave trading than in the 1940s, but he was less positive about East Africa.<sup>218</sup> He also believed that the population of former British West Africa remained stationary during the first quarter of this century, and that East African population declined somewhat.<sup>219</sup> Martin supports the view that East African population before the First World War had changed very little over a century, and believes that it declined somewhat in the first quarter of this century, and then increased during 1930-1948 by rates in the range of 5 to 15 per thousand.<sup>220</sup> Growth has been least in Equatorial Africa, a region of low African fertility. In the Republic of South Africa, intercensal average annual rates of growth have been between 2.1 and 2.4 for the most recent period, except for 1911-1921 and 1936-1946. Total population had increased by 27 per cent between 1950 and 1960; Bantu population by almost 30 per cent and European by 18 per cent.

<sup>214</sup> Durand, "The modern expansion ..." (1967), p. 137.

<sup>215</sup> Martin, "Estimates of population growth ..." (1961), pp. 49-53.

<sup>216</sup> For a survey of recent findings, see Spengler, "Population movements and problems ..." (1964); Lorimer, *Demographic Information on Tropical Africa* (1961); and Coale, "Estimates of fertility ..." (1966), pp. 173-181.

<sup>217</sup> United Nations, *Demographic Yearbook, 1968* ... (1969), table 1.

<sup>218</sup> Kuczynski, *Demographic Survey* ... (1948), vol. 1, pp. 13-14; vol. 2 (1949), pp. 120-122.

<sup>219</sup> *Ibid.*, vol. 1, pp. 13-15; vol. 2, pp. 122-123.

<sup>220</sup> Martin, "Estimates of population growth ..." (1961), pp. 50-53.

103. High natality serves the cultural requirements of the great variety of kinship systems that have been documented in African tribal society.<sup>221</sup> However, tribal customs governing marital relations and child care have usually been a deterrent to a realization of maximum fertility. Numerous explanations, in addition to the toll of endemic diseases, intertribal warfare of former times and famine, have been offered for the existence of areas of sparse settlement, relative low fertility, and probably depopulation. The incursions of the Europeans not only brought disease, but may have caused cultural shock and social disorganization which led to lowered fertility.<sup>222</sup> The relative importance of these factors affecting fertility is usually obscure. In most large tribal societies where contact with European population continued over a long period, the initial trend toward depopulation often experienced gave way to processes of adjustment, followed by a trend toward rapid natural increase.<sup>223</sup> Susceptibility to diseases introduced by Europeans may have been counteracted by the increasing practice of modern health measures.

#### E. Summary of regional trends, 1750-1965

104. The summary of rates of growth given in table II.8 as they relate to fifty-year periods for 1750-1950 indicate broad trends for major regions of the world. From a global viewpoint, population increased at a steady, modest pace until the first half of this century, after which a marked acceleration became apparent. The long-term trend was not uniform among regions, however, but embodied considerable variation. Decline was registered for North America, stability for Europe, fluctuations for the USSR and China, while for the remainder of Asia, and for Latin America and Africa a reflection of the steady over-all increase is found.<sup>224</sup>

105. This generally slow rise of the world trend, doubling its average rate of growth in 200 years, was broken by the spectacular acceleration apparent for 1950-1965. For these fifteen years, the rate was more than double that for the preceding fifty years. The number of inhabitants probably increased by about 70 per cent between 1800 and 1900 and by about 100 per cent between 1900

<sup>221</sup> Lorimer *et al.*, *Culture and Human Fertility* ... (1954), pp. 58-90, 118-125, 255-403.

<sup>222</sup> *Ibid.*, pp. 125-132.

<sup>223</sup> For review of evidence and bibliography on this subject, with reference to other regions, see Taeuber and Han, "Micronesian Islands under ..." (1950), pp. 93-115; see also Rosenblat, *La población indígena* ..., vol. 1 (1954), p. 121. The acculturation of tribal societies in India, where direct contact with Europeans has been largely limited to missionaries and administrators, does not seem to have involved any initial trend towards depopulation, but has led to generally high and rising rates of natural increase. See Sovani, *The Population Problem in India* ... (1942), pp. 204-207.

<sup>224</sup> Broad temporal and territorial scale unavoidably mask the fluctuations which are responses to a complexity of agents of short duration or localized impact. As stated by Glass, "Population and population movements ..." (1965), p. 238, "What is interesting is ... the short-period variation, the movement of ... fertility and mortality rates ... territorial distribution of population in different points of time ... social and other differences in fertility, and changes in marriage frequency and habits". For such a study relating to England in the period immediately preceding the Industrial Revolution, see Laslett, *The World We Have Lost* (1965).

TABLE II.8. ESTIMATED AVERAGE ANNUAL PERCENTAGE RATES OF POPULATION GROWTH, 1750-1965,  
FOR THE WORLD AND MAJOR REGIONS

Regions	1750-1800	1800-1850	1850-1900	1900-1950	1950-1965
<i>World</i> .....	0.4	0.5	0.5	0.8	1.9
<i>Africa</i> .....	0.0	0.1	0.4	1.0	2.2
North Africa .....	0.2	0.5	1.2	1.4	2.5
Remainder .....	0.0	0.0	0.2	0.9	2.1
<i>Asia</i> .....	0.5	0.5	0.3	0.8	2.0
China .....	1.0	0.6	0.0	0.5	1.8
India and Pakistan .....	0.1	0.3	0.4	0.8	2.2
Japan .....	0.0	0.1	0.7	1.3	1.1
Remainder of Asia (excluding USSR) .....	0.1	0.6	0.8	1.2	2.4
<i>America</i> .....	1.0	1.5	1.8	1.5	2.2
Latin America .....	0.8	0.9	1.3	1.6	2.8
Northern America .....	...	2.7	2.3	1.4	1.7
<i>Europe (excluding USSR)</i> .....	0.4	0.6	0.7	0.6	0.8
<i>USSR</i> .....	0.6	0.6	1.1	0.6	1.6
<i>Oceania</i> .....	...	...	...	1.6	2.2

SOURCE: Durand, "The modern expansion ..." (1967), p. 137; 1950-1965 rates computed from data in United Nations, *World Population Prospects as assessed in 1968* ...

and 1965, with an increase of 30 per cent taking place between 1950 and 1965. With the exception of Japan, all major regions of the world contributed to the most recent trend of expansion, including those regions where the former general trend of increase had reversed. This downturn appeared first in North America in the period 1850-1900 and next in Europe's moderate level in the following fifty-year period, signifying that declining fertility outbalanced a lengthening life span as industrialization transformed living conditions. The low rate for the USSR in the first half of the twentieth century may be ascribed in part to unusually heavy losses in a period that included two world wars. Thus, as Japan joined the ranks of the industrialized nations, from 1950 it also experienced the demographic transition from high to low mortality and fertility.<sup>225</sup>

106. Where the demographic transition first occurred, in countries of European settlement, wide gaps between gradually descending mortality and fertility rates did not develop. In general, the slow fall of mortality acted as a brake on population growth until the downtrend of fertility gained momentum. These countries and Japan combined (the more economically developed regions), had an average growth rate of 1.2 per cent for 1960-1965.<sup>226</sup> The remainder of the world, comprising about 70 per cent of the world's 1965 population, had a corresponding rate of 2.3 per cent. Here, the recent, relatively rapid decline in mortality is not a reflection of the technological advance which has been found to foster attitudes favouring smaller families; it rests upon the experience of the more industrialized societies in combating disease and famine. High birth rates have begun to give indications

of lowering in some instances, but a repetition of the intense and rapid industrialization which accompanied Japan's decline in vital rates has not yet appeared. Without this impetus to social change, the prospect appears to be one of continued rapid growth for some time to come. This prospect is discussed in chapter XV.

107. The scientific measurement of man's numbers has been attempted only in comparatively recent times, and as yet falls considerably short of total world coverage.<sup>227</sup> Acknowledging the imperfection of the information now available, it is nevertheless evident that the numerical expansion of the human race has been sporadic. There have been periods when populations grew at a comparatively rapid rate, others when they remained nearly stationary or experienced depletion. The periods of growth have not been synchronous in different areas. Diversity in the patterns of economic and social change has been matched by a diversity of population trends.

108. In earlier centuries, the pace of demographic growth appears to have been linked to the achievement of a social and political order which more or less successfully related population to the economic resources attainable. Populations were in the short run at the mercy of violent swings of mortality, but in the secular movements of population, fertility is likely to have been a major determinant of the trend, although the mechanisms for social control of fertility were, and to a large extent remain, of infinite variety and differ in their adaptability to changing conditions. There is no warrant in population history for a belief that until recently most of mankind subsisted in a uniform state of natural propagation, with a fertility close to the maximum level, passively responding to the changing toll of death.

<sup>225</sup> Relative levels of the two fundamental factors determining population change may be summarized broadly for the modern period in three demographic régimes: high fertility and mortality; high fertility and declining mortality; low fertility and mortality. The transition from one to another of these stages is discussed in chapter III.

<sup>226</sup> Rates computed from data in United Nations, *World Population Prospects as assessed in 1968* ...

<sup>227</sup> During 1855-1864, population censuses were taken in fifty-one countries and covered about 17 per cent of the world's population. Censuses taken in 1945-1954, which included that of China, counted about 78 per cent of the world; in 1955-1964, world coverage was about 67 per cent, when 202 countries had censuses, United Nations, *Demographic Yearbook, 1962* ... (1963), p. 1.

## Chapter III

### POPULATION THEORY

1. Man has been concerned with population problems since ancient times. From antiquity, statesmen and thinkers have held opinions, based on political, military, social and economic considerations, about such issues as the most desirable number of people or the need to stimulate or retard population growth. While these ideas were formulated with a view to public policy and only in exceptional cases went beyond mere speculation or incidental observations, the thoughts expressed foreshadowed many of the issues which would make their reappearance in modern population theory. Nevertheless, no consistent population theory emerged until the modern period.

2. While these early writings merit attention in that they anticipate aspects of the more formal population theory that was to develop later, modern population theory is generally considered to have its beginnings in the late eighteenth century writings of Malthus. His work stimulated interest in population and the economic and social issues associated with it, and pushed the subject into prominence for the first time. Malthus's work created controversy and that controversy spurred further investigation into demographic problems and stimulated continuing development in methods of observation and analysis. The literature dealing with population theory since Malthus's time is voluminous and therefore its review occupies most of this chapter.

3. As in the social sciences in general, ideas and theories on population have nearly always revolved round the real or supposed problems of individual societies and have stimulated the most response when directed specifically towards those problems. Thus the ideas of the philosophers of ancient Greece dealt mainly with the population questions faced by the city-state with a relatively small population. In the Roman Empire the views on population reflected the populationist outlook of a society in which population was considered a source of power. At the dawn of the modern era, the emergence of the nation-states and the related issue of power led mercantilist writers to emphasize once again the advantages, both political and economic, of a large population. Malthus's theory had its roots in political, economic and social issues which existed during his time. The same can be said of Marxist views on population. While other approaches to population theory—mathematical, biological, sociological—were formulated later, reflecting some of the major contemporary interests, more recent developments in population theories have been influenced predominantly by two factors. The first of these was the upsurge of population growth, especially in the developing

countries. Unprecedented in earlier history, this fact has created a need for a better understanding of the factors in population growth. Secondly, the nearly universal preoccupation with the problems of development called for a considerably more penetrating theoretical framework for assessing the interrelations between population and economic and social development. In this context, the search for an acceptable population theory has gained importance, not only because it would provide a better insight into the development process, but also because such a theory would constitute a basic element in development policy-making and planning.

#### A. Ancient and mediaeval writings on population

4. Germs of certain ideas which have figured prominently in recent theoretical works on population can be found in ancient writings. The thesis that excessive population growth may reduce output per worker, depress levels of living for the masses and engender strife is of great antiquity. It appears in the works of Confucius and his school, as well as in the works of other ancient Chinese philosophers. Some of these writings suggest that the authors had some concept of optimum population, as far as the population engaged in agriculture was concerned. Postulating an ideal proportion between land and population, they held the government primarily responsible for maintaining such a proportion by moving people from over-populated to under-populated areas, although noting also that government action was reinforced at times by spontaneous migration.

5. These ancient Chinese writers also paid some attention to another aspect which has occupied an important place in subsequent literature on population theory, that is, the checks to population growth. They observed that mortality increases when food supply is insufficient, that premature marriage makes for high infant mortality rates, that war checks population growth and that costly marriage ceremonies reduce the marriage rates,<sup>1</sup> although they paid little attention to the manner in which numbers adjusted to resources.<sup>2</sup> Despite these

<sup>1</sup> Chen, *The Economic Principles of Confucius* ... (1911), vol. 1, pp. 180, 186-187, 249-250, 297-309, 322-323, 328-330, 338-339, 345-346, 355-356, 361-362; Liang, *History of Chinese Political Thought* ... (1930), pp. 65-66, 128-129, 187-188; Lee, *The Economic History of China* ... (1921), pp. 144-146, 155-156, 159, 201, 229, 292, 416-417, 419, 436-437; Weber, *Gesammelte Aufsätze zur Religionssoziologie* (1920), pp. 276-536.

<sup>2</sup> Swann, *Food and Money in Ancient China* (1950), pp. 61, 126-127, 302; Wittfogel and Fêng, *History of China's Society: Liao, 907-1125* (1949), pp. 41-112.

views on population and resources, the doctrines of Confucius regarding family, marriage and procreation were essentially favourable to population increase.<sup>3</sup>

6. The writers of early Greece were more concerned with the formulation of policies and rules for population than with theories about it.<sup>4</sup> Plato and Aristotle discussed the question of the "optimum" population with respect to the Greek city-state in their writings on the ideal conditions for the full development of man's potential. They considered the problem of population size not so much in economic terms, but more from the point of view of defence, security and government. The thought was that population should be self-sufficient, and thus possess enough territory to supply its needs but not be so large as to make constitutional government impossible.<sup>5</sup> The more specific observations on these conditions were made by Plato, particularly in his *Laws*. He held that if the so-called "highest good" was to be achieved, the city-state should have 5,040 citizens. Since the actual course of demographic trends might result in either an excess or a shortage of population, Plato also proposed measures to be taken in order to maintain the desired size. In the case of under-population, he recommended rewards, advice or rebuke to the young in order to increase the birth rate, and, in the last resort, immigration. To remedy over-population he proposed birth control for large families and, if necessary, colonization.<sup>6</sup> Aristotle dealt with population problems particularly in his *Politica*. He was less specific than Plato on the matter of optimum population but stated that in size and extent the State should be such as to enable the inhabitants to live at once temperately and liberally in the enjoyment of leisure.<sup>7</sup> He held that land and property could not be increased as rapidly as the population would grow and concluded that an excessive number of inhabitants would breed poverty and social ills. Among the factors which could prevent an excessive population he mentioned child exposure and abortion.<sup>8</sup>

<sup>3</sup> Stangeland, *Pre-Malthusian Doctrines of Population* ... (1904), p. 46; Silberman, "Hung Liang-Chi: a Chinese Malthus" (1960), p. 257.

<sup>4</sup> Whittaker, *A History of Economic Ideas* (1946), p. 320. See also Cannan, *Wealth* ... (1928), p. 54; Hutchinson, *The Population Debate* ... (1967), p. 4.

<sup>5</sup> Stangeland, *Pre-Malthusian Doctrines of Population* ... (1904), pp. 18-28; Gonnard, *Histoire des doctrines de la population* (1923), chap. 2; Moreau, "Les théories démographiques dans l'antiquité grecque" (1949), pp. 597-614.

<sup>6</sup> Plato, *Laws* (c. 340 B.C., 1926 ed.), book 4, paras. 707-709; book 5, paras. 736-741; book 6, para. 754. Plato specified 5,040 as the number of citizens "most likely to be useful to all cities because it has fifty-nine divisors". A state with 5,040 citizens would have a total population of about 60,000. Plato, *Laws* (c. 340 B.C., 1926 ed.), book 5, paras. 737-738; and his *Republic* (c. 370-380 B.C., 1930 ed.), book 2, para. 372; book 4, para. 423; book 5, paras. 459-461. See also Welles, "The economic background of Plato's communism" (1948); Whittaker, *A History of Economic Ideas* (1946), pp. 320-321.

<sup>7</sup> Aristotle, *Politica* (c. 354 B.C., 1932 ed.), para. 1326 b.

<sup>8</sup> Aristotle, *Politica* (c. 354 B.C., 1932 ed.), book 2, paras. 6-9; book 7, paras. 4-5, 16. Aristotle thus proposed some of the ideas later advanced by Malthus, but von Bortkiewicz did not consider him a forerunner of Malthus. Bortkiewicz, "War Aristoteles Malthusianer?" (1906). For a somewhat different view, see Moissides, "Le Malthusianisme dans l'antiquité grecque" (1932); Himes, *Medical History of Contraception* (1936), chap. 4.

7. The Romans viewed population questions in the perspective of a great empire rather than a small city-state. They were less conscious than the Greeks of possible limits to population growth and more alert to its advantages for military and related purposes. Perhaps because of this difference in outlook, Roman writers paid less attention to population than the Greeks. Cicero rejected Plato's communism in wives and children and held that the State's population must be maintained by monogamous marriage.<sup>9</sup> The preoccupation with population growth, the disapproval of celibacy and the view of marriage as primarily and fundamentally for procreation was mainly reflected in the Roman legislation of that time. Particularly the laws of Augustus, creating privileges for those married and having children and discriminating financially against those not married, aimed at raising the marriage and birth rates.<sup>10</sup>

8. The Hebrew sacred books placed much emphasis on procreation and multiplication and, for this reason, unfruitfulness was regarded as a serious misfortune.<sup>11</sup> In general Oriental philosophers appear to have favoured fertility and multiplication.<sup>12</sup> An exponent of some of the views on population for the period dating back to some three to four centuries B.C. is Arthashastra, a book written as a guide for rulers and attributed to Kautilya. The work discusses such aspects as the desirability of a large population as a source of military and economic power (although recognizing that the population may become too large); the effects of war, famine and pestilence, and the colonization and settlement of new areas.<sup>13</sup>

9. Early and mediaeval Christian writers considered questions of population almost entirely from a moral and ethical standpoint. Their doctrines were mainly populationist but less so than those of Hebrew writers. On the one hand, they condemned polygamy, divorce, abortion, infanticide and child exposure; on the other hand, they glorified virginity and continence and frowned upon second marriage. The main arguments in favour of celibate practices are found in the teachings of Paul.<sup>14</sup> Some early Christian defenders of ecclesiastical celibacy resorted to economic arguments not unlike some of those later used by Malthus. Referring to the growth of the known world's population, they attributed want and poverty to this cause and cited pestilence, famine,

<sup>9</sup> Cicero, *De re publica* (c. 44 B.C., 1928 ed.), book 4, para. 5. Cicero, *De officiis* (c. 44 B.C., 1913 ed.), book 2, para. 5 listed various checks to population growth—floods, epidemics, famine, wild animals, revolution—but did not attempt to state a general theory of the determinants of population change.

<sup>10</sup> Stangeland, *Pre-Malthusian Doctrines of Population* ... (1904), pp. 29-39; Gonnard, *Histoire des doctrines de la population* (1923), chap. 3; Whittaker, *A History of Economic Ideas* (1946), p. 322; Hutchinson, *The Population Debate* ... (1967), p. 8.

<sup>11</sup> Passages of the Old Testament relevant in this respect are: Genesis, i, 28; xxviii, 14; xxx, 1-28; Deuteronomy, xxvi, 5; Proverbs, xiv, 28; xvii, 6; Psalms, cxxvii, 3-5; Ecclesiastes, iv, 8; Jeremiah, xxii, 30.

<sup>12</sup> Stangeland, *Pre-Malthusian Doctrines of Population* ... (1904), chap. 2.

<sup>13</sup> Kautilya, *Arthashastra* (1956); Spengler, "Arthashastra economics" (1963).

<sup>14</sup> See I Corinthians, vii; Romans, ix, 13; Colossians, iii, 5; I Thessalonians, iv, 3; I Timothy, v, 11-14.

war, etc., as nature's means of reducing excess population.<sup>15</sup> The prevailing tendency, however, was to favour, as in earlier times, population growth. The high mortality which was found everywhere and the constant threat of sudden depopulation through famine, epidemics and wars predisposed most writers towards the maintenance of a high birth rate. The opposition to birth control, for instance, was founded not only on church doctrine but also on a fear of depopulation.

10. The views of Moslem authors on population resemble those of the Hebrew and Christian authors. Special mention should be made, however, of the interesting but long unrecognized work by Ibn Khaldoun, an Arab author of the fourteenth century. His opinions are noteworthy in two respects. In the first place, he held that a densely settled population was conducive to higher levels of living since it permitted a greater division of labour, a more effective use of resources and military and political security. Secondly, he maintained that a State's periods of prosperity alternate with periods of decline and that cyclical variations in the population occur in rhythm with these economic fluctuations. Favourable economic conditions and political order stimulated population growth by increasing natality and checking mortality. In the wake of these periods of economic progress came luxury, rising taxes and other changes which in several generations produced political decline, economic depression and depopulation.<sup>16</sup>

## B. Towards modern theory

11. The relatively short span between the late fifteenth and the late eighteenth centuries was a period of great change set in motion by the changes in man's attitudes brought about by the Renaissance. This period witnessed the emergence of the nation state, new scientific discoveries, the exploration of new territories, and the rapid growth of trade, the gradual dissolution of the mediaeval feudal system and the development of early capitalism which laid the basis for the Industrial Revolution. The combined influence of these events was reflected also in the evolution of economic ideas and the thinking on population.

### 1. MERCANTILIST, PHYSIOCRATIC AND RELATED VIEWS

12. The above-mentioned factors were important elements in the rise of mercantilism, a current of new ideas in political economy, which was greatly influenced by Machiavelli's and Bodin's theories of the absolutist State.<sup>17</sup> While the ideas of individual mercantilist and

<sup>15</sup> Theophilus, "Theophilus to Antolychus" (c. A.D. 170, 1867 ed.), book 2, para. 32; book 3, para. 6; Methodius, "The banquet of the ten virgins; or concerning chastity" (c. A.D. 270; 1869 ed.); Jerome, "Letter 22" (c. A.D. 384, 1893 ed.); Dionisius Exiguus, "Libri de creatione hominis" (c. A.D. 520, 1848 ed.); Tertullian, "De anima" (c. A.D. 200, 1870 ed.); Eusebius, "Oration in praise of Constantine" (c. A.D. 300, 1890 ed.).

<sup>16</sup> Quadir, "The economic ideas of Ibn Khaldoun" (1942); Issawi, *An Arab Philosophy of History* ... (1950), chap. 5; Rosenthal, *Political Thought in Mediaeval Islam* ... (1962), chap. 4.

<sup>17</sup> Machiavelli, *The Prince* (1513, 1963 ed.); Bodin, *Les six livres de la république* (1576). Both of them spoke of a large population as a source of strength. Hutchinson, *The Population Debate* ... (1967); Soule, *Ideas of the Great Economists* (1952), chap. 2.

cameralist writers diverged considerably and the term "mercantilism" continues to be interpreted differently<sup>18</sup> the central tenet was the power and wealth of the state, and, in particular, the accumulation of money and precious metals came to be considered by a number of these writers as the main objective of national policy. The principal means of attaining these goals of power and wealth were the expansion of foreign trade and the development of manufacturing. Mercantilist doctrine oriented towards economic policy, did not develop a population theory in a strict sense, although views on population occupied a prominent place in the mercantilist system.

13. Mercantilist ideas dominated economic thinking in most of Europe during much of the seventeenth and part of the eighteenth century. Some of the views expressed by the mercantilists are, however, already found in earlier writings, among them those of Botero. According to Botero, the strength of the state is to be found in its population and the predominance of industry over agriculture.<sup>19</sup> However, he also noted that population tends to increase to the full extent made possible by human fecundity, while the means of subsistence and their capacity to increase were limited and, therefore, imposed a ceiling on population increase. This limit on population growth manifested itself through poverty, which discouraged marriage, and through periodic calamities, such as wars and pestilence. Like some mercantilists later, Botero advocated the establishment of colonies which could help to absorb a surplus population and at the same time would strengthen the power of the state.<sup>20</sup>

14. Mercantilist writers in general stressed the advantages of a large and growing population and favoured policies aimed at stimulating population growth, including measures to encourage marriage and large families, to improve public health, to check emigration to other countries and to promote immigration especially of skilled workers.<sup>21</sup> Some mercantilists, like Child, Coke, Davenant

<sup>18</sup> See, for instance, Heckscher, *Mercantilism* (1935); Lipson, *The Economic History of England* (1947), vol. 3, pp. 3 ff.; Spengler, "Mercantilist and physiocratic growth theory" and his "Appendix to chapter I" (1960). The reasons for this diversity of views may in part be found in the circumstance that mercantilist ideas underwent an evolution during the relatively long period in which they played an important role in economic and political thinking. In addition, mercantilist writers were necessarily influenced by the conditions peculiar to their own countries. On this latter aspect, see Viner, "Power versus plenty as objectives of foreign policy ..." (1948).

<sup>19</sup> Botero, *The Reason of State and the Greatness of Cities* (1558, 1589; 1956 ed.); Spengler, "Appendix to chapter I" (1960).

<sup>20</sup> Botero, *The Reason of State and the Greatness of Cities* (1558, 1589; 1956 ed.), pp. 220-224; 376-381; Schumpeter, *History of Economic Analysis* (1961), pp. 254-255; Hutchinson, *The Population Debate* ... (1967), pp. 18-20.

<sup>21</sup> The views of individual mercantilist writers on population are discussed in: Stangeland, *Pre-Malthusian Doctrines of Population* ... (1904), pp. 118-223; Gonnard, *Histoire des doctrines de la population* (1923), part 2; Reynaud, *La théorie de la population en Italie* ... (1904), part 1; Small, *The Cameralists, the Pioneers of German Social Policy* (1909); Viner, *Studies in the Theory of International Trade* (1937), chaps. 1-2; Johnson, *Predecessors of Adam Smith* ... (1937), especially part 2; Heckscher, *Mercantilism* (1935), vol. 2; Spengler, *French Predecessors of Malthus* (1942), chaps. 2-3, 9; Cole, *French Mercantilism, 1683-1700* (1943), pp. 3-6, 229-272, (Continued on next page)

and Bossuet, argued that wealth itself consists in the largest possible population,<sup>22</sup> while others, like Fortrey and Becher, stressed the combination of a large population and much money.<sup>23</sup> Even those mercantilist writers who did not pay much attention to population, usually considered a large population as an important element in the strength of the State.<sup>24</sup> The mercantilists saw both political and economic advantages in having a numerous population. Population was not only an important factor in the power of the State, but also played a role in increasing the State's revenue and wealth. These latter goals, it was argued, could be reached either by increasing the total income of the State or through a higher excess of national product over its wage costs. Both would be served by a larger population, since such a population would, supposedly through a large and growing labour force, simultaneously generate a higher income<sup>25</sup> and depress wage levels and thus wage costs.<sup>26</sup> Temple asserted that the density of population is the basis of wealth. He argued that when population is scarce, people can easily obtain their livelihood and that, as a result, they would become lazy. On the contrary, under conditions of high density, people would have to work hard to live, creating attitudes favouring economic activity and industry.<sup>27</sup> The benefits of a larger population and additional labour would be particularly great, according to most mercantilist writers, if they served to develop manufacturing. This since manufacturing rather than agriculture was supposed to yield increasing returns and because manufactured products could be exchanged abroad for precious metals—materials considered among the most important elements in a nation's wealth.

15. In general mercantilist writers were inclined to consider a large population desirable, but differences in degree and even in opinions existed. Various writers

(Footnote 21 continued)

284-286; Spengler, "Mercantilist and physiocratic growth theory" (1960); and his "Appendix to chapter I" (1960); Hutchinson, *The Population Debate* ... (1967), chap. 3.

<sup>22</sup> Child, *A New Discourse on Trade* (1694), chaps. 2 and 10; Coke, *A Treatise Wherein is Demonstrated, that the Church and the State of England* ... (1671), pp. 2, 10; Bossuet, *Œuvres oratoires* (1922), vol. 1, p. 457; Bodin, *Les six livres de la république* (1576), book 5, chap. 2. Although French economic literature of the seventeenth century is relatively limited, in practice measures aimed at stimulating the increase of population were probably as important, or even more so, as in other countries which followed a mercantilist policy, viz. Colbert's legislation on marriage, dowries etc. Cole, *Colbert and a Century of French Mercantilism* (1939), vol. 1, pp. 19-26, 45.

<sup>23</sup> Fortrey, *England's Interest and Improvement* ... (1673), p. 218; Becher, *Politische Diskurs von den eigentlichen Ursachen* ... (1688), pp. 110-112, 305-321.

<sup>24</sup> Mun, *England's Treasure by Forraign Trade* (1664, 1949 ed.), pp. 86-87.

<sup>25</sup> Most mercantilists regarded labour and its industry as the main source of wealth. Child, *A New Discourse on Trade* ... (1694); Davenant, *Discourses on the Publick* ... (1698), vol. 1, p. 17; Hull, ed., *The Economic Writings of Sir William Petty*, No. 1 ... (1899), p. 108.

<sup>26</sup> Mandeville, *The Fable of the Bees* ... (1723), pp. 212, 280, 327-328; Petyt, *Britannia Languens* ... (1680), pp. 153 ff.

<sup>27</sup> Temple, *Observations upon the United Provinces of the Netherlands* (1696); and his *An Essay upon the Advancement of Trade in Ireland* (1673). See also, Landry, *Traité de démographie* (1949), p. 518; Spengler, "Appendix to chapter I" (1960).

recognized that the size of a country's population was determined by the amount of subsistence that could be produced at home or obtained from abroad.<sup>28</sup> Others held that a large labour supply was useful only if it could be employed or that the size of the population was determined by the employment that could be made available.<sup>29</sup> Spengler noted that populationist feelings were probably strongest in countries such as Germany and Spain which had experienced depopulation, but less so in France, Italy, and especially England, where even some apprehension at over-population was expressed. In addition he stated that populationists lost much of their support in the latter half of the eighteenth century when the view that the growth of subsistence governs that of numbers became generally accepted.<sup>30</sup> Some mercantilist and cameralist writers commented on a variety of factors affecting population growth, such as plagues, wars, climate, infecundity due to urbanization and other causes, vice, abortion, postponement of marriage, debauchery and mortality, the effects of emigration to colonies and of the immigration of skilled workers, but writers in this tradition did not, on the whole, attempt a systematic explanation of population changes and their causes.

16. The physiocratic school of thought was in part a reaction against the ideas and policies proposed by mercantilist writers, and consequently opposed state intervention, trade regulation and other aspects of mercantilist thinking. The fundamental concept in the physiocratic thinking, according to Gide and Rist, was the "natural order" and within this system the economic aspect which stood in the foreground was the role of land in production.<sup>31</sup> Unlike the mercantilists, the physiocrats found the agricultural sector to be most strategic: the growth of the entire economy was supposed to be governed by the increase in agricultural produce. The physiocrats did not accept the populationist tenets of the mercantilist writers, in particular they did not agree with the mercantilist policy of increasing population even at the expense of levels of living. Nevertheless, they took a generally favourable view of population growth, on the condition that it was possible to expand agricultural production to support the increasing population. Some of the physiocrats were optimistic in this respect, others had a more pessimistic opinion.

17. Some of the ideas of the physiocrats were shared by Cantillon, who in other respects, can be considered a mercantilist writer. He believed that land was the main factor determining wealth, and that population would be limited by the amount of subsistence which could be

<sup>28</sup> Becher, *Politische Diskurs von den eigentlichen Ursachen* ... (1688).

<sup>29</sup> Child, *A New Discourse on Trade* ... (1698), pp. 186 ff.; Davenant, *Essays upon Ways and Means* ... (1695); Ulloa, *Restablecimiento de las fábricas y comercio español* (1740).

<sup>30</sup> Spengler, "Mercantilist and physiocratic growth theory" (1965); According to Petersen, *The Politics of Population* (1964), p. 30, mercantilist writers never were able to reconcile their desire for a large population with the existence of "overcrowding" as shown by a high incidence of vagrancy and crime.

<sup>31</sup> Gide and Rist, *Histoire des doctrines économiques* (1947), vol. 1, pp. 6-13; Soule, *Ideas of the Great Economists* (1952), chap. 3.



produced on the land. In his explanation of population trends Cantillon distinguished between people living at the subsistence level where maximum population size was determined by the amount of subsistence available, and the wealthier classes, such as royalty, landowners etc., accustomed to a certain level of living and willing to give up or postpone marriage in order to maintain that level.<sup>32</sup>

18. The best-known among the physiocrats, Quesnay, thought that a large population was desirable, but under the condition that people must live comfortably. He stressed in maxims XXV and XXVI of his *Tableau*, that more emphasis should be given to the increase of wealth than to that of population. In his opinion, population tends to overtake the means of subsistence. As evidence he cited that there were always people who live poorly and in want. Although he noted that colonies might serve as outlets for excessive population, he and his followers stressed the increase of agricultural production and net product, and not the increase in numbers, as the proper objective.<sup>33</sup> Mirabeau considered a large population desirable, but emphasized also that population is dependent on food supply and that agriculture should be encouraged in every conceivable manner.<sup>34</sup> Mercier de la Rivière also believed in the dependence of population on the means of subsistence, but thought that when governments promoted the best possible ways of cultivation, the increase in production would outpace that in population.<sup>35</sup>

19. The optimism of the eighteenth century writers concerning the possibilities of feeding a growing population reached its peak at the time of the French Revolution.<sup>36</sup> Two writers are worthy of special note: Godwin, a philosopher and social reformer, and Condorcet, a mathematician and philosopher. Godwin had boundless faith in science; he declared that scientific progress would multiply the food supply to the point where a man would have to work only one half hour daily to satisfy all his needs. He did not think that the abundance thus created would lead to over-population, since man's reason was strong enough to curb sexual desire and procreation. He ascribed the poverty of the people and the vices of the society of his time mainly to the inequalities imposed by the social institutions.<sup>37</sup> Condorcet professed the same

faith in the power of science and in the future of human society: science would be able to prolong the life span without any worsening of the human condition through a production of food which would reach unsuspected heights and also because reason would come in to play to prevent irrational population growth.<sup>38</sup>

## 2. POLITICAL ARITHMETIC

20. The period between the late fifteenth and late eighteenth century saw not only a significant evolution of the views on population, but witnessed also the beginnings of the systematic measurement and analysis of population trends. Graunt in his *Natural and Political Observations on the Bills of Mortality* . . . , published in 1662, was the first to discern an underlying order in vital statistics. Using mainly the "bills of mortality" of the City of London, which were reports on burials and incidentally other events such as births, he observed the numerical regularity of a variety of demographic phenomena. He studied such matters as the sex ratio at birth; the relation between burials and christenings in London comparing it with that in a rural parish; the frequency of births and deaths in relation to population; the ratio of births to weddings as an index of fertility, etc. In addition, he commented on such matters as migration to the city, the effects of war and emigration on the sex ratio; the excessive size of London; the future growth of the city and a schematic life-table design.<sup>39</sup>

21. Petty, with whom Graunt collaborated,<sup>40</sup> not only analysed some of the demographic aspects also dealt with by Graunt, but maintained that arithmetic could be applied to population, economic and "political" affairs and developed a "political arithmetic" which involved a more searching study of population in human affairs and is considered the precursor of modern demography. Petty stressed the importance of population as "human capital", calling labour "the Father and active principle of wealth, as Lands are the Mother". He also was the first to attempt an estimate of "human capital" as well as of income and is thought to be the first to have intro-

<sup>32</sup> Cantillon, *Essai sur la nature du commerce en général* (1755, 1952 ed.), chaps. 15-16, also held that if agriculture fell short of requirements, or was subject to diminishing returns, additional agricultural products could be obtained abroad in exchange for manufactured goods. See also Landry, *Traité de démographie* (1949), pp. 519-522.

<sup>33</sup> Quesnay, *Œuvres économiques* . . . (1758, 1888 ed.); Spengler, "Mercantilist and physiocratic growth theory" (1960); Schumpeter, *History of Economic Analysis* . . . (1961), p. 257; Stangeland, *Pre-Malthusian Doctrines of Population* . . . (1904), pp. 255-257.

<sup>34</sup> Mirabeau, "L'ami des hommes ou traité de la population" (1755). See also Landry, *Traité de démographie* (1945), pp. 522-523.

<sup>35</sup> Mercier de la Rivière, *L'ordre naturel et essentiel des sociétés politiques* (1767, 1910 ed.).

<sup>36</sup> For a discussion of views on population at this time see Fage, "La révolution française et la population" (1953); Reinhard, "La révolution française et le problème de la population" (1946).

<sup>37</sup> Godwin, *An Enquiry Governing Political Justice* . . . (1796), vol. 2, book 8; Gide and Rist, *Histoire des doctrines économiques* (1947), vol. 1, pp. 141-142.

<sup>38</sup> Condorcet, *Esquisse d'un tableau historique* . . . (1795). See also Spengler, "Mercantilist and physiocratic growth theory" (1960), pp. 59 ff.

<sup>39</sup> Graunt, *Natural and Political Observations* . . . (1662, 1939 ed.); Glass, "John Graunt and his natural and political observations" (1963); Lorimer, "The development of demography" (1959); Ptoukha, "John Graunt, fondateur de la démographie" (1937); Willcox, "Biographical sketches: John Graunt, Lemuel Shattuck, John Shaw Billings" (1940). A more complete life table than Graunt's was published thirty years later by Halley, "An estimate of the degree of the mortality of mankind . . ." (1693, 1942 ed.).

<sup>40</sup> According to some writers, Petty, rather than Graunt, is the author of *Natural and Political Observations* . . . (1662, 1939 ed.). See for this discussion Hull, ed., *The Economic Writings of Sir William Petty*, vol. 1 . . . (1899); Willcox, "Biographical sketches: John Graunt, Lemuel Shattuck, John Shaw Billings" (1940); Greenwood, *Medical Statistics from Graunt to Farr* (1948); Glass, "Graunt's life table" (1950); Strauss, *Sir William Petty* (1954), p. 188.

duced the division of the population and the economy into primary, secondary and tertiary activities.<sup>41</sup>

22. Around the middle of the eighteenth century the research initiated by Graunt and Petty was carried further by Süssmilch, who saw in the regular patterns in population movements and relations the divine hand of Providence which ruled human society. Noting the existence of a number of checks to population growth, he wrote that they might be means for preventing excessive population, and particularly could be considered as punishments. Süssmilch studied a great number of demographic factors and their interrelations including the sex ratio at birth and at later ages, the distribution of deaths according to age and cause of death, the relations between population and marriages, births and so forth. Apart from constructing the first life table for Prussia, he also analysed the effects of age at marriage, dissolution of marriage by death, the nursing of infants and other factors on fertility.<sup>42</sup> He noted, as did Gregory King and others,<sup>43</sup> that population grew in geometric progression and while he believed that under normal conditions it might tend to double approximately every century, he said that under certain conditions the period of doubling might be as little as forty-two years.

23. Most of the writers in this tradition held the prevailing populationist view, but nevertheless recognized that the means of subsistence determined population. Their major contribution is the fact that even with limited statistical data at their disposal and a lack of basic theoretical concepts and methods of analysis, they extended the horizons of thought in population theory by breaking down limitations imposed on it in earlier times.

### C. Malthus and his theory

24. The eighteenth century was a period of profound change in intellectual climate. These changes were to have a decisive influence on social and economic as well as population theory. As old religious and philosophical beliefs were abandoned under the influence of the enlightenment, the conviction grew that human institutions would be subject to a natural order, as scientific discoveries had shown was true in the physical world. However, ideas about the character of the "natural order" differed. Some, like Condorcet and Godwin, thought that the "natural" society was one in which all bounties of nature should be held in common and in which progress through science would be continuous. On rejecting these views, Malthus, writing in the tradition of his times, based his thinking on his own idea of necessary relations as established in his principle of population.

Instead of the egalitarian society in continual progress, he envisaged the inevitability of a class society with the poor condemned to live at the subsistence level.

25. The view that man's capacity to reproduce was unlimited, whereas that of producing his means of subsistence was limited, had already been proposed by such writers as Botero in the sixteenth century.<sup>44</sup> Wallace, writing around the middle of the eighteenth century, drew attention to the relatively short period in which population could double and contrasted it with the capacity for food production.<sup>45</sup> Similar views were also found in other parts. In the last decade of the eighteenth century, the Chinese writer Hung Liang-Chi noted that the increase in means of subsistence was not in direct proportion to that in population. He argued that while in the course of a century population can increase from five-fold to twenty-fold, the means of subsistence—because of the limitation of the land area—could increase only from three to five times.<sup>46</sup>

26. These ideas were most forcefully presented by Malthus. He was the first to develop a consistent and comprehensive population theory in relation to economic conditions and his writings exercised a great influence on population and economic theory. He developed his ideas on population mainly in his *Essay on the Principle of Population*, first published in 1798.<sup>47</sup> The first edition of his *Essay* was essentially a polemic directed against earlier writers who held more optimistic views concerning the possibilities of supporting an increasing population. Malthus criticized in particular Condorcet's conjectures regarding the perfectability of man, Godwin's system of equality, his allegation that the vices of mankind originated in human institutions. On his part, Malthus regarded the social institutions of his days as natural and inevitable, asserting "the absolute impossibility from the fixed laws of our nature, that the pressure of want can ever be removed from the lower classes of society" and that "the principal and most permanent cause of poverty has little or no direct relation to forms of government, or the unequal distribution of property". Having formulated the principle that man could increase his subsistence only in arithmetical progression whereas his numbers tended to increase in geometrical progression, Malthus replied to the optimism expressed by other writers that man's capacity to increase his means of subsistence was much less than his capacity to multiply and that the evils of over-population existed and had always existed. The history of mankind, according to Malthus, demonstrated that population always tended towards the limits set by subsistence and was contained within those limits by the operation of positive and

<sup>41</sup> Petty, *Political Arithmetick* ... (1691); and his *Verbum sapienti* (1665); Hull, ed., *The Economic Writings of Sir William Petty*, vol. 1 ... (1899); Bonar, *Theory of Population from Raleigh to Arthur Young* (1931), chaps. 3-5; Cannan, *A Review of Economic Theory* (1929, 1964 ed.), pp. 14-17; Lorimer, "The development of demography" (1959); Hutchinson, *The Population Debate* ... (1967), pp. 46-50.

<sup>42</sup> Süssmilch, *Die göttliche Ordnung in den Veränderungen* ... (1775); Lorimer, "The development of demography" (1959); Hutchinson, *The Population Debate* ... (1967), pp. 112-113, 123.

<sup>43</sup> King, "Natural and political observations and conclusions ..." (1696, 1936 ed.).

<sup>44</sup> See section B of this chapter.

<sup>45</sup> Wallace, *Various Prospects of Mankind, Nature and Providence* (1761); Cannan, *A Review of Economic Theory* (1929, 1964 ed.), pp. 66-67.

<sup>46</sup> Ho, *Studies on the Population of China* ... (1959); Chesneaux, "Un pré-malthusien chinois: Hong Liang Ki" (1960); Sauvy, *Malthus et les deux Marx* ... (1963), p. 154; Silberman, "Hung Liang-Chi; a Chinese Malthus" (1960), also mentions the existence of the eighteenth century Japanese writer, Toshiaki Honda, who had similar ideas.

<sup>47</sup> Malthus, *An Essay on the Principle of Population as it Affects the Future Improvement of Society* ... (1798).



preventive checks, which, with the exception of the deferment of marriage, would take the form of either "misery" or "vice".<sup>48</sup>

27. In the much revised and enlarged second and later editions of his *Essay* Malthus developed his theory further and examined at greater length the role of population as the principal cause of poverty.<sup>49</sup> The basic propositions he attempted to prove are stated as follows:

"1. Population is necessarily limited by the means of subsistence. 2. Population invariably increases where the means of subsistence increase, unless prevented by some very powerful and obvious checks. 3. These checks, and the checks which repress the superior power of population, and keep its effects on a level with the means of subsistence, are all resolvable into moral restraint, vice, and 'misery'."

After stating that strong impediments to population growth are constantly in operation, Malthus inquires what would be the natural increase of population, if left unchecked, and what would be the rate at which the means of subsistence can be increased. On this basis he derives his two basic propositions that population tends to double itself every twenty-five years, thus increasing in a geometrical ratio, while under the most favourable conditions agricultural produce increases each twenty-five years by an equal quantity, thus increasing only in an arithmetical ratio. He concludes that "Taking the whole earth ... the human species would increase as the numbers 1, 2, 4, 8, 16, 32, 64, 128, 256 and subsistence as 1, 2, 3, 4, 5, 6, 7, 8, 9. In two centuries, the population would be to the means of subsistence as 256 to 9 ..."<sup>50</sup>

28. In general, Malthus appears to assume diminishing returns from land.<sup>51</sup> While the ultimate check to population is then the lack of food resulting from the different rates at which population and food increase, there are operating, according to Malthus, other checks which keep population down to the level of subsistence. He classified these under two headings: the preventive and the positive checks. The former ones, being voluntary, arise from man's reasoning faculties which enable him to foresee distant consequences, and they include moral restraint, which consisted mainly of the deferring of marriage, and "vice", which could take the form of the prevention of the birth of children, extra-marital sexual relations and prostitution. The positive checks were

assumed to be extremely various and to include all factors which contributed in any degree to a shortening of the normal duration of life. Among them were epidemics, wars, plague and famine, all manifestations of "misery". Malthus asserted that although one or more of these checks operate in every country, there are only few cases in which population does not tend to increase beyond the means of subsistence.<sup>52</sup> Under these conditions, Malthus concluded, moral restraint, together with frugal conduct, was the only practicable and morally acceptable alternative to unrestrained population growth.<sup>53</sup> Since the increase of population is limited by the increase in the means of subsistence, the encouragement of marriage, as opposed to moral restraint, would be possible only at the cost of higher mortality. Likewise, the reduction of mortality due to one cause of death would increase mortality due to some other cause.<sup>54</sup>

29. Malthus reviewed conditions in various societies and countries in order to substantiate his thesis and concluded that the history of mankind validated his basic propositions.<sup>55</sup> Nevertheless, the lack of a more objective approach and a less restrictive interpretation made Malthus overlook the fact that the scheme he proposed was not inevitable, as proved by the experience of countries then in the process of, or on the threshold of, the industrial revolution.

30. Much of Malthus's influence on his contemporaries and of the controversy surrounding him did not derive directly from his "principle of population" but from his rigid views of society. Malthus's view that the conditions of the poorer classes could not be improved by a more equitable distribution of income is found especially in his discussion of the system of the so-called "poor laws" existing at that time in England. He asserts that such a system of relief for the poor, given the quantity of food available, would only have the effect of increasing the population, raising the price of provisions and especially impoverishing the labouring classes immediately above the poor.<sup>56</sup> These arguments became a political force in England during the first half of the nineteenth century when these measures were under discussion.<sup>57</sup> Malthus's rigid views of society caused violent attacks by the opponents of the existing order, thus complicating the controversy concerning his propositions regarding population.<sup>58</sup> As far as the latter are concerned, Malthus's writings constituted an important factor in the subsequent development of population theory. His "principle of population" by creating considerable controversy, made both his followers and opponents conscious of the need for a

<sup>48</sup> *Ibid.*, chaps. 2, 4, 7.

<sup>49</sup> For a summary of Malthus's views as set forth in various editions of the *Essay* and other works, see: Spengler, "Malthus' total population theory: a restatement and reappraisal" (1945); Bonar, *Malthus and his Works* (1885, 1924 ed.), pp. 319 ff.; McCleary, *The Malthusian Population Theory* (1953), chaps. 1-6.

<sup>50</sup> Malthus, *An Essay on the Principle of Population*, 7th ed. (1872), book 1, chap. 1.

<sup>51</sup> *Ibid.* Malthus states "When ... all fertile land is occupied, the yearly increase of food must depend upon the melioration of the land already in possession. This is a fund, which, from the nature of all soils, instead of being increasing, must be gradually diminishing". He was more explicit in this respect in his *Observations on the Effects of the Corn Laws* (1814, 1932 ed.). See also Marshall, *Principles of Economics* (1890, 1961 ed.), p. 179; McCleary, *The Malthusian Population Theory* (1953), pp. 109-112; Hutchinson, *The Population Debate ...* (1967), pp. 160-161. See however, Cannan, *A History of the Theories of Production ...* (1903), p. 144.

<sup>52</sup> Malthus, *An Essay on the Principle of Population*, 7th ed. (1872), book 1, chap. 2.

<sup>53</sup> *Ibid.*, book 4, chaps. 1-4.

<sup>54</sup> *Ibid.*, book 4, chap. 5.

<sup>55</sup> *Ibid.*, book 1, chaps. 3-14; book 2, chaps. 1-10, 13.

<sup>56</sup> *Ibid.*, book 3, chaps. 5-7.

<sup>57</sup> Court, *A Concise Economic History of Britain ...* (1954), pp. 7-8.

<sup>58</sup> Sauvy, *Malthus et les deux Marx ...* (1963), p. 38, notes that Malthus in his theory introduces an element of the class struggle. See also Myrdal, *Population: A Problem for Democracy* (1940, 1962 ed.), pp. 14-17.

better understanding of population trends and their relations with social and economic conditions.

#### D. The classical and neo-classical schools of economics and population theory

31. The evolution of population theory during the first half of the nineteenth century was largely dominated by two developments. One of these was the incorporation into the theory of the "classical school" of Malthus's population principle, thus placing it in the context of a theory of economic growth. However, during the same period, Malthus's views were becoming increasingly criticized within the context of traditional economic thinking as well as by non-economists.<sup>59</sup>

##### 1. MALTHUS'S POPULATION THEORY AND THE THEORY OF ECONOMIC GROWTH OF THE CLASSICAL SCHOOL

32. The "classical school" did not constitute a school of thinking in the usual sense of the word.<sup>60</sup> The unifying element in the views of these writers was their concern with the "laws" governing the levels and trends of production and its distribution among wages, interest, rent and profits. However, fundamental differences existed among the classical economists concerning their opinion about the outlook for future economic growth. While some of them were optimistic in this respect, most took a more pessimistic view. Basing themselves on the Malthusian theory of population and the "law" of diminishing returns, they derived their theory of the "stationary state" which pretended to explain how, through the interaction of the forces involved, economic growth would come to a standstill under equilibrated conditions and a stationary population and income.<sup>61</sup>

33. The law or principle of diminishing returns had already been advanced by Serra, Stewart and Turgot. Diminishing returns, however, were thought to be typical for agriculture only, whereas industry, with the possibilities it offered for increasing the division of labour and continued technological improvement, was assumed to be working under either constant or increasing returns. Decreasing returns in agriculture were expected, at least beyond a certain point, because, first, the quantity and quality of land were fixed and, secondly, the opportunities for a far-reaching division of labour and technological progress were limited in agriculture. In the absence of the latter, the fixed quantity and quality of land meant

that in the long run agricultural production could be expanded only by resorting to land of inferior quality with lower returns to labour or by bestowing on land already in use additional labour—or additional labour and capital in a fixed proportion—which also after a given point would result in lower than proportionate increases in production.<sup>62</sup> Views as to the extent to which other factors might offset the trend towards diminishing returns in agriculture differed. Some writers qualified their opinion in the sense that they argued that with improvements in agricultural skills and in land tenure, returns in agriculture would not decline as rapidly as in their absence, but they conceded that decreasing returns were bound to prevail if population continued to grow.<sup>63</sup> Others recognized that increasing returns might prevail in industry, but thought that the extension of the division of labour and technological progress in the non-agricultural sectors could not in the long run compensate for the diminishing returns in agriculture, partly because industries depended on raw materials from that sector.<sup>64</sup>

34. Malthus's proposition that population was limited by the means of subsistence and that, in the absence of checks, population would increase when these means increased, was incorporated in the theory of wages of the classical school. According to this, wages tended towards a level which was just necessary to enable the labourers to subsist and "to perpetuate their race without either an increase or decrease".<sup>65</sup> This wage theory held that at the so-called subsistence wage level,<sup>66</sup> the supply of labour would be completely elastic. If wages were above the subsistence level—and the means of subsistence of the workers were above the minimum level for any length of time—population and labour supply would tend to reproduce at a more rapid rate in accordance with Malthus's theory and the increased supply of labour would tend to bring wages down again to the subsistence level. Likewise, if wages were below the subsistence or natural price, population would decline; but in response

<sup>59</sup> Some of the severest criticisms of Malthus's theory came from the pre-Marxian socialists, but since the socialist ideas on population were only fully developed by Marx around the middle of the century, they are dealt with in the section on Marxist views on population.

<sup>60</sup> No unanimity exists as to what writers should be considered as belonging to the classical school. Usually Smith, Ricardo, Malthus, Say, West and James Mill are considered among its main contributors.

<sup>61</sup> Since the different writers in this school did not share identical views, nor develop their analyses in all detail, this is a synthetic view of the theory of the classical school developed mostly by modern economists. Baumol, *Economic Dynamics* ... (1951), pp. 11-19; Meier and Baldwin, *Economic Development* ... (1957), pp. 34-39; Higgins, *Economic Development* ... (1959), pp. 95-99; Adelman, *Theories of Economic Growth and Development* (1961), chaps. 3-4.

<sup>62</sup> West, *Essay on the Application of Capital to Land* ... (1815), p. 7; Ricardo, *Principles of Political Economy and Taxation* (1821, 1933 ed.); Mill, *Elements of Political Economy* (1821); Senior, *An Outline of the Science of Political Economy* (1836); Malthus, *Principles of Political Economy* ... (1836); Mill, *Principles of Political Economy with Some of Their Applications to Social Philosophy* (1848); McCulloch, *Principles of Political Economy* ... (1825), part 3, chap. 6; Say, *Traité d'économie politique* ... (1826), book 1, chap. 1. The formulation of the concept of diminishing returns by the writers of the classical school was not always very rigorous and concise, although the essential elements of the principle were contained in their ideas.

<sup>63</sup> Senior, *An Outline of the Science of Political Economy* (1836), pp. 26 ff., 81-86, thought that even then there would be no reason for alarm, as long as food could be imported in exchange for manufactured products.

<sup>64</sup> Mill, *Principles of Political Economy with some of Their Applications to Social Philosophy* (1848), book 1, chaps. 10-13; Ricardo, *The Principles of Political Economy and Taxation* (1821, 1933 ed.), chap. 31.

<sup>65</sup> Ricardo, *The Principles of Political Economy and Taxation* (1821, 1933 ed.), chap. 5.

<sup>66</sup> The concept of subsistence wage is not a completely unequivocal concept. Some of the contemporary writers regarded it as the wage necessary to satisfy the purely biological requirements, as in the case of Ricardo; others believed that the subsistence wage was, at least in part, socially or culturally determined.

to the resulting labour shortage, wages and population would rise again, tending towards the equilibrium level.

35. The two basic principles of classical doctrine, diminishing returns and the pressure of population on subsistence, were, together with the theory of accumulation, at the core of the long-run view of economic growth of the classical school. This led to the stationary state of the economy and the population.<sup>67</sup> Like most economists since, the classical economists took it for granted that profit was the motive force in economic growth and particularly in capital formation. As long as additional investments were expected to produce profits, capital accumulation would continue and so would the demand for labour. As a result of the latter, wages would remain above the subsistence level and induce population to grow, as postulated in the Malthusian theory. From a certain point on, due to the fixed quantity of land, diminishing returns would set in and profits and wages would decline. This process would continue until the point was reached where wages reached their lowest level—the subsistence level—and profits would disappear. This would also be an equilibrium situation, since with wages at the subsistence level, population would not grow further and with the disappearance of profits, capital accumulation would come to an end and income would stabilize.

36. Although most of the classical economists as well as their successors considered it likely that ultimately, economic growth—and with it population growth—would come to an end, only a few regarded the stationary state as imminent or absolutely inevitable. In fact, Smith did not share the pessimistic view of the later classical economists and he thought that under favourable conditions the propensity to “truck and barter” would cause ever-increasing specialization, improvement in technology and expanding markets.<sup>68</sup> A growing population, according to Smith, by widening the market and fostering inventiveness, facilitated the division of labour. Increasing division of labour would produce greater productivity, a larger revenue and stock which would produce an enlarged wage fund, an increased demand for labour and, thus, economic conditions favourable to population growth. Everett subscribed to the idea that an increase in population would produce “a division of labour and a consequent increase of skill in its application”. The result of this was, he said, an extension of manufacturing and trade, with a rise in wages due to the increasing productivity of labour.<sup>69</sup> Senior believed that there was a natural tendency for subsistence to increase at a greater ratio than population.<sup>70</sup> Carey stressed what

he called “the power of association” which grew as population increased and made possible greater diversity of employment, greater development of the human faculties, and increasing *per capita* output.<sup>71</sup> Some of the early American critics of the classical theory and Malthusian views in particular, argued that increasing population density would increase the division of labour.<sup>72</sup> Ricardo, whose views were among the most pessimistic, considered it possible that the natural tendency of profits to fall, leading to stagnation, could be checked by “improvements in machinery” and discoveries in “the science of agriculture”.<sup>73</sup> He also noted that in a society improving because of capital accumulation, the market wage—that is the wage actually paid—might remain above the natural or subsistence wage rate and that the resulting demand for labour would give a continuous stimulus to population growth. J. S. Mill, although accepting Malthus’s principle of population and assuming the inevitability of the stationary state, stressed, among others, social reforms, improvements in education, progress in science and the state of the arts, the extension of specialization and more efficient economic organization as factors which could make for long-term economic progress. While arguing that countries like England could not indefinitely import food, he mentioned emigration as a factor in reducing but not solving population pressure.<sup>74</sup> Some other writers noted that the operation of the law of diminishing returns in agriculture could be weakened through international trade by exchanging manufactured for agricultural products or through emigration.<sup>75</sup>

37. In the theoretical framework of the classical school, population emerged as essentially a dependent variable, the supply of labour being considered perfectly elastic at the subsistence level of wages.<sup>76</sup> This point of view is expressed by several of the classical economists. According to Smith, “the demand for men like that of any other commodity necessarily regulates the production of men”.<sup>77</sup> Ricardo maintained that population “regulates itself by the funds which are to employ it and, therefore, always increases or diminishes with the increase or diminu-

<sup>67</sup> The description of the mechanism by which a progressive state developed into a stationary state is mostly based on modern interpretation of classical theory. Harrod, *Towards a Dynamic Economics* ... (1963); Adelman, *Theories of Economic Growth and Development* (1961); Baumol, *Economic Dynamics* ... (1951); Higgins, *Economic Development* ... (1959).

<sup>68</sup> Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776, 1966 ed.); see also Hansen, *Fiscal Policy and Business Cycles* (1941), p. 350.

<sup>69</sup> Everett, *New Ideas on Population* ... (1823), chaps. 4-5. See also Spengler, “Alexander Hill Everett, early American opponent of Malthus” (1936).

<sup>70</sup> Senior, *Outline of the Science of Political Economy* (1836), p. 49.

<sup>71</sup> Carey, *Principles of Social Sciences* (1858), vol. 1, chaps. 7-10, was of the opinion that contrary to Ricardo’s assumption, cultivation proceeded from inferior to superior soils. On this point, see also Rogers, *A Manual of Political Economy* ... (1869), pp. 14, 69, 154-159.

<sup>72</sup> See Smith, *The Malthusian Controversy* (1951), pp. 58, 118-119, 147, 191, 229; Cady, “The early American reaction to the theory of Malthus” (1931); Spengler, “Population doctrines in the United States” (1933).

<sup>73</sup> Ricardo, *The Principles of Political Economy and Taxation* (1821, 1933 ed.), chaps. 5, 6 and 31.

<sup>74</sup> Mill, *Principles of Political Economy* ... (1848), book 1, chaps. 10-13.

<sup>75</sup> Senior, *Political Economy* (1836), pp. 26 ff., 81-86; Fawcett, *Manual of Political Economy* (1863), pp. 159-160, 249-250. This view was, however, not held by Mill, *Principles of Political Economy* ... (1848), book 1, chap. 13.

<sup>76</sup> McKinley, “The theory of economic growth in the English classical school” (1960).

<sup>77</sup> Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776, 1966 ed.). Gray saw in this statement a summary of Malthus’s theory. Gray, *The Development of Economic Doctrine* ... (1931, 1963 ed.), p. 135.

tion of capital”<sup>78</sup> Malthus’s proposition that the pressure of population on the means of subsistence would not engender an effective stimulus to the continued increase of wealth reflects the same opinion.<sup>79</sup> Other writers of the classical school like James Mill, Senior, and McCulloch held similar opinions.<sup>80</sup>

38. Nevertheless, the classical writers often not only qualified their theory of economic growth in the sense that technological progress might postpone the coming of the stationary state, but also their views on population in that they did not exclude the possibility that population growth might respond to other factors than the limits set upon it by the means of subsistence. Ricardo suggested the possibility of some form of voluntary population control in mentioning that the best security against overpopulation would be to stimulate “a taste for comforts and enjoyments” in the labouring classes.<sup>81</sup> A more moderate than usual formulation of the population principle by Senior, who asserted that population was limited “only by the moral or physical evil or by the fear of deficiency of those articles of wealth which the habits of the individual have lead them to require”, suggests the existence of such control.<sup>82</sup> J. S. Mill, although supporting Malthus’s propositions that population could double in not much more than twenty years, made the important distinction between economically more and less advanced countries. Arguing that in the latter population would be checked by want and starvation, he also thought that in the more advanced societies population growth would be restrained by the fear of want and the desire for improved living conditions. The increase in numbers could be checked by means of the limitation of births, prompted by “prudence and foresight” and “conscientious self-restraint”. These motivations and practices were most evident among the middle classes according to Mill, but the gradual, though slowly increasing levels of living of the labouring classes would presumably lead to a spread of these practices also in the latter.<sup>83</sup>

39. Whereas English writers probably made the most significant contribution to the classical theory, the works of contemporaries in other countries merit attention because, although they held ideas similar to those of the former, on the whole they took a more optimistic view of the population problem.<sup>84</sup> In Germany, von Thünen, attributing low wages to the low marginal productivity of labour and the exploitation by employers, thought that both these conditions were mainly attributable to

the rapid growth of population but could be remedied by reducing the number of workers in relation to capital.<sup>85</sup> French economists like Say, Destutt de Tracy, Courcelle-Seneuil, Liesse and others called attention to the importance of the distribution of income as a factor affecting population growth. They contended, in general, that the size of a country’s population varies inversely with the *per capita* consumption, which in turn varies directly with the degree of inequality of income.<sup>86</sup> A similar view was put forward by von Storch, founder of the Germano-Russian school of economics.<sup>87</sup> Garnier defended the views held by Malthus, but he was more optimistic than the latter, believing that poverty could be prevented by prudence, capital formation, regulation of the family size and so forth.<sup>88</sup> Tucker, in America, although a disciple of Malthus, observed that the rate of natural increase of the population was declining.<sup>89</sup>

## 2. CRITICISMS OF MALTHUS’S THEORY BY NON-SOCIALIST WRITERS

40. The population theory of the classical school was challenged, apart from the socialists, by a number of contemporary writers. These criticisms of the classical economists may be divided into two categories: first, economic considerations stressing such factors as the technological progress, division of labour, expansion of production or trade which seemed to contradict the classical views on economic progress, wages and population, and secondly, demographic considerations in the true sense, especially the speculations and findings as to population trends and the evolution of the birth rates which tended to contradict the Malthusian and classical propositions on population.

41. Some indications that the trend towards the “stationary state” was not as immediate or as inevitable as it appeared are found, as already noted, in some of the writings of the classical school. Later critics of the theory of the classical school on economic growth placed more emphasis on the possibility of technical progress. Leroy-Beaulieu stated that technical progress, together with capital accumulation and the development of the international division of labour, would continue to increase output per man.<sup>90</sup> In the view of Oppenheimer, the continuing improvement in living conditions of the masses indicated that any tendency towards diminishing

<sup>78</sup> Ricardo, *The Principles of Political Economy and Taxation* (1821, 1933 ed.), chap. 2. The wage fund theory was also adopted by Malthus, Senior and James Mill.

<sup>79</sup> Malthus, *Principles of Political Economy* ... (1836).

<sup>80</sup> Mill, *Elements of Political Economy* (1821); Senior, *Political Economy* (1836); McCulloch, *The Principles of Political Economy* ... (1825).

<sup>81</sup> Ricardo, *The Principles of Political Economy and Taxation* (1821, 1933 ed.), chap. 5.

<sup>82</sup> Senior, *An Outline of the Science of Political Economy* (1836); see also his *Two lectures on Population Delivered before the University of Oxford in Easter Term 1828* ... (1829), pp. 27, 34-35.

<sup>83</sup> Mill, *Principles of Political Economy with Some of their Applications to Social Philosophy* (1848).

<sup>84</sup> The views if some of these writers who rejected Malthus’s population theory will be discussed in the following subsections.

<sup>85</sup> Thünen, *Der isolerte Staat* (1826; 1875 ed.), book 2, part 1.

<sup>86</sup> Courcelle-Seneuil, *Traité d’économie politique* (1857); however, the author later rejected this view; *ibid.* (1857, 1891 ed.), p. 151; Liesse, *Leçons d’économie politique* (1892), pp. 44-52, 70-74. See also Block, *Les progrès de la science économique* (1890), vol. 1, pp. 540-541.

<sup>87</sup> Storch, *Cours d’économie politique* (1823), vol. 3, part 2; book 2, chap. 2.

<sup>88</sup> Garnier, *Du principe de population* (1857), chaps. 1, 4-11.

<sup>89</sup> See Dorfman, *The Economic Mind in American Civilization* ... (1946), pp. 178-195; Cady, “The early American reaction to the theory of Malthus” (1931); Spengler, “Population doctrines in the United States” (1933).

<sup>90</sup> Leroy-Beaulieu, *Traité théorique et pratique d’économie politique* (1896), book 1, pp. 740-776; book 3, p. 314.

returns in agriculture was more than compensated for by an improved productivity in manufacturing.<sup>91</sup>

42. Certain early nineteenth century writers disagreed fundamentally with the ideas of the classical school and held that a tendency for productivity to increase was predominant. Such writers either denied the law of diminishing returns altogether, or, while admitting its existence within agriculture, stated that its action was more than counterbalanced by a law of increasing returns outside agriculture, by technical progress, or by a combination of both. There were some writers who contended that an increase in population or population density made for an increase in productivity. A view along this line can be found in works of some of the writers of the classical school who were more optimistically inclined. Smith, for instance, regarded population growth as, at once, a cause and a consequence of economic progress.

43. The writers who disagreed with Malthus's arguments and propositions on population can be divided into three main groups.<sup>92</sup> One group maintained that preventive checks would become more and more important in slowing down population growth, though they offered little rationale to support this belief. Representatives of this group include Hazlitt, who supposed that moral restraint would prove adequate;<sup>93</sup> Hamilton, who held that the rate of increase of population would fall as civilization advanced;<sup>94</sup> Moreton, who inferred that the failure of the "higher orders" to replace themselves and the consequent opportunity for ascent in social scale generated a tendency for the lower rate of reproduction to spread through the ranks of society;<sup>95</sup> Weyland, who thought that population would cease to grow when a sufficiently high proportion of the people had located in cities where birth rates were lower,<sup>96</sup> as well as many other writers who presumed that the standard of living would continue to rise and check undue population growth.<sup>97</sup>

44. The second group of writers attempted to demonstrate that preventive checks were the result of social and economic progress. Such an opinion is even suggested

in Malthus's later work. Commenting on the situation in England, he noted that "this great increase over the necessities of life did not produce a proportionate increase of population". The result of a higher respect of the lower classes by others and by themselves was that instead of an increase in population exclusively, a considerable portion of their increased real wages was expended in a marked improvement in the quality of food consumed, and a decided elevation in the standard of their comforts and conveniences.<sup>98</sup> In addition to similar views already cited,<sup>99</sup> various writers like Rickards<sup>100</sup> and Alison<sup>101</sup> argued that as the real income of workers rose, they tended to adjust their standards of life accordingly, and that the higher standards, once attained, would not willingly be relinquished. As they became more self-respecting, workers would protect their position the more zealously by postponing marriage and limiting their families, as well as in other ways.

45. The third group of writers who rejected Malthus's population theory emphasized the reduction of natural fecundity which, they believed, would necessarily occur in the course of economic development as a result of social selection and changes in milieu. Some saw the reason for a decline of human fecundity in increased mental exertion, inbreeding and modifications of diet.<sup>102</sup> Spencer proposed a theory setting forth an antagonism between the power to maintain life and the power to propagate.<sup>103</sup>

46. Much of the criticism against Malthus, however, was based on the actual trends in population, which became better known, and, according to Blaug after the middle of the third decade of the nineteenth century no economist expounded the Malthusian theory without noting the empirical evidence that contradicted it.<sup>104</sup>

### 3. THE NEO-CLASSICAL SCHOOL AND POPULATION THEORY

47. Towards the close of the nineteenth century many of the assumptions on which the classical school had built its theory of economic growth and population were being increasingly questioned. The birth rate was declining in many western countries and in a number of them emigration was further reducing the impact of the natural increase of population, food imports offset the insufficiency of domestic agricultural production where necessary, and, most important, it was increasingly felt that technological progress, the increase in human skills and material productive wealth, and progressive social

<sup>91</sup> Oppenheimer, *Das Bevölkerungsgesetz des T. R. Malthus unter der neuen Nationalökonomie* ... (1901), chaps. 2 and 4.

<sup>92</sup> Various writers criticized the use of the geometrical and, especially, the arithmetical ratios by Malthus, but a number of them argued that they were not essential to the theory. See, for instance, Mill, *Principles of Political Economy with Some of their Applications to Social Philosophy* (1848); Cannan, *A Review of Economic Theory* (1929, 1964 ed.), p. 69; Roll, *A History of Economic Thought* (1950), p. 209; McCleary, *The Malthusian Population Theory* (1953), pp. 103-105. Some writers such as Sadler, *The Law of Population* ... (1830), criticized much of the evidence Malthus had cited supporting his hypothesis. See also Coontz, *Population Theories and the Economic Interpretation* (1957), pp. 22-28.

<sup>93</sup> Hazlitt, *A Reply to the Essay on Population by the Rev. T. R. Malthus* (1807).

<sup>94</sup> Hamilton, *The Progress of Society* (1830), chap. 18.

<sup>95</sup> Moreton, *Civilization; or a Brief Analysis of the Natural Laws* ... (1836), chap. 9.

<sup>96</sup> Weyland, *Principles of Population and Production, As They are Affected by the Progress of Society* ... (1816), book 1, chaps. 2 and 7; book 3, chap. 2.

<sup>97</sup> Spengler, "Population doctrines in the United States" (1933); and his "French population theory since 1800" (1936); Smith, *The Malthusian Controversy* (1951), book 4.

<sup>98</sup> Malthus, *Principles of Political Economy* ... (1836), pp. 253-254. See Enke, *Economics for Development* (1963), pp. 84-85; Douglas, *The Theory of Wages* (1934), p. 321.

<sup>99</sup> See the preceding subsection.

<sup>100</sup> Rickards, *Population and Capital* ... (1854), p. 251.

<sup>101</sup> Alison, *The Principles of Population and their Connection* ... (1840), p. 105.

<sup>102</sup> Jarrold, *Dissertations on Man, Philosophical, Physiological and Political* ... (1806), pp. 245-274, 306-313; Hickson, "Laws of population" (1850); Doubleday, *The True Law of Population* ... (1853).

<sup>103</sup> Spencer, *The Principles of Biology* (1867), book 2, pp. 406-410; 479-508.

<sup>104</sup> Blaug, *Ricardian Economics, a Historical Study* (1958), p. 117.

changes might counterbalance the tendency towards diminishing returns. In addition, neo-classical analysis focusing its attention mostly on short-run, static or methodological problems, was much more concerned with such aspects as the interrelations between parts of the economy, equilibrium theory and the allocation of resources than with the more general and long-run problems of economic growth and population.<sup>105</sup> Nevertheless the issues continuing to dominate the discussion on population and economic growth were basically the same as those raised by Malthus and the classical school.

48. The belief that other things being equal, diminishing returns were typical for the economy as a whole was accepted by a majority of economists in the late nineteenth and early twentieth century.<sup>106</sup> This implied that after the ratio of workers to resources passed a certain point, further population growth would bring with it a fall in the average output per worker. On the other hand most of these writers conceded that the *ceteris paribus* conditions did not apply in practice and that the appearance of diminishing returns, and by implication the effects of population growth on income, depended upon technological progress, the specialization and division of labour, the scale of the economy and the enterprise and so forth. Many of the writers who accepted the principle of diminishing returns thought also that through such changes the onset of diminishing returns could be delayed indefinitely or even offset completely.<sup>107</sup>

49. The view that increasing returns might predominate was held, especially by Marshall, who asserted that "while the part which nature plays in production shows a tendency to diminishing returns, the part which man plays shows a tendency to increasing returns".<sup>108</sup> In another place he wrote that even in agriculture the law of increasing returns was constantly contending with that of diminishing returns as a result of more careful cultivation, the development of roads, railroads and markets.<sup>109</sup> Increasing returns according to Marshall had their origin in the tendency of external economies, and to some extent internal economies, to increase as the aggregate volume of production increased. Such economies arose out of increased knowledge, greater specialization of labour and machinery, better localization of industry, the increasing scale of industry, more economic use of factors and materials, better and more time-saving

communications, more efficient marketing and other organizational improvements.<sup>110</sup> All of these changes could be associated with increases in the aggregate volume of production and, therefore, increasing returns might result from population growth as well as other factors which increased production.<sup>111</sup> Among the factors which generally might bring about increases in income per head, Marshall thus included population growth in so far as it stimulated or made possible the development of industry, gave rise to certain inventions and innovations and to various economies consequent upon the improvements in the organization.<sup>112</sup> He declared that an increase in population "accompanied by an equal increase in the material resources of enjoyments and aids to production" was likely to result in a more than proportionate increase of enjoyments of all kind, provided that an adequate supply of raw produce can be obtained without great difficulty and that there would not be such overcrowding as to impair health and recreation.<sup>113</sup> While he believed that the growth of population in the more advanced countries was, on the whole, advantageous, this would not be indefinitely so, nor was population growth, elsewhere in the world, necessarily a favourable factor. According to Marshall, continuing population growth would tend to have an adverse effect upon levels of living when a country's supply of land is limited so that the production from land is highly inelastic. In an old country where all cultivated land has been brought into use, diminishing incremental returns were likely to occur when no further improvements in the "arts of agriculture" took place. Under these conditions England's position, and presumably that of other countries in similar condition, might worsen because it might lose its leading industrial position, thus shrinking its foreign market for manufactured products exchanged for food and causing terms of trade to turn against her.<sup>114</sup> Because resources were limited, it was essential according to Marshall that premature and improvident marriage be avoided in order to avert a growth of population which would be evil.<sup>115</sup> The less

<sup>105</sup> See, for instance, on this point Schumpeter, *History of Economic Analysis* (1961); Whitney, "Population in theories of economic development" (1959); Buttrick, "Toward a theory of economic growth: the neoclassical contribution" (1965).

<sup>106</sup> Sidgwick, *The Principles of Political Economy* (1883), pp. 150-151; Cannan, *Elementary Political Economy* (1903), part 1, sect. 7; Commons, *The Distribution of Wealth* (1893), chaps. 3-4; Clark, *The Distribution of Wealth* (1899), pp. 48-50; Wicksteed, *Lectures on Political Economy* (1901, 1934 ed.), vol. 1, pp. 122-124; Wicksteed, *The Commonsense of Political Economy* (1910), pp. 529-530. See also Stigler, *Production and Distribution Theories* ... (1946).

<sup>107</sup> Sidgwick, *The Principles of Political Economy* (1883), pp. 150-151, 154-155; Cannan, *A History of the Theories of Production* ... (1903), chap. 9; Wicksteed, *The Commonsense of Political Economy* (1910), p. 529; Edgeworth, *Papers Relating to Political Economy* (1925), vol. 1, pp. 79-80.

<sup>108</sup> Marshall, *Principles of Economics* (1920, 1961 ed.), pp. 318-321.

<sup>109</sup> *Ibid.*, p. 670.

<sup>110</sup> Marshall, *Principles of Economics* (1920, 1961, ed.), pp. 286 ff., 318-321, 396 ff., 457 ff.

<sup>111</sup> Spengler, "Marshall on the population question, part I" (1955), noted however, that Marshall did not clearly separate the effect of population growth and other factors upon increasing returns.

<sup>112</sup> *Ibid.* It is noteworthy that among the other factors which would raise levels of income, Marshall included improvements in the health, vigour, education and efficiency of the labour force.

<sup>113</sup> Marshall, *Principles of Economics* (1920, 1961 ed.), p. 321.

<sup>114</sup> Marshall, *Industry and Trade* ... (1919), pp. 647 ff.; Pigou, ed., *Memorials of Alfred Marshall* (1925), p. 316; Keynes, ed., *Official Papers of Alfred Marshall* (1926), pp. 401-402. The view that some European countries such as Great Britain and also Germany would have to rely to an excessive degree on foreign trade for obtaining food and that such imports might cease was propounded also by a number of other writers. See, for instance, Sidgwick, *The Principles of Political Economy* (1883), chap. 6; Giffen, *Economic Inquiries and Studies* (1904), vol. 1, pp. 382 ff.; vol. 2, pp. 14-27, 35-38, 46, 230, 340-344; Wagner, *Agrar- und Industriestaat* (1901), pp. 23-28, 143, 152-160. For different opinions, see Brentano, *Die Schrecken des überwiegenden Industriestaats* (1901); Dietzel, *Weltwirtschaft und Volkswirtschaft* (1900), pp. 112-120.

<sup>115</sup> Cited in Spengler, "Marshall on the population question, part I" (1955).



advanced countries could only escape the "iron" law of wages and attain levels of living comparable to the more advanced ones if their numbers were effectively regulated.<sup>116</sup>

50. Some writers took exception to the law of increasing returns as formulated by Marshall, while others argued that it minimized the problems of realizing the potential increase in efficiency and output that growth of capital and labour supply might seem to make possible.<sup>117</sup> Wicksell pointed out that the validity of Marshall's "law" depended on the assumption, which he considered unacceptable, "that the raw materials required are to be found in practically unlimited quantities at an unchanged, or almost unchanged, price". Although increasing returns might well prevail for a time, Wicksell thought that diminishing returns would predominate in the long run.<sup>118</sup> Wolfe pointed out that natural resources always set a limit to production, though that limit is somewhat elastic and faced by different countries at different times according to the availability and management of resources. Continuing population growth would therefore eventually bring the law of diminishing returns into operation, so that economic, social and political policy changes would be necessary to ensure continued progress in the material well-being of the people.<sup>119</sup> Budge held that the limitations to human progress were to be found in nature rather than in man's institutions, and that population was tending to increase beyond the means of subsistence. He denied that diminishing returns in agriculture would be offset indefinitely by improvements in agricultural technique or counterbalanced by increasing returns in manufactures and transportation, or that population increases caused *per capita* product to rise.<sup>120</sup> Wolfe drew attention to the various limitations to which technical progress itself is subject, thereby in effect denying the way of escape which many sought from the Malthusian problem. He identified four factors limiting economic progress and accordingly formulated four "laws of retardation of progress". One of these "laws" was that "every technical improvement . . . bars the way to further progress" by reducing the number and the range of possibilities still open in a field until finally all possibilities have been exhausted and technical development has ceased.<sup>121</sup> Mombert, while admitting the operation of diminishing returns in agriculture and the limitations on technical progress described by Wolfe, believed that there existed many ways by which these tendencies could be counterbalanced; thus, he anticipated improving living conditions rather than increasing population pressure for some time to come.<sup>122</sup>

<sup>116</sup> Marshall, *Principles of Economics* (1920, 1961 ed.), pp. 531, 690-693.

<sup>117</sup> On the manner in which some of these laws of returns were formulated, see Stigler, *Production and Distribution Theories* . . . (1946), pp. 48 ff.

<sup>118</sup> Wicksell, *Lectures on Political Economy* (1901, 1934 ed.), p. 112.

<sup>119</sup> Wolfe, *Readings in Social Problems* (1916), p. 1.

<sup>120</sup> Budge, *Das Malthus'sche Bevölkerungsgesetz* . . . (1912), especially chap. 2.

<sup>121</sup> Wolfe, *Die Volkswirtschaft der Gegenwart und Zukunft* (1912); pp. 335 ff.; and his *Nahrungsspielraum und Menschenzahl* (1917), pp. 19-27.

<sup>122</sup> Mombert, *Bevölkerungslehre* (1929), pp. 356-372.

## E. Socialist and Marxist writings

51. The socialist writers and reformers focused attention on the class differentiations and the misery of the working class that was attendant upon the growth of capitalism. Even earlier, Thomas More's *Utopia* (1516) contained an egalitarian plea for an ideal state and social organization founded on reason and moral considerations. The early British socialists and particularly, the early French socialists, raised strong objections against the capitalist system; the social reforms they suggested and the theories they held concerning the reorganization of society constituted what is known as "utopian socialism". But it was only with the rise of Marxian "scientific socialism", as opposed to the former, that the working classes acquired a consistent revolutionary theory. Dialectic materialism, Marx's system of philosophy, was in fact a continuation of German philosophical thought, English political economy and French socialistic theory of the nineteenth century.<sup>123</sup> According to the theory of historical materialism, which is an application of dialectic materialism to social change, the history of mankind has been one of continuous class struggle by which less advanced social systems have been replaced by more advanced ones.<sup>124</sup> Just as the establishment of the bourgeoisie replaced the feudal system so, according to this theory, the proletariat, the productive class under capitalism, would replace the bourgeoisie and establish a socialist, exploitation-free society.<sup>125</sup> Marxian political economy, in which the labour theory of value holds a central place,<sup>126</sup> is consistent with dialectic and historical materialism.

52. All the socialist writers have attributed human misery to defects in the capitalist social order, claiming that under the reforms they advocate the productive forces of the people could increase and unemployment and over-population could be prevented. Although these writers were unanimous in rejecting Malthus's theory, their ideas about population differed markedly. The early socialists were concerned with matters related to population, but their views were far from fully developed. Marx and Engels may be credited with formulating a consistent approach to the population problem which most socialists were later to adopt.<sup>127</sup>

<sup>123</sup> Lenin, "Tri istochnika . . ." (1913, 1948 ed.), pp. 3-8.

<sup>124</sup> Engels, *Landmarks of Scientific* . . . (1878, 1907 ed.).

<sup>125</sup> Marx, *Communist Manifesto* (1848, 1965 ed.); Lenin, "Tri istochnika i tri . . ." (1913, 1948 ed.), pp. 6-7.

<sup>126</sup> Marx, *Zur Kritik der politischen Oekonomie* (1951-1959), and his *Das Kapital* . . . (1890-1894).

<sup>127</sup> For general accounts of socialism and the theory of population, see Dumas, *Le socialisme et le principe de population* (1908); Sonolet, *Principe de population et socialisme* (1907); Soetbeer, *Die Stellung der Sozialisten zur Malthus'schen Bevölkerungslehre* (1886); Martello, *L'economia politica antimalthusiana ed il socialismo* (1894); Mombert, *Geschichte der Nationalökonomie* (1927), pp. 410-416; and his *Bevölkerungslehre* (1929), pp. 214-235; Lowenthal, "The Ricardian socialists" (1911). For later representative statements that collectivism made for imprudence in matters of population, see Naquet, *Socialisme collectiviste, et socialisme liberal* (1890), chap. 4; Hadley, *Economics* (1896), pp. 45-51; Budge, *Das Malthus'sche Bevölkerungsgesetz* . . . (1912), p. 218. Lloyd questioned this thesis on the ground that since the gain from restricting family size is largely diffused to others, the individual

(Continued on next page)

## 1. EARLY SOCIALISTS

53. The early socialists maintained that, in the reorganized society propounded by them excessive population growth would be prevented by increased production, a better social order and, where possible, by foresight. Such views were evident in the writings of the British Ricardian socialists,<sup>128</sup> who in general tended to reject the Malthusian propositions. Thompson believed that population growth could be brought under control in the co-operative society he envisioned. Bray indicated that, since labour produced all wealth, production would keep pace with population as long as raw materials were available and implied that the numbers of population would be brought under control. Robert Owen, social reformer and socialist writer, established a model industrial community in which the welfare of workers was a major consideration. His social reforms perhaps made a stronger impact than his literary work upon utopian socialism.<sup>129</sup>

54. Socialist views were more vehemently asserted in the works of the early French socialists. Saint-Simon endeavoured to show that poverty could be eliminated under the system of collective industrialism by means of greater productivity. He objected to Malthus's "moral restraint" because it was incompatible with the workers' happiness. While Fourier favoured voluntary control of conception, he believed that changes in living patterns in the "societary state" would bring about population control. Louis Blanc suggested that imprudence was the product, rather than the cause, of misery and that a reorganization of society, by removing misery, would prevent over-population. Proudhon's view was that his type of libertarian socialism would strike a balance between population and production.<sup>130</sup>

55. The German precursors of state socialism, Rodbertus and Lassalle, maintained that the system of private property and free competition depressed wages and encouraged unemployment. Although labour alone could create wealth, workers received only a bare subsistence salary (Lassalle's "iron law of wages"), and population growth merely intensified exploitation of the workers. While the social reforms recommended by Rodbertus and Lassalle differed, they shared a faith in the active role of the workers' state, in contrast to the bourgeois state which left the weak to the mercy of the strong.<sup>131</sup>

56. The Italian socialist Achilla Loria considered population size with respect to capital rather than to

means of subsistence. He maintained that the capitalist system restricted the productive utilization of capital and compelled the masses to work for miserable wages, thereby undermining their continence and exciting them to excessive procreation. He believed that population growth was the cause of economic evolution and of the historical succession of social systems.<sup>132</sup> Nitti felt that each improvement in the economic condition of the working class brought about a lowering of the birth rate, and that the population problem could be solved by a reorganization of society in which the social causes of inequality would be eliminated.<sup>133</sup>

57. According to Valentei, Malinovsky was the first Russian author to disagree with Malthus,<sup>134</sup> as later did Chernishevsky and other "revolutionary democrats"<sup>135</sup> but not on the grounds of social considerations. Milytin was the first representative of utopian socialism in Russia who considered that population was an important factor in the economy, but had a wider social importance, which a population law must take into account. He emphasized the productive capacity of man, whose economic activity, while aimed at the "satisfying of human requirements", should not therefore be viewed as an objective *per se*. He rejected the Malthusian approach and suggested that science should endeavour instead to alleviate human suffering and promote the material well-being of people.<sup>136</sup> Milytin's views concerning population questions were in general optimistic, as were the views of many Russian authors of the nineteenth century.<sup>137</sup>

## 2. MARX AND ENGELS

58. In the broad context of historical materialism, Marx and Engels did not formulate a population theory *per se*, but formulated a set of basic principles which they regarded as governing population and its economic and social correlates. In contrast to Malthus's "abstract" principle of population, Marx held that there could be no natural and universal law of population; population was rather determined by the social and economic conditions prevailing in different societies. He insisted that each specific historic mode of production (which included a variety of social factors)<sup>138</sup> had its own peculiar law of population, historically valid within its limits. In his view, "an abstract law of population exists for plants

<sup>132</sup> Loria, *La legge di popolazione ed il sistema sociale* (1882).

<sup>133</sup> Nitti, *La popolazione ed il sistema sociale* (1894). See also Martello, *L'economia politica antimalthusiana ed il socialismo* (1894).

<sup>134</sup> Valentei, *Teoriia i politika narodonaseleniia* (1967), p. 83; Malinovsky's paper "Rassuzhdenie o mire i voine" was published in 1803.

<sup>135</sup> Valentei, *Teoriia i politika narodonaseleniia* (1967), p. 84; and his *Problemy narodonaseleniia* (1961), pp. 62-75.

<sup>136</sup> Milytin, *Maltus i evo protivniki* (1847, 1946 ed.). See also: Valentei, *Teoriia i politika narodonaseleniia* (1967), pp. 85-89; and his *Problemy narodonaseleniia* (1961), pp. 58-61.

<sup>137</sup> Valentei, *Teoriia i politika narodonaseleniia* (1967).

<sup>138</sup> Dobb pointed out that Marx's concept of mode of production did not refer merely to the state of technique ("state of productive forces") but to "the way in which means of production were owned and the social relations between men which resulted from their connections with the process of production". Dobb, *Studies in the Development of Capitalism* (1947), p. 7.

(Footnote 127 continued)

under capitalism has little incentive to restrict family size. See Lloyd, *Two Lectures on the Checks to Population* (1833), p. 22. See also: Sweezy, *The Theory of Capitalist Development* . . . (1942), pp. 86, 89, 92-93, 222-226; Pjanić, *Problemi stanovništva u ekonomskoj teoriji* (1957); Smulevich, *Kritika burzhuaizmskikh teorij* . . . (1959), Valentei, *Teoriia i politika narodonaseleniia* (1967).

<sup>128</sup> See Lowenthal, "The Ricardian socialists" (1911); Smith, *The Malthusian Controversy* (1951), book 2, chap. 4; book 4, chap. 3.

<sup>129</sup> Owen, *A New View of Society* . . . (1813).

<sup>130</sup> Dumas, *Le socialisme et le principe de population* (1908); Spengler, "French population theory since 1800" (1936).

<sup>131</sup> Lassalle, *Kapital und Arbeit* (1864); Rodbertus, *Aus dem literarischen* . . . (1899), vol. 2; Gonner, *The Social Philosophy of Rodbertus* (1899), part 2.



and animals only, and only in so far as man has not interfered with them".<sup>139</sup> In *Das Kapital* he outlined the population law "peculiar to the capitalist mode of production", covering both the relative surplus population, which was primarily a socio-economic concept, and the inverse relationship between family size and wage levels, which reflected demographic and social relationships.

59. Marx maintained that Malthus's "over-population" could be ascribed to the capitalist mode of production and to the acquisition by the capitalist class of the surplus labour product rather than to man's supposed biological proclivities. Over-population, which was in fact relative, arose from capital accumulation—a process in which "variable capital", the source of demand for labour, increased less rapidly than did "constant capital", the source of finance of capital assets.<sup>140</sup> In the course of the expansion of the capitalist system, the natural increase in population alone could not satisfy the requirements for readily available labour, but the accumulation of capital, by replacing labour, would generate the surplus population needed for the functioning of the system.<sup>141</sup> Relative surplus population was therefore inherent in the capitalist system; it was a consequence of the accumulation of capital as well as a condition for the continuation of the system. The "industrial reserve army" had to be sufficiently large to hold the pretensions of the workers in check, to keep wages and salaries low, and thus to maintain high rates of surplus value and profit. It was the pivot upon which the law of demand and supply of labour turned.<sup>142</sup>

60. According to Marx, there are three forms of relative surplus population, or unemployment: the floating, the latent and the stagnant. The floating category consists largely of persons displaced by machinery and structural changes within industry. The latent category is made up of that part of the agricultural population which is on the verge of migrating to the cities, mainly as a consequence of the penetration of capital into agriculture. The stagnant category is comprised of workers with highly irregular employment and the lowest levels of living. Different economic and demographic factors specifically contribute to the creation and perpetuation of individual forms of relative surplus population.<sup>143</sup> One is technological progress, which underwent a "complete inversion" in capitalism: "the higher the productiveness of labour, the greater is the pressure of the labourers on the means of

employment, the more precarious therefore becomes their condition of existence".<sup>144</sup>

61. Differences in mortality and fertility, both among social classes and within the working class are, according to Marx, determined by social position, levels of living (a modern term for "the amount of means of subsistence"), work conditions and other social factors.<sup>145</sup> Recalling Smith's observation that poverty encourages "generation", Marx noted that the number of births and deaths, as well as absolute family size, were in inverse proportion to wage levels and, hence, to the means of subsistence available to different categories of workers.<sup>146</sup> He deplored such demographic patterns and pointed out that this was the law of capitalist society which was meaningless to primitive peoples and even to enlightened settlers.<sup>147</sup>

62. While in full agreement with Marx's analysis, Engels made an additional contribution to Marx's approach to population theory. On the one hand, he maintained that the productive power of mankind was unlimited, since productivity in general, and that of land in particular, can increase by the application of capital, labour and science.<sup>148</sup> He thus rejected the law of diminishing returns which he considered implicit in Malthus's principle of population. On the other hand, he stressed that under capitalism surplus population was always bound by surplus capital. This was a contradiction inherent in capitalism which could be overcome only by fundamental "social reorganization". He suggested that even if Malthus were right with respect to the reproductive behaviour of workers, social reorganization was necessary, for only this reorganization and the enlightenment of the masses could make possible "that moral restraint upon the instinct for reproduction which Malthus himself puts forward as the easiest and most effective counter-measure against overpopulation".<sup>149</sup> On another occasion Engels suggested that in the final analysis the decisive factor in history which was dual in nature was "production and reproduction of life itself". On the one hand there was the production of the means of subsistence. On the other hand there was the production of man himself. The higher productivity is and the more developed the production

<sup>144</sup> *Ibid.*, pp. 644-645.

<sup>145</sup> Marx, *Capital* (1867, 1959 ed.), pp. 293-294, 397-398, 465, 641-643.

<sup>146</sup> Under the capitalist system, Marx observes, labour power is so quickly used that the middle-aged worker is apt to be worn out and expectation of life is especially short among the workers in large-scale industry. Under these circumstances successive generations of workers have to succeed one another very rapidly, a need which is satisfied by early marriage and the exploitation of working-class children, which puts a premium upon their production. This law did not, however, apply to other classes of population. See Marx, *Das Kapital* (1867, 1890 ed.), vol. 1, pp. 595-596.

<sup>147</sup> Marx, *Das Kapital* (1867, 1890 ed.), vol. 1, p. 522.

<sup>148</sup> Engels, "Outlines of a critique of political economy" (1844, 1931 ed.). Forty years later, in a letter to Kautsky (1881), he did not consider the question of over-population "to be at all a burning one" at the time when American "mass production and real large-scale agriculture" were in progress; and on the eve of a major change "which must have this consequence among others, that the earth will now be populated". Marx and Engels, *Sochineniia* (1965), vol. 28, p. 108.

<sup>149</sup> Marx and Engels, *Sochineniia* (1955), vol. 2, p. 315.

<sup>139</sup> Marx, *Capital* (1867, 1959 ed.), p. 632.

<sup>140</sup> "With the magnitude of social capital already functioning, and the degree of its increase, with the extension of the scale of production, and the mass of the labourers set in motion, with the development of the productiveness of their labour, with the greater breadth and fullness of all sources of wealth, there is also an extension of the scale on which greater attraction of labourers by capital is accompanied by their greater repulsion . . . The labouring population therefore produces, along with the accumulation of capital produced by it, the means by which itself is made relatively superfluous, is turned into a relative surplus-population; and it does this to an always increasing extent." Marx, *Capital* (1867, 1959 ed.), pp. 641-642.

<sup>141</sup> Marx, *Das Kapital* (1867, 1890 ed.), vol. 1, pp. 594-596.

<sup>142</sup> Engels, *Dialectics of Nature* (1940), pp. 208 ff., 235.

<sup>143</sup> Marx, *Capital* (1867, 1959 ed.), pp. 640-644.

of means of subsistence, the more economic and social factors determine the social order.<sup>150</sup>

63. What would the population situation be in a future socialist society? Marx and Engels were in general much more reserved on this point than their predecessors, but Engels, faced with the discussion on birth control, commented on this in a letter addressed to Kautsky in 1881. He believed that a socialist society would have at its disposal a highly developed productive capacity managed by careful planning. Under such conditions, production would keep pace with population and provide for the population's well-being. He admitted, however, that there was an "abstract possibility" of over-population calling for limits to population growth. Then he suggested that if at some stage communist society found itself obliged to "regulate the production of human beings", just as it would regulate the production of things, it would be "precisely this society . . . which can carry this out without difficulty". He believed that the kind of reduction in fertility rates that had already been spontaneously achieved in France and lower Austria could also be brought about through planning.<sup>151</sup>

64. The economic and social writings of Marx and Engels contain many observations concerning demographic and socio-economic interrelationships. Population is here conceived of in a dual capacity—as a producer and as a consumer—and the term population is used interchangeably for both labour force and population, as it was used by Petty, Smith and others. According to these writings, the sex and age structure of population in early societies was a "physiological foundation" of the division of labour; at a later stage this was replaced by more advanced forms of division of labour in society.<sup>152</sup> The separation of town from country and the acceleration of urbanization attendant upon the concentration of capital, manufacturing and population were both a cause and a consequence of an advanced division of labour.<sup>153</sup> Shifts in the labour force and population from agriculture to non-agricultural industries were an underlying process of urbanization that was stimulated by the growth of manufacturing and by advances in agricultural technology.<sup>154</sup> A certain density of population was a prerequisite for an adequate division of labour, but density was a combined demographic and economic concept, since it depended upon both the geographic distribution of population and transport and communication.<sup>155</sup>

<sup>150</sup> Engels, *Der Ursprung der Familie, des Privateigentums . . .* (1894), p. viii. Plekhanov and Lenin supported Engels's proposition against Weisengrinn and Mikhailovsky. More recently it was challenged by the editors of the Marx-Engels-Lenin Institute but supported by Bojanovski and Pjanić. For details consult: Engels, *Proiskhozhdenie semi . . .* (1947), p. 8; and Pjanić, *Problemi stanovništva u ekonomskoj teoriji* (1957), pp. 72-77.

<sup>151</sup> Marx and Engels, *Sochineniia* (1965), vol. 28, pp. 107-109.

<sup>152</sup> Marx, *Das Kapital* (1867, 1890 ed.), vol. 1, pp. 316, 322-323, 325-334.

<sup>153</sup> *Ibid.*, vol. 1, p. 317; Engels, *The Conditions of the Working Class in England in 1844* (1887).

<sup>154</sup> Marx, *Das Kapital* (1867, 1890 ed.), vol. 1, pp. 643-644; —, (1867, 1894 ed.), vol. 3, p. 177.

<sup>155</sup> *Ibid.*, vol. 1, p. 317.

### 3. POST-MARXIAN SOCIALISTS

65. With the bifurcation in the socialist movement the views on population began to differ on both theoretical and political grounds. The "revisionist" stream adopted the neo-Malthusian proposition that birth control tends to improve the living conditions of workers, while the "revolutionary" stream adhered to Marx's and Engels's basic concepts.<sup>156</sup> Social reforms,<sup>157</sup> women's rights issues,<sup>158</sup> progress in demographic statistics and analysis, as well as the demographic change experienced in many countries, brought additional elements into the discussion. But the major factor in the development of a socialist population theory was the emergence of the USSR and a number of socialist states in which Marxian theory became the ideological foundation of the new society.

66. Kautsky, unlike most socialists of his time, initially attached considerable importance to the population question, suggesting among other things the possibility of both Marxian relative over-population and Malthusian absolute over-population.<sup>159</sup> Following Marx more closely in his later writings, he explained relative over-population as a result of the "variable constituent" of capital increasing less rapidly than total capital and the labouring population. From this might ensue an excess of population relative to variable capital with the result that wages would be depressed and profits would rise. This situation would disappear upon the collectivization of the economy.<sup>160</sup> Kautsky believed that under socialism conditions more conducive both to the appropriate regulation of numbers of population and to the increase of production would develop.<sup>161</sup>

67. Bebel's analysis of population questions was primarily related to the status of women under capitalist conditions and in a socialist society, but it also touched upon the more general issue. He believed in the possibility of greatly augmenting the food supply and in changes in reproductive behaviour occurring as a consequence of improved economic conditions. He held that population was likely to increase more slowly in a socialist society than in a bourgeois society, mainly because of the superior position of women under socialism.<sup>162</sup>

68. Lenin, like Marx, objected to the Malthusian principle of population and replied to those Russian authors who misinterpreted Marx's views. He restated

<sup>156</sup> Glass, *Population Policies and Movements in Europe* (1940), p. 83, for instance, after noting that socialist doctrine did not agree with the Malthusian theory of the ever-present pressure of population upon the means of resources, added that "For socialists—as distinct from mere members of the labour party—the remedy for poverty was not primarily a restriction of births but a change in the basis of society".

<sup>157</sup> *Ibid.*, chaps. 2 and 4.

<sup>158</sup> Banks, *Feminism and Family Planning in Victorian England* (1964), p. 142.

<sup>159</sup> See Kautsky, *Der Einfluss der Volksvermehrung . . .* (1880), especially chap. 5 on the control of population growth. See also Schippel, *Das moderne Elend und die moderne Übervölkerung* (1889), p. 242 and conclusion.

<sup>160</sup> See Kautsky, *The Economic Doctrines of Karl Marx* (1925), part 3, chap. 5.

<sup>161</sup> See Kautsky, *Vermehrung und Entwicklung . . .* (1920), especially chap. 16.

<sup>162</sup> See Bebel, *Die Frau und der Sozialismus* (1894), pp. 441-463.

the view that human reproduction depended directly upon the structure of society, and rejected an abstract population law which bore no relation to "historically different forms of social orders".<sup>163</sup> He suggested that the over-population of agrarian Russia was not the consequence of disparity between human reproduction and means of subsistence, but a result of the penetration of capitalism into agriculture. The specific features of over-population in the non-monetary sector of agriculture were related to the recency of capitalist farming which had to operate in an out-dated feudal setting.<sup>164</sup> He also denied that the law of diminishing returns applied under conditions of technological progress and improved agricultural methods.<sup>165</sup> Lenin as a proponent of socialism saw the development of capitalism in nineteenth century Russia as a transformation of a backward agrarian society into a modern one, founded on the expansion of capitalist production and class differentiation. Significant changes in population accompanied this process, including the growth of industrial population, a decline in the agricultural population, rural-to-urban migration, and the modification of the population's social composition.<sup>166</sup>

69. In contrast to the optimism of the revolutionary labour movement, Lenin said that neo-Malthusianism was a *petit-bourgeois*, pessimist philosophy.<sup>167</sup> It was on these grounds that in 1913 he rejected the "social theory" of neo-Malthusianism, while supporting "unconditioned abolition of all laws prohibiting abortion or dissemination of medical means for preventive measures". He regarded such laws as hypocrisy on the part of the ruling class because they were incapable of curing what he considered wounds inflicted by capitalism. He pointed out that freedom for medical propaganda and the protection of democratic rights of citizens, men and women, are one thing. The social theory of neo-Malthusianism, he noted, is quite another.<sup>168</sup> Lenin's concept of birth control as a human right had a lasting influence both upon socialist writings and health policies affecting fertility.

70. Contemporary socialists have continued to be inspired by Marxian historical materialism and its interpretation of the population problem. Their writings have had to deal with population questions in a complex world in which socialist societies co-existed with capitalist

ones and with a new group of countries that formed *le tiers monde*.

71. In his study of bourgeois population theories, Smulevich on two occasions examined the Marxian law of population peculiar to the capitalist mode of production in the light of modern experience. He asserted that this law operates through the growth of the material part of the productive forces at the expense of and in a manner detrimental to the working class.<sup>169</sup> Analysing the factors affecting birth rates in developed capitalist countries, he argued in particular that the main cause of fertility decline among workers was uncertainty concerning their future and the fear of losing their jobs; this was displayed especially during economic crises when birth rates dropped sharply.<sup>170</sup> Mass unemployment, which had reached its peak during the Great Depression, had been accompanied by the lowest birth rates ever experienced, a phenomenon that was neither biological nor a consequence of improved education, but rather the result of the contradictions of capitalism. Extremely low birth rates and the tendency towards depopulation appeared to be primarily the consequence of relative over-population.<sup>171</sup> This view was reflected in other Soviet writings.<sup>172</sup> Strumilin noted that the decline of fertility in Western countries responded to the social conditions under capitalism and the extinction of the bourgeoisie.<sup>173</sup> Boyarsky suggested that the period of fertility decline in the 1930s, while reducing the labour supply and thus improving the employment situation in the 1950s, could not eliminate unemployment which is inherent in the capitalist system.<sup>174</sup>

72. In Boyarsky's view, socialist reconstruction affected all the vital aspects of society, including population, and the new social ownership of means of production abolished antagonism between them and the main productive force,<sup>175</sup> which was the population. With slight variations in emphasis, Soviet writers maintained that the basic characteristics of the socialist law of population were full employment, the rational utilization of the population's productive capacity, and improvement in the material and cultural components of the level of living of an exploitation-free population.<sup>176</sup> Some authors, however,

<sup>163</sup> Lenin, *Ekonomicheskoe soderzhanie narodnichestva i kritika* ... (1894; 1934 ed.); and his *Sochineniia* (1941), vol. 1, p. 433.

<sup>164</sup> Lenin, *Sochineniia* (1941), vol. 1, pp. 432-459.

<sup>165</sup> Lenin, *Agrarny vopros i "kritiki" Marksa* (1901, 1934 ed.); and his *Sochineniia* (1946), vol. 5, pp. 91-103, 136-140; vol. 13, pp. 159-161; 276-282.

<sup>166</sup> Lenin, *Razvitie kapitalizma v Rossii* (1908); and his *Sochineniia* (1946), vol. 3, pp. 18-19, 210-212, 437-438, 481-483, 489-496.

<sup>167</sup> Lenin, "Rabochi klass i neomaltuzianstvo" (1913, 1948 ed.), pp. 205-207.

<sup>168</sup> Lenin, "Rabochi klass i neomaltuzianstvo" (1913, 1948 ed.), p. 207. Along with other social reforms, the Soviet Government legalized abortion in 1920. It was again prohibited in 1936 and re-legalized in 1955. See: Uralan, *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 28-32. On the interpretation of Lenin's position see: Podyachikh, "Impact of demographic policy on the growth of the population" (1968), pp. 236-237; Guzevaty, *Programmy kontrolya nad rozhdaemosti* ... (1969), p. 59; Tatochenko, "O nekotorykh prakticheskikh aspektakh kampanii ..." (1969), p. 65.

<sup>169</sup> Smulevich, *Burzhuaiznye teorii* ... (1936); and his *Kritika burzhuaiznykh teorii* ... (1959). Dobb, referring to an earlier period of British history, stated that in forty years prior to the First World War, population had grown more slowly than previously, employment had risen 50 per cent, domestic investment 80 per cent and foreign investment 165 per cent. Dobb, *Studies on the Development of Capitalism* (1947), pp. 316-317.

<sup>170</sup> Smulevich, *Narodnoe zdorovie i sotsiologiya* (1965), p. 36.

<sup>171</sup> Smulevich, *Kritika burzhuaiznykh teorii* ... (1959), pp. 94-98.

<sup>172</sup> Strumilin, "K probleme rozhdaemosti v rabochei srede" (1936); *Bolshaia sovetskaia entsiklopediia*, 2nd ed. (1954), vol. 29, p. 175; *Filozofskaya entsiklopediia* (1964), vol. 3, p. 549.

<sup>173</sup> Strumilin, *Problemy ekonomiki truda* (1957), p. 202.

<sup>174</sup> Boyarsky et al., *Kurs demografii* (1967), pp. 27-28. See also Strumilin, *Problemy ekonomiki truda* (1957), p. 203.

<sup>175</sup> Boyarsky et al., *Kurs demografii* (1967), p. 28.

<sup>176</sup> Smulevich, *Burzhuaiznye teorii* ... (1936), pp. 173-175; Valentei, *Problemy narodonaseleniia* (1961), p. 115; Sonin, *Aktualnye problemy ispol'zovaniia rabochei sily v SSSR* (1965), pp. 16-17; Podyachikh, ed., *Voprosy narodonaseleniia* ... (1966), p. 15; Boyarsky et al., *Kurs demografii* (1967), pp. 28-30; Smulevich, "K voprosu o zakone narodonaseleniia" (1967), p. 19; Boldyrev, *Ekonomicheskii* (Continued on next page)

maintained that over-population may persist in the initial stages of a socialist society, owing to specific economic and demographic circumstances which are not easy to overcome.<sup>177</sup>

73. With regard to demographic aspects of the population law, Smulevich suggested that socialism made possible a rapid growth of population.<sup>178</sup> He denied that industrialization, general well-being, cultural advancement and the improved social status of individuals would reduce fertility and the natural increase of population in the USSR, as they did in capitalist countries. Moreover, the rate of natural increase in the USSR was several times higher than in the latter.<sup>179</sup> The proposition of rapid population growth seemed to be accepted by many Soviet authors,<sup>180</sup> but was questioned by Strumilin and others. Socialist laws were not inverted capitalist laws, said Strumilin, and both the birth rate and the rate of natural increase had undergone a significant decline, as had the death rate. In the "first phase of communism", relative over-population certainly disappeared while the inverse relation between income and fertility still remained. The "second phase of communism", with further improvements in living conditions, would also reduce differences in fertility.<sup>181</sup>

(Footnote 176 continued)

*zakon naseleniia pri sotsializme* (1968), p. 111; *Bolshaia sovetskaia entsiklopediia* (1954), vol. 29, p. 175; *Filosofskaia entsiklopediia* (1964), p. 549.

<sup>177</sup> The possibility of at least temporary over-population under socialism until the achievement of a desirable level of production and development was noted by Lubny Gertsyk, *Chto takoe pere-naselenie* (1923), pp. 46, 56, 89, 100. Agrarian over-population was considered by Cobeljic and Mihajlović as a typical case of relative over-population which can persist in a socialist society. Cobeljic and Mihajlović, "Pitanje agrarne prenaseljenosti u Srbiji" (1953), pp. 3-22. Yin-Chia Ma considered over-abundant population and scarcity of capital an important dilemma in a socialist society. Ma, "New population theory" (1957), pp. 34-41. Litvyakov stated that in the Soviet Union in 1928 agricultural over-population accounted for 8 to 9 million (one-seventh of the agricultural labour force) and urban unemployment for 1.5 million (9 per cent of the non-agricultural labour force). The problem was solved within two to three years. Litvyakov, "Economic and social factors in ensuring full employment (experience of the Soviet Union)" (1967), pp. 308-309.

<sup>178</sup> Smulevich, *Burzhuaznye teorii* . . . (1936), p. 363. In general, Stalin favoured rapid population growth in the USSR. In his writings, however, he made only incidental comments on population as a factor of social progress. He agreed that density and growth of population had an influence upon the development of society, but not a decisive influence. Stalin, *Voprosy leninizma* (1945), pp. 549-550.

<sup>179</sup> Smulevich, *Burzhuaznye teorii* . . . (1936), p. 174.

<sup>180</sup> Ostrovitianov, ed., *Politicheskaya ekonomiya; uchebnik* (1959), pp. 647-648. Full employment and continuous improvement in the people's well-being under socialism brought about a decrease in mortality and morbidity and a rapid increase in the total population. *Bolshaia sovetskaia entsiklopediia* (1954), vol. 29, p. 175. The encyclopaedia suggests that systematic rapid population growth existed in other socialist countries, as well as in the USSR. See also Valentei, *Problemy narodonaseleniia* (1961), p. 147.

<sup>181</sup> Strumilin, *Problemy ekonomiki truda* (1957), pp. 191-207. Ulanis supported Strumilin's analyses with minor comments and further suggestions concerning the law. Ulanis, "S. G. Strumilin kak demograf" (1962), pp. 341-348. More recently it was pointed out that although almost the same factors contributed to fertility decline in the Soviet Union and in Western countries, under socialist conditions their manifestation differed. Such factors as unemployment, depressions etc. which produce unhealthy effects on fertility, did not exist in the USSR. Podyachikh, ed., *Voprosy narodonaseleniia* . . . (1966), pp. 28-29. Smulevich also noted that in many

74. Chinese socialist writers have rejected the population theory of Hung Tian-Tsi, a Chinese predecessor of Malthus, as they rejected the Malthusian principle of population.<sup>182</sup> In search for a population law pertinent to socialist society, Chang, Mao Gang and Hu have maintained that rational utilization of labour and improvements in living conditions, as well as the elimination of differences between town and country and between manual and intellectual labour, are essential to socialism. As for population growth, they have suggested that mortality will gradually reach a minimum physiological level, while fertility, after reaching a high level, will decline. The change in mortality and fertility should produce a change in population increase, from high and rapid to "stable". A "stable" natural increase in population would mean a rate of increase that is "basically stable", possibly at a low level and with upward and downward variations. The authors have expressed the opinion that in the interest of the people's well-being, as well as the community's, the natural increase in population ought to be stabilized at a relatively low level, a matter to be determined by the policy of Party and of State.<sup>183</sup> Ma's "new population theory" includes relationships between the economy and population and points to the need for birth control in view of the difficulties which rapid agricultural development would encounter.<sup>184</sup> The latter statement evoked a number of comments;<sup>185</sup> nevertheless it was obvious, as Wang suggested, that even with the abolition of private property, the problem of population was not fully solved.<sup>186</sup>

75. Differences in historical circumstances, patterns of transformation of society, and population trends have afforded little common ground for the formulation of a comprehensive population theory pertinent to socialism. While there has been a consensus on questions relevant to population as the only real producer of wealth, differences in opinion concerning the patterns of population growth under socialism still remain. In a general observation, Sweezy suggested that from the standpoint of the optimum population in a planned socialist society, the decline in the rate of population growth "might well be a good thing", for a continuation of high population growth

socialist countries fertility significantly declined. He saw the rationale of population growth under socialism in the following: conscious motherhood; protection of mother and child; harmony between individual and social objectives; adequate demographic and economic policy; and scientific foundation of the policy. Socialist population law was—as a general tendency—the full and rational utilization of human resources and "rational reproduction of population". Smulevich, "K voprosu o zakone narodonaseleniia" (1967), pp. 25-27.

<sup>182</sup> Chang, Mao and Hu, "The law of population under socialism . . ." (1957); Wang, "Marxist theory of population and the Chinese . . ." (1957); Ma, "New population theory" (1957); Tai, "A critique of Ma Yin-Chin's . . ." (1958); and Chu Chung, "Problem of population and employment in China".

<sup>183</sup> Chang, Mao and Hu, "The law of population under socialism . . ." (1957).

<sup>184</sup> Ma, "New population theory" (1957).

<sup>185</sup> Tai, "A critique of Ma Yin-Chin's . . ." (1958); Su Chung, "The country's population and employment problems" (1958); Lee, "The system of social production and population problems . . ." (1960).

<sup>186</sup> Wang, "Marxist theory of population and the Chinese . . ." (1957).

"must from any standpoint sooner or later be attended with disastrous consequences".<sup>187</sup> Pjanić considered that the experience of the socialist countries was too brief, and that examining any proposition concerning demographic regularities under socialism was rather difficult. Conditions differed among the various socialist countries, as did population trends, so that policies might differ as well.<sup>188</sup> Fajfr also maintained that the study of demographic and social facts and trends was crucial, suggesting that this was even more important than the search for a population law, and that those existing did not correspond to reality but were based on abstract and normative postulates.<sup>189</sup>

76. None of the Marxist writers considered population growth to be a cause of poverty in the colonies; rather they all maintained that this poverty was mainly due to colonial rule and under-development.<sup>190</sup> Under British rule, said Palme Dutt, the rate of India's population growth was markedly less than that of almost any European country.<sup>191</sup> Economic development which, earlier, had facilitated more rapid population growth in Europe was "artificially arrested" in India by the requirements of the metropolises, by the failure of the social and economic organization to develop abundant natural resources, by exports of wealth, and by unfavourable policy measures. The main reason for the extreme poverty lay neither in any natural cause nor in a non-existent "over-population", but in the social and economic conditions existing under imperialist rule.<sup>192</sup> According to Kozlov, colonial expansion contributed to the decline of fertility in some of the former colonies. The breakdown in the primitive social structures coupled with exploitation, low levels of living, and the migration of the male population in search of employment were also among the factors contributing to this decline.<sup>193</sup> Khalatbari suggested that the traditional equilibrium between population and the corresponding pre-capitalist "mode of production" was disturbed without the re-establishment of a new equilibrium at a higher level.<sup>194</sup>

77. The forms of over-population in contemporary developing societies differ just as the causes of over-population and the social and economic settings in which they have operated are different. Khalatbari has

<sup>187</sup> Sweezy, *The Theory of Capitalist Development* ... (1942), p. 225. This proposition never was further elaborated or discussed.

<sup>188</sup> Pjanić, *Problemi stanovništva u ekonomskoj teoriji* (1957), pp. 143-146.

<sup>189</sup> Fajfr, "O studiu populačného vývoje" (1959), p. 9; and his "Demografie v klasifikaci ..." (1968).

<sup>190</sup> Sweezy, *The Theory of Capitalist Development* ... (1942), pp. 301-303 and 326-337; Dobb, *Studies in the Development of Capitalism* (1947), pp. 204-209. See also: Lenin, *Imperializm, kak vysshaya stadiia kapitalizma* (1925); Stalin, *Marxism and the National and Colonial Question* ... (1947), pp. 214-220.

<sup>191</sup> Dutt, *India Today* (1949), pp. 48-49. He said that from 1870 to 1910 only France had a slower rate of growth; from 1872 to 1931 the population increase in India was 30 per cent, and in England and Wales 77 per cent (p. 49). This was of course prior to the initiation of the recent demographic revolution.

<sup>192</sup> *Ibid.*, pp. 50-57.

<sup>193</sup> Kozlov, *Dinamika chislennosti narodov* ... (1969), pp. 176-177.

<sup>194</sup> Khalatbari, *Überbevölkerung in den Entwicklungsländern* ... (1968), p. 22.

suggested that a qualitative difference exists between over-population in the advanced capitalist and developing societies. In the latter, over-population is associated with the backwardness of productive power. Over-population has primarily affected the traditional agrarian sector as a result of the rapid growth of the agricultural population and of traditional under-development. He distinguishes three types of over-population: that existing in the village economy, that existing under semi-feudal conditions, and that which is found in the modern sector of the economy. Demographic stabilization and the re-establishment of equilibrium between population and production is a complex process which requires rapid economic growth, the socialist transformation of society and many other related radical changes.<sup>195</sup> Nun has offered a Marxian concept of "marginal masses", a form of relative surplus-population which has come to dominate the Latin American scene. He states that in contrast to the industrial reserve army—a "functional" form of unemployment in the industrialized capitalist system—marginality is either "a-functional" or even "dis-functional" for it is generated by the system but not essential to its functioning.<sup>196</sup> Nun, however, did not work out the demographic relationships with marginality.

78. With the acceleration of population growth in the developing countries in the 1950s, many socialist authors gave increased attention to the population problem in relation to development in general and to family size, employment and food in particular. Since they have placed emphasis on policy aspects, their writings are to be discussed in chapter XVII, which is devoted to the topic of population policies.

## F. Contributions of other disciplines

79. The relationship between population and economic factors, specifically the natural, capital and human resources, are found at the core of most population theories. Nevertheless, other disciplines have contributed significantly to a better understanding of population phenomena and often have formed part of these theories—such as the mathematical assumption of Malthus's geometrical rate of growth of population, or the biological element in his idea of "the passion between the sexes". But these other disciplines have made their own independent contribution to population theory. With the acceleration of scientific progress in the nineteenth century and the development of distinct disciplines, population became a phenomenon which attracted the attention of scientists involved in a variety of disciplines. Progress in the natural and social sciences contributed not only to a better description and analysis of population phenomena, but the conviction which emerged at that time that man and his actions were subject to certain well-defined laws,<sup>197</sup> gave rise to the formulation of population theories in different fields.

<sup>195</sup> *Ibid.*, pp. 85-86, 92-93, 101-119, 122-138, 175-176.

<sup>196</sup> Nun, "Superpoblación relativa, ejército industrial ..." (1969), pp. 178-236.

<sup>197</sup> See, for instance, Quetelet, *Sur l'homme et le développement de ses facultés* ... (1835), pp. 1-20.

# 1. MATHEMATICAL THEORIES: THE "LOGISTIC" LAW AND RELATED THEORIES OF POPULATION GROWTH

80. Attempts to formulate mathematical "laws" of population growth were encouraged by the development of mathematical techniques as well as by the increasing availability of statistics relating to population trends which made it possible to "test" such theories. One of the first to take a mathematical approach to the population problem was Quetelet in 1835. Observing that demographic evolution progresses at an accelerated rate up to a point where it begins to slow down, he asserted that the resistance, or the sum of obstacles opposed to the unlimited growth of population, increases in proportion to the square of the velocity with which population tends to increase. Accordingly, in the absence of a change in underlying conditions, or the "social state", a population tends to grow more and more slowly after a certain point.<sup>198</sup> At Quetelet's request Verhulst submitted this principle to examination and suggested that a symmetrical theoretical curve which he termed the "logistic" was suitable to describe the course of population. Initially Verhulst supposed that the obstacles increase exactly in the same proportion as the superabundant population, but he replaced this supposition with the hypothesis that the obstacles increase in proportion to the ratio of the superabundant population to the total population.<sup>199</sup> However, Verhulst's work was generally forgotten until after 1920, when the logistic curve was independently rediscovered by Pearl and Reed.<sup>200</sup>

81. The logistic "law" and the modified logarithmic equation employed by Pearl and Reed commanded much attention.<sup>201</sup> According to Pearl, growth occurs in cycles and "within the same cycle and in a spacially limited area or universe, growth in the first half of the cycle starts slowly, but the absolute increment per unit of time increases steadily until the mid-point of the cycle is reached. After that point the increment per unit of time

becomes steadily smaller until the end of the cycle."<sup>202</sup> The absolute increase per time period thus shows the form of a symmetrical bell-shaped curve which rises to a peak, at the point where the actual population is one-half the maximum, and then declines again to zero. The total population ( $N$ ) follows an S-shaped curve as it moves from a very low value toward the maximum ( $K$ ). The theory of population growth implicit in the simple logistic curve rests on several assumptions: among them the constant physical environment on which the population depends for its support, the existence of an asymptotic limit ( $K$ ) which represents the maximum population that can exist in the given environment and conditions, and the hypothesis that the population increase is proportional to the absolute population size already attained and the amount still left until the maximum, where the population becomes stationary, is reached.<sup>203</sup>

82. Pearl interpreted the logistic at first as a general "law" without attempting to formulate a logical, theoretical explanation to support it, but he argued that in so far as the logistic appeared to hold for human and non-human populations—including the number of cells in a pumpkin and in a culture of yeast and the number in a population of fruit flies—the theoretical basis for the theory must be found not in social or economic factors and institutions but in biological, physical or chemical natural causes.<sup>204</sup> Nevertheless, even in his earlier work he recognized the influence of other factors. Asserting that a negative correlation existed between fertility and population density, he inferred direct or indirect biological effects of population density on fertility. Among other things, he also noted a negative correlation between birth rates and wealth.<sup>205</sup> In his later works he moved even further away from his earlier determinism.<sup>206</sup>

83. Although the logistic received much attention for a time, its relevance both as a tool for estimating and

<sup>198</sup> Quetelet, *Sur l'homme et le développement de ses facultés* . . . (1835), pp. 277-278.

<sup>199</sup> Verhulst, "Notice sur la loi que la population . . ." (1838); his "Recherches mathématiques sur la loi . . ." (1845); and his "Deuxième mémoire sur la loi . . ." (1847). See also Miner, "Pierre-François Verhulst, the discoverer of the logistic curve" (1933); Yule, "The growth of population and the factors . . ." (1925).

<sup>200</sup> Miner, "Pierre-François Verhulst, the discoverer of the logistic curve" (1933), found only one modern reference to Verhulst's work in du Pasquier, "Esquisse d'une nouvelle théorie de la population" (1918). See, however, Sorokin, *Contemporary Sociological Theories* . . . (1928, 1964 ed.), p. 377.

<sup>201</sup> Pearl and Reed, "On the rate of growth of the population of the United States since 1790 and its mathematical representation" (1920). See also: Pearl, *The Biology of Population Growth* (1925), pp. 4, 17, 119, 125-130, 137; and his *Introduction to Medical Biometry and Statistics* (1940), chap. 18; Lotka, *Elements of Physical Biology* (1925), pp. 66-76; and his *Théorie analytique des associations biologiques* (1939), pp. 48-62; Yule, "The growth of population and the factors . . ." (1925); Volterra, *Leçons sur la théorie mathématique* . . . (1931); Glenday, *The Economic Consequences of Progress* (1934), especially part 2; Afzalipour, "Contribution à l'étude de la théorie . . ." (1936); Rhodes, "Population mathematics" (1940); Davis, *The Analysis of Economic Time Series* (1941), pp. 524-529; Corbleau, "La fonction logistique et la description des phénomènes . . ." (1947); Dor, "Analyse des phénomènes logistiques . . ." (1948); Kendall, "Stochastic processes and population growth" (1949).

<sup>202</sup> Pearl, *The Biology of Population Growth* (1925), p. 22.

<sup>203</sup> Assuming that  $r$  is the maximum rate of increase of the population,

$$\frac{K - N}{K},$$

the fraction by which the actual population ( $N$ ) remains below the maximum ( $K$ ), then the increase of population per unit of time is

$$\frac{dN}{dt} = rN \frac{K - N}{K}.$$

The total population will then be

$$N = \frac{K}{1 + be^{-rt}},$$

when  $t$  is time,  $b$  is a constant.

<sup>204</sup> Pearl, *Studies in Human Biology* (1924), p. 585.

<sup>205</sup> Pearl, *The Biology of Population Growth* (1925), p. 209; Sadler, *The Law of Population* . . . (1830), had already proposed a theory that fertility varies inversely with the density of population. See Coontz, *Population Theories and their Economic Interpretation* (1957), pp. 28-42.

<sup>206</sup> Pearl, *The Natural History of Population* (1939), p. 95. See also Lorimer, "The development of demography" (1959); Robinson, "The development of modern population theory" (1964).



projecting population<sup>207</sup> and as a theory of population growth was widely questioned. One of the objections against the logistic as a theory was that even when there were strong grounds for assuming that population growth would follow an S-shaped curve, it had not been established that because of the inherent nature of the growth process itself, a population must of necessity pursue the path of a logistic.<sup>208</sup> It is, however, on social, cultural and economic grounds that the strongest criticism against the logistic theory has been formulated. The logistic does not effectively take into account changes in those traits which permit a population to exploit its resources effectively nor does it anticipate changes in aspirations and tastes and hence in reproductive behaviour brought about by such factors.<sup>209</sup> Nevertheless, the size of the maximum population, the trends of its growth rates and, in general, the progress of population depend largely upon such social, cultural and economic changes. Critics of the logistic "law" therefore looked upon it primarily as an empirical formula which under certain conditions might describe past or future population trends.<sup>210</sup>

84. Several writers have tried to formulate a general law of population development in a broader context, relying not only upon over-simplified hypotheses and predominantly biological analogies but taking into account various influences, particularly those of an economic nature. An attempt at such a theory was made by Amoroso, who introduced the concept of demographic elasticity in order to represent the relation between the logarithmic derivative of the population and the corresponding logarithmic derivative of an index of economic activity.<sup>211</sup> This concept was used in turn by Vinci to obtain a so-called "generalized logistic curve". According

to Vinci: (a) a demographic elasticity becomes consistently, but as an unknown function of time, smaller as the population becomes greater; and (b) the relative increase of income is a function, also unknown, of time and the relative magnitude of the population.<sup>212</sup> Vianelli applied this theory by investigating how the economic and demographic evolution, as represented by various indices, had influenced one another in the United States and Italy and found that demographic elasticity and the response of output to population growth varied in time and by country.<sup>213</sup>

## 2. BIOLOGICAL THEORIES

85. Apart from the biological interpretation of the logistic law by Pearl and Reed, other writers attempting to elucidate the role of biological factors in the historical process of population have formulated biological theories of population. As noted before in the discussion on the critics of Malthus's theory, Spencer formulated a theory of biological evolution, introducing a self-regulating principle of population growth.<sup>214</sup> He asserted that there existed an antagonism between what he called "individuation" or the power to maintain life, on the one hand, and "genesis" or the power to propagate, on the other hand, and he considered that the former varied directly and the latter inversely with the development of the nervous system. Where the power to maintain life was low, survival of the population required high fertility. When fertility is high population pressure arises and this pressure, in turn, is conducive to improvements in methods of production and intensifies the need for skill, intelligence, self-control and education, thus developing intellectual qualities and raising nervous tension. In consequence man's nervous centres became enlarged, with the result that his "individuation" or power to maintain life increased while his power to reproduce diminished. According to Spencer, his theory, which was general in scope, explained why certain animal species are more prolific than others, why man is the least prolific of the higher animals, and why the upper classes of society—British in the case discussed—have fewer children than the lower classes. In all these cases, the rate of reproduction of the groups whose members are more differentiated and

<sup>207</sup> Frank, "Ecology and demography" (1959), points out that the logistic may provide a satisfactory fit during the active growth path partly because the logistic is so flexible that it will fit both data which show a strong inflection and those which could be approximated by a straight line, but that when the curve approaches the asymptotes, examples that fit reasonably well are rare. On the use and limitations of the logistic for projection, see chap. XV.

<sup>208</sup> For such a theoretical basis it would be necessary to show, for instance, that as population density increases, fertility or mortality has to respond in such a manner as to yield the appropriate rate of slackening of the rate of increase. While, in general, it is thought that a rationale might exist to expect a non-human population to grow in a certain predetermined manner, for a human population, such a possibility has been virtually discarded. Volterra and d'Ancona, *Les associations biologiques au point de vue mathématique* (1935); Rashevsky, *Advances and Applications of Mathematical Biology* (1940); and his *Mathematical Theory of Human Relations* ... (1947).

<sup>209</sup> Adherents to the logistic theory thought that as the result of major changes in such factors a new cycle of logistic growth would be initiated. Wolfe, "Is there a biological law of human population growth?" (1927); Vianelli, "A general dynamic demographic scheme ..." (1936); Hart, "Technological acceleration and the atomic bomb" (1946).

<sup>210</sup> Wolfe, "Is there a biological law of human population growth?" (1927); Knibbs, "The growth of human populations and the laws of their increase" (1925); Dor, "Analyse des phénomènes logistiques ..." (1948); Wilson and Puffer, "Least squares and population growth" (1933); Hogben, *Genetic Principles in Medicine and Social Science* (1931), chap. 7; Douglas, *The Theory of Wages* (1934), chap. 13; Robinson, "The development of modern population theory" (1964).

<sup>211</sup> Amoroso, "L'equazione differenziale del movimento della popolazione" (1929).

<sup>212</sup> Vinci, "La logica della curva logistica" (1929); his "Ancora sulla curva logistica" (1930); and his *Manuale di statistica* ... (1934), vol. 2.

<sup>213</sup> Vianelli, "Evoluzione economica e demografica ..." (1935); and his "A general dynamic demographic scheme ..." (1936). In simplified terms the thinking of these writers can be presented as follows: Assume that the population increases in a small proportion  $x$  and its net income in a small proportion,  $y$ , and further that the increment of income is composed of two parts, one of which ( $y_1$ ) is due to population growth and the other ( $y_2$ ) to other factors such as the advance of technology and the discovery of new resources. Then the demographic elasticity  $e$  is  $x/y$  and the elasticity of productivity of population  $y_1/x$ . For a further generalization of Vianelli's scheme, see Figueroa, "Un modelo dinámico general de desarrollo ..." (1947).

<sup>214</sup> See section D. Spencer's and other theories in this subsection have also been reviewed in chap. IV, section B.

less well adapted is lower than those of the more homogeneous groups.<sup>215</sup>

86. More recently Gini formulated a thesis, the cyclical theory, according to which populations tend to follow an evolution analogous to that of the life course of the individual passing through the successive stages of development, maturity and involution.<sup>216</sup> Gini stressed the role of the fecundity of the population, arguing that the rate of reproduction of a population tended to describe a parabola reflecting not variations in such factors as the amount of subsistence or the environment, but changes in the quality of the "germinal cells". According to his theory, a population cycle is initiated as the result of cross breeding between differentiated groups. Fecundity increases and the rate of growth rises, because fecundity is somewhat hereditary and each generation is largely the product of the relatively more fecund components of the preceding generations. In time, however, the forces making for an increase in fecundity are more than counterbalanced by the forces of "physical exhaustion"—principally a deterioration of germinal cells which is accentuated by the movement of a relatively large fraction of the population into social classes which have characteristically a low fecundity. In consequence, the rate of natural increase starts to decline to a low or even below zero level. Immigration and other movements, by infusing new cross-strains and new blood into the population, may set off another demographic cycle.

87. Another theory concerns the influence which the diet may have on fertility. Some writers in the nineteenth century had already maintained that an inverse relation existed between diet and fertility.<sup>217</sup> More recently de Castro propounded the theory that the fertility of generations diminishes as the diet becomes richer. He obtained his evidence from the association he found between meat consumption and levels of fertility in different countries without, however, firmly establishing a causal relation.<sup>218</sup>

### 3. SOCIOLOGICAL THEORIES

88. A number of late nineteenth and early twentieth century sociological theories considered the relationships between population growth and concentration and the evolution and progress of society. According to some of these, human communities, while they grow in volume and density, experience progress in the form of the development of the division of labour, the extension of personal contacts and the co-ordination of individual activities; the stimulation of initiative and technical innovations

and the creation of other conditions which together make up social progress and the development of civilization.<sup>219</sup>

89. Coste was among those who held that actual social evolution, as distinct from what he termed ideological phenomena, is the result of the growth of population and increases in its density.<sup>220</sup> Durkheim held that the transformation of segmentary societies into organically well-knit communities is brought about by population growth and the subsequent development of the division of labour. The growth and condensation of societies require a more far-reaching division of labour, which can be attained more rapidly the faster the number of individuals increases.<sup>221</sup> More recently, Dupréel and his school stressed the importance of population growth for technical and social progress and for the consequent raising of the cultural and material levels of living. According to this thesis, population growth produces effects such as the augmentation of social mobility; increased frequency in personal contacts and in consequence, in social and intellectual stimuli; changes in values including greater emphasis on the future; a more optimistic and enterprising climate of expectation, and intensified technological progress and innovation. These and other effects, it is argued, more than offset any adverse initial implications of population growth. In contrast, a low rate of population growth or a population decline would have the opposite effects.<sup>222</sup>

90. A number of writers have speculated about the interrelations between the decline in fertility in the economically more developed countries and social conditions. Noting that this phenomenon spread simultaneously with changes in social environment, they enumerated such factors as the diversification of man's activities, his increasing individuality, his growing concern with well-being and the more widespread employment of women. Also discussed as active in shaping attitudes in favour of reducing the size of families were factors associated with the urbanization process and the growing spirit of rationalization.<sup>223</sup>

91. A theory on this basis was developed by Dumont, who formulated the principle of "social capillarity". He, like a number of other writers before him, believed that the weakening of the desire to procreate was caused by the progress of civilization and attributed the reduction in family size to the individual's ambitions to improve his position in society. Using a comparison, he argued

<sup>215</sup> Spencer, *The Principles of Biology* (1867), vol. 2, pp. 406-410, 480-506; and his *A New Theory of Population, Deduced . . .* (1852). See also Coontz, *Population Theories and the Economic Interpretation* (1957), pp. 53-56.

<sup>216</sup> Gini, "The cyclical rise and fall of population" (1930); his *Saggi di demografia* (1934), pp. 281 ff.; and his "Les facteurs de la décroissance . . ." (1940). For a critical review, see Lundberg, "The biology of population cycles" (1930); Valentei, *Reaktsionnye teorii narodonaseleniia . . .* (1963), pp. 242 ff.

<sup>217</sup> Doubleday, *The True Law of Population . . .* (1841); Hickson, "Laws of population" (1850).

<sup>218</sup> Castro, *The Geography of Hunger* (1952), pp. 70-72. See also Coontz, *Population Theories and the Economic Interpretation* (1957), pp. 46-53.

<sup>219</sup> Mougeolle, *Statistique des civilisations* (1883); Giddings, *Principles of Sociology . . .* (1896). For a critical review, see Sorokin, *Contemporary Sociological Theories . . .* (1928, 1964 ed.), chap. 7.

<sup>220</sup> Coste, *Les principes d'une sociologie objective* (1899), pp. 95-103; and his *L'expérience des peuples . . .* (1900), pp. 588 ff. See also Sorokin, *Contemporary Sociological Theories . . .* (1928, 1964 ed.), pp. 359-370.

<sup>221</sup> Durkheim, *De la division du travail social* (1893, 1960 ed.), pp. 237-244, 259-266.

<sup>222</sup> Dupréel, *Deux essais sur le progrès* (1928), part 2; Fromont, *Démographie économique* (1947), pp. 211 ff.

<sup>223</sup> Nitti, *Population and the Social System* (1894); Spengler, *Der Untergang des Abendlandes* (1921), vol. 2; Mombert, "Über den Rückgang der Geburten- und Sterbenziffer in Deutschland" (1912); Brentano, "Die Malthus'sche Lehre und die Bevölkerungsbewegung . . ." (1909); Ungern-Sternberg, *The Causes of the Decline in the Birth-rate . . .* (1931).



that just as water can rise only under the force of capillarity in thin tubes, an individual can rise in the social scale only by having fewer children. The development of individualism and the desire for personal improvement and that of the children in advanced societies created, in his view, a state of mind conducive to declining fertility.<sup>224</sup> While agreeing that changes in social environment due to the progress of civilization were at the basis of the fertility decline, other writers attributed the latter more to the diversion of energies from procreation to the intellectual and physical activities imposed by the way of life. The declining birth rate then was supposed to reflect the pressure of those needs.<sup>225</sup>

## G. Focus on population

92. Towards the end of the nineteenth century population became to an increasing extent a subject of separate study. This trend, exemplified primarily by the shift away from population theory and toward empirical demographic research, can also be found in those theoretical approaches which emerged at that time: optimum population theory and theoretical or pure demography. Although closely related they do not fall strictly within the field of population theory. Optimum theory, inquiring as it does into the most favourable dimensions of population, fundamentally poses a problem of policy. Theoretical demography, in studying the quantitative relations among demographic phenomena, makes abstractions from the interrelationships between demographic variables and other phenomena. However, at the same time these approaches have contributed to a clarification of many issues involved in population theory and, in this manner, constituted important elements in the development of population theory.

### 1. OPTIMUM POPULATION THEORY

93. At the basis of the theory of optimum population is the relationship between population and resources. The ingredients of such a theory can already be found in the works of economists of the classical school who discussed the effects of population size and growth on the specialization and division of labour on the one hand, and on the onset of diminishing returns on the other.<sup>226</sup> The basic elements of the optimum population theory can be found in the writings of Sidgwick. He observed

<sup>224</sup> Dumont, *Dépopulation et civilisation* ... (1890), pp. 106 ff.; and his *Natalité et démocratie* ... (1898), pp. 163-166, 190-191, 212-216; Coontz, *Population Theories and the Economic Interpretation* (1957), pp. 57-61.

<sup>225</sup> Hankins, "Does advancing civilization involve a decline in natural fertility?" (1930). See also Spengler, *France Faces Depopulation* (1938); and Fisher, *The Social Selection of Human Fertility* (1932).

<sup>226</sup> See, for instance, West, *Essay on the Application of Capital to Land* (1815); Mill, *Principles of Political Economy with Some of their Applications to Social Philosophy* (1848). Spengler, "French population theory since 1800" (1936), considered Sismondi, Gide and Effertz also as precursors of the optimum population theory. Sauvy, *Théorie générale de la population, vol. 1* ... (1963), p. 50, mentioned in addition More, Botero, Machiavelli, Cantillon, Necker, Rousseau, Quesnay, Adam Smith, Malthus and others as fore-runners of the theory.

that as a result of the aforementioned factors, the productivity of labour tended to diminish as the proportion of labourers to land increased after a certain degree of density had been reached; that there was a point of maximum return per head, and that this depended on the state of arts, the capital accumulated and technical progress.<sup>227</sup> While Sidgwick thus laid the foundation for a dynamic theory of optimum population, Cannan is usually thought to have defined what later came to be called the concept of "optimum population" in a static sense. He affirmed that "at any given time the population which can exist on a given extent of land consistent with the greatest productiveness of industry possible at that time is definite". At the same time, however, he held that "the existence of over-population or under-population is not susceptible of exact demonstration".<sup>228</sup>

94. Different criteria have been used to define optimum population. The concept has been variously interpreted as to mean that size of the population which results in the highest *per capita* income,<sup>229</sup> the highest productivity as measured in different manners,<sup>230</sup> or the highest level of other less well-defined economic indicators such as economic welfare, level of living, real income and in some cases, employment.<sup>231</sup> Other writers, some of whom considered the concept of economic optimum as excessively restrictive,<sup>232</sup> have broadened optimum population to refer to other non-economic factors, including the

<sup>227</sup> Sidgwick, *The Principles of Political Economy* (1883), pp. 150-155.

<sup>228</sup> Cannan, *Elementary Political Economy* (1888), part 1, sect. 7. For the contributions to the development of optimum population theory of different writers see Robbins, "The optimum theory of population" (1927); Wolfe, "The population problem since the World War: a survey of literature and research" (1928); Cohn, *Die Theorie des Bevölkerungsoptimums* (1934), pp. 15-22, 81-83; Whittaker, *A History of Economic Ideas* (1946), pp. 347-350; Spengler, "Marshall on the population question, part 1" (1955).

<sup>229</sup> Robbins, "The optimum theory of population" (1927); Hicks, *The Social Framework* ... (1950), p. 198; Wolfe, "The optimum size of population" (1926), favoured the use of *per capita* value of consumers' goods; Penrose, *Population Theories and their Application* ... (1934), p. 84, included the qualification that income should be spent so that it resulted in the greatest welfare.

<sup>230</sup> Cannan, *Wealth* ... (1914), pp. 57-58; Wolfe, "The theory of optimum population" (1936); Gottlieb, "The theory of optimum population for a closed economy" (1945). In connexion with measuring optimum population with respect to income or productivity the point was raised, that optimum population was not only a question of the size but also of the structure of population. See Mombert, "L'optimum de population" (1935); Cohn, *Die Theorie des Bevölkerungsoptimums* ... (1934), p. 143; Ferenczi, *The Synthetic Optimum of Population* ... (1938); Plummer, "The theory of population: some questions of quantity and quality" (1932). Gottlieb, "The theory of optimum population for a closed economy" (1945), dismissed, however, the importance of the age distribution in this respect.

<sup>231</sup> Fairchild, *People: the Quantity and Quality of Population* (1934), pp. 64-70; and his "Optimum population" (1927). For a critical review of the use of such general concepts as "standards of living" or "welfare" in this connexion, see Cohn, *Die Theorie des Bevölkerungsoptimums* ... (1934), pp. 69-70; Rao, "The optimum population" (1939); Wolfe, "On the criterion of an optimum population" (1937). Carr-Saunders, *World Population* (1937), p. 330, thought, however, that for practical purposes "maximum economic welfare" could be taken as equivalent to real income per head.

<sup>232</sup> Thompson, *Population Problems* (1935), pp. 429-432; Penrose, *Population Theories and their Application* ... (1934), p. 73; Reuter, *Population Problems* (1937), pp. 279-280.

total of well-being, health, longevity, ideal family size, the conservation of natural resources, power, defence, and other spiritual, cultural and aesthetic factors.<sup>233</sup> Nevertheless, most of the literature on optimum population has been concerned with the economic optimum.

95. Criticism of optimum population has been strong and many writers have challenged the practical applicability as well as the formal validity of the concept as originally formulated.<sup>234</sup> As far as the former is concerned, while many writers agree that it may be possible to give some meaning to the concept of "under-population" or "over-population", the majority among them expressed doubt whether optimum population, in the sense of an "optimum point" can be determined. A number of writers have, therefore, referred to an optimum zone, area, plateau or range, with those taking a critical view of the theory asserting that the concept of optimum population thus becomes indeterminate.<sup>235</sup>

96. More fundamental are those objections against the optimum theory which stress its essentially static nature. Many writers have pointed out that formally the optimum theory assumes a *ceteris paribus* condition for all other factors—technology, resources, social structure and external trade to name a few.<sup>236</sup> Such an assumption, it is argued, is highly unrealistic; in the time it would inevitably take the population to adjust to the optimum determined under the assumption of *ceteris paribus*, the real optimum itself would have shifted, since the other factors in fact, are constantly changing.<sup>237</sup> Another argument in this connexion, already advanced by Cannan, stresses the fact that the population at a given time is

part of a process of continuing demographic change and that it cannot be dissociated from the population which preceded it nor from the population which will follow. Asserting that there is no reason for isolating the present population in preference to others, Cannan held that optimum population should be treated in terms of the "right movement" of population increase or decline rather than with reference to a particular point of time.<sup>238</sup> In view of these criticisms the problem of optimum population has been described not so much as that of adjusting a variable population to a given technology and resources but as that of harmonizing population changes with those that take place in the other factors involved.<sup>239</sup> Such a formulation, although significantly complicating the practical task of ascertaining the optimum population,<sup>240</sup> introduces a dynamic element. It does not, in the view of many, however, resolve the problem that optimum theory also assumes the independence of technology, capital resources and other relevant factors from population, while in reality there exist complex interrelationships between population and these other factors.<sup>241</sup> It follows that unless these interrelations are known<sup>242</sup> or can be ignored,<sup>243</sup> it becomes impossible to determine the optimum population.

97. While optimum theory received most attention during the 1920s and 1930s, a more recent contribution to it was made by Sauvy. Contrary to many of the earlier writers, he considered the concept of optimum population—which he defined as that population which best assures the realization of a pre-determined objective—not so much as an absolute theoretical concept but as a convenient tool. Recognizing that the concept was essentially static and implied the questionable assumption that all other things except population size remain the same, he nevertheless held that the concept of optimum greatly facilitates the analysis of the influence of population on other factors.<sup>244</sup> After analyzing the economic and power optimum in an over-all, static manner, he dealt subsequently with the influence of structural aspects—such as the distribution of population among workers and non-workers, among different economic activities and among different social classes in terms of his "theory of domination". He then considered the effects of dynamic factors—

<sup>233</sup> Mukerji, "The optimum in recent population theories" (1937); Fraser, "On the concept of an optimum in population theory" (1934); Ferenczi, *The Synthetic Optimum of Population* . . . (1938); Dupréel, "L'optimum de population et ses critères" (1928); Mukerji, *The Political Economy of Population* (1943), chap. 8; Gini, "Considerations on the optimum density of a population" (1929); Sauvy, *Théorie générale de la population*, vol. 1 . . . (1952, 1963 ed.), pp. 51-52, 67-79.

<sup>234</sup> Whelpton, *Needed Population Research* (1938), p. 157; Sarkar, *The Sociology of Population* . . . (1936), p. 34; Myrdal, *Nation and Family* . . . (1941), p. 86; Mombert, *Bevölkerungslehre* (1929), p. 242; Sorokin, *Contemporary Sociological Theories* . . . (1928, 1964 ed.), p. 402; Myrdal, *Population: a Problem for Democracy* (1940, 1962 ed.), p. 26; Reuter, *Population Problems* (1937), p. 278; Osborn, "Optimum rates of population growth" (1958); Robinson, "The development of modern population theory" (1964).

<sup>235</sup> Cohn, *Die Theorie des Bevölkerungsoptimums* . . . (1934), p. 112, cites Gini as speaking of an optimum zone; Penrose, *Population Theories and their Application* . . . (1934), p. 57, uses the expression "plateau"; Fairchild, *People: the Quantity and Quality of Population* (1939), pp. 87-88, suggests the use of optimum "area"; Hicks, *The Social Framework* . . . (1942), p. 199, uses the word "range"; Gottlieb, "The theory of optimum population for a closed economy" (1945), adds that the productivity (or income) curve is not necessarily continuous, but may exhibit irregularities in inflection and even reverses because of the discontinuities in the process of economic growth. See also Cohn, *Die Theorie des Bevölkerungsoptimums* . . . (1934), pp. 112 ff.; Myrdal, *Population: a Problem for Democracy* (1940; 1962 ed.), p. 142.

<sup>236</sup> In general the theory of optimum population deals with an isolated state or closed economy. See, for instance, Cohn, *Die Theorie des Bevölkerungsoptimums* . . . (1934), p. 124. However, Gottlieb, "Optimum population, foreign trade and world economy" (1949), discussed the theory in the setting of an open economy.

<sup>237</sup> Myrdal, *Population: a Problem for Democracy* (1940, 1962 ed.), p. 143; Hicks, *The Social Framework* . . . (1942), pp. 199-200.

<sup>238</sup> Cannan, *Wealth* . . . (1914, 1928 ed.), pp. 60-61; and his *A Review of Economic Theory* (1929, 1964 ed.), pp. 82-83. See also Osborn, "Optimum rates of population growth" (1958).

<sup>239</sup> Rao, "The optimum population" (1939); Cohn, *Die Theorie des Bevölkerungsoptimums* . . . (1934), p. 21.

<sup>240</sup> Cannan, *A Review of Economic Theory* (1929, 1964 ed.), p. 83; Myrdal, *Population: a Problem for Democracy* (1940, 1962 ed.), p. 143.

<sup>241</sup> Cannan, *A Review of Economic Theory* (1929, 1964 ed.), p. 82; Fairchild, "Optimum population" (1927); Cohn, *Die Theorie des Bevölkerungsoptimums* . . . (1934), p. 125; Mombert, "L'optimum de population" (1935).

<sup>242</sup> For a discussion as to the state of knowledge of the effect of demographic factors on such variables as capital formation, employment and productivity see chap. XIII.

<sup>243</sup> Gottlieb, "The theory of optimum population for a closed economy" (1945), thought that the assumption of the independence of the "other variables" postulated by optimum theory constitutes a reasonable working hypothesis.

<sup>244</sup> Sauvy, *Théorie générale de la population*, vol. 1 . . . (1952, 1963 ed.), pp. 50-54. See also his *Richesse et population* (1944).

such as technological progress and changes in the structure of the economy and employment—on the optimum population. Finally, he discussed the policies for attaining optimum population, their effectiveness and costs.<sup>245</sup>

## 2. THEORETICAL DEMOGRAPHY

98. Theoretical demography, also often referred to as formal or pure demography, is concerned with the immediate factors which influence the size and change of population, determining the influence which each of these factors exert as well as the mechanism they form together. Pure demography, in studying the immediate causes, it has been asserted, logically constitutes the first stage in demographic theory. Once those causes have been established, the less direct determinants from which the direct ones depend should be studied.<sup>246</sup> In other words, theoretical demography is concerned exclusively with demographic phenomena and the necessary mathematical and quantitative relations among them and does not consider social, economic or other factors.<sup>247</sup>

99. Theoretical demography may be said to have come into existence with the development of the life table interpreted as providing the proportional distribution by ages of a hypothetical population with constant age specific mortality rates and a given and equal number of births and deaths.<sup>248</sup> In the eighteenth century, Euler, assuming a hypothetical population with a constant schedule of age-specific mortality rates and a constant rate of increase, showed that such a population would have a stable age distribution and that its other demographic characteristics could be completely determined.<sup>249</sup> The basis for the calculation of reproduction rates and especially the net reproduction rate as a measure of the replacement of one generation by the succeeding one, was laid by Lexis<sup>250</sup> in the latter part of the nineteenth century. It was developed by Böckh<sup>251</sup> and later, by others, including Kuczynski<sup>252</sup> and Dublin and Lotka.<sup>253</sup>

100. A general and complete theory of the interrelations of the basic demographic processes, including the determination of the age structure and other functions of the population, was developed by Lotka.<sup>254</sup> The study

of quantitative demography or population analysis, according to Lotka, can be undertaken from two points of view or by two methods: the empirical method and the rational or formal method. The rational method, he notes, is possible because of the necessary relations imposed by biological laws or the laws of logic between various demographic characteristics, and is indispensable in order to obtain a satisfactory understanding of population phenomena. The internal factors, such as birth rates, death rates and rates of natural increase of a population of living beings are thus connected by a variety of interrelations. While his approach was essentially biological, Lotka recognized that the study of human population necessitates the consideration of a number of relationships which do not exist or are subordinate in other species, but he noted that fundamentally these were special aspects of the general phenomenon of biological reproduction.<sup>255</sup>

101. In his analytical theory Lotka began by discussing the relationships in a closed population between the basic demographic variables, such as population growth, births, deaths and their respective rates, age-specific survival ratios and the age distribution. In the course of his analysis he formulated certain assumptions as to some of these factors and on this basis distinguished between various population types. A Malthusian population was defined as one in which mortality and age structure are constant. Taking fertility into account, he distinguished a population, commonly referred to as stable, in which both age-specific fertility and mortality schedules are constant.<sup>256</sup> On the basis of these assumptions he analysed the relationships between the different demographic phenomena and derived certain properties of the populations concerned, demonstrating that under these conditions the crude birth and death rates and the rates of natural increase,<sup>257</sup> among others, would be constant.

102. Apart from its usefulness for practical applications, Lotka's work constituted a significant contribution to a better understanding of the demographic processes, the interrelations between demographic factors and their respective roles. Nevertheless, more recent work on this subject has shown various limitations in his analysis. In particular a number of writers have noted that in considering only individuals of one sex, Lotka evaded or

<sup>245</sup> Sauvy, *Théorie générale de la population*, vol. 1 ... (1952, 1963 ed.).

<sup>246</sup> Landry, *Traité de démographie* (1949), pp. 506-507.

<sup>247</sup> Lotka, "Population analysis" (1936, 1956 ed.); Landry, *Traité de démographie* (1949), p. 487; United Nations, *Multilingual Demographic Dictionary* (1958), p. 3; Hauser and Duncan, "Demography as a body of knowledge" (1959); Lorimer, "The development of demography" (1959).

<sup>248</sup> Lorimer, "The development of demography" (1959).

<sup>249</sup> Euler, "Recherches générales sur la mortalité ..." (1760); Lorimer, "The development of demography" (1959).

<sup>250</sup> Lexis, *Einleitung in die Theorie der Bevölkerungs-Statistik* (1875).

<sup>251</sup> Böckh, *Statistisches Jahrbuch der Stadt Berlin* (1884), pp. 30-34.

<sup>252</sup> Kuczynski, *The Measurement of Population Growth* ... (1936).

<sup>253</sup> Dublin and Lotka, "On the true rate of natural increase ..." (1925).

<sup>254</sup> Lotka and Sharpe, "A problem in age-distribution" (1911); Lotka, "The measure of net fertility" (1925) and, especially, his *Théorie analytique des associations biologiques. Deuxième partie* ... (1939).

<sup>255</sup> Lotka, "Population analysis" (1936, 1956 ed.); his "Some recent results in population analysis" (1938, 1956 ed.); and his *Théorie analytique des associations biologiques. Deuxième partie* ... (1939), pp. 9-10.

<sup>256</sup> The term "stable populations" may be interpreted in two ways: either as a sub-set of Malthusian populations with constant fertility in addition to constant mortality or as the limiting state of a process of demographic evolution in which mortality and fertility remain unchanged. See United Nations, *Le concept de population stable* ... (1966), pp. 2-3.

<sup>257</sup> Lotka called a population with constant mortality and age distribution Malthusian because the rate of increase of such a population would be geometrical, and Malthus assumed that population would tend to increase geometrically.

ignored difficulties in relationships between male and female reproduction rates in stable populations.<sup>258</sup>

103. A more general framework was used by Winkler, who introduced the term "demometrie"—defined as the precise measurement of population development by mathematical means. Demometrie may be based on either real or theoretical populations. According to Winkler, it involves the refining and further development of available statistics, the improvement of techniques for data collection and analysis, the graphic representation of data and the construction of demographic models. Demographic models may be empirical, that is based on observations of real populations, or constructed—built up from certain assumptions. Winkler classified these models according to content, scope, assumptions and whether they were static or dynamic, functional or stochastic, complete or partial, and then analysed them in these different forms and types.<sup>259</sup>

## H. Recent developments

104. Over the last few decades the evolution of population theory has been dominated to a great extent by two trends. In the first place, progress in demographic analysis, and particularly in the study of fertility and mortality, has confirmed the necessity of formulating population theories not in terms of over-all population growth, but in terms of its main components—fertility and mortality. Secondly, this period has witnessed an increasing preoccupation with the problems of economic development in the economically less advanced countries and the repercussions of high rates of population growth and characteristics associated with it on the process of development. These circumstances have been responsible for an increasing amount of literature dealing with, on the one hand, the theory of demographic transition, which inquires into the simultaneous behaviour of fertility and mortality through time and, on the other hand, with the increasing number of models and theories of economic development which incorporate theories of population as one of their basic ingredients. Nonetheless, despite the better insight and the clearer understanding they have provided, none of the approaches has as yet produced a completely acceptable or accepted theory of population.

### 1. THE THEORY OF DEMOGRAPHIC TRANSITION

105. Contrary to most other theories of population, the theory of demographic transition derives from actual historical experience. On studying the demographic evolution of the countries in the Western sphere of civilization, a number of writers inferred that populations historically pass through different more or less well-defined stages. Developed as an attempt to formulate a

<sup>258</sup> Vincent, "De la mesure du taux intrinsèque ..." (1946); Hajnal, "Aspects of recent trends in marriage in England and Wales" (1947); Karmel, "The relations between male and female reproduction rates" (1947); and his "The relations between male and female nuptiality in a stable population" (1948).

<sup>259</sup> Winkler, *Demometrie* (1969). See also his *Typenlehre der Demographie* ... (1952) and his "Types and models in demography" (1963).

generalized explanation of the process of mortality and fertility decline in these countries, the transition theory was elaborated and received a much broader interpretation in more recent decades, when it was thought to be applicable also to the less developed countries still in the early stages of demographic change. In effect, transition theory has come to be increasingly considered as a theory which might anticipate the future demographic trends in countries presently in the early phases of transition. These are characterized by high population growth as a result of rapidly decreasing levels of mortality and high but more or less stable fertility levels.

106. Landry was probably the first to attempt a description of the demographic stages. In a study published in 1909 he identified three main stages, or "régimes", of population.<sup>260</sup> He held that in studying the influence of economic factors on population the crucial factor is productivity. In answering the question as to how variations in productivity affect population, he said three economic régimes must be distinguished: the primitive, the intermediate and the modern. The primitive régime is characteristic of all living beings other than man, although it has been characteristic of man in the past and can still be found. Fertility, without necessarily attaining its physiological maximum (because of, for instance, customs of marriage), is not subject to any restrictions originating in economic factors—such as the economic consequences of having children. The economic factor does influence mortality through which it regulates population growth. Population will tend to the maximum limit determined by the means of existence and will reach that maximum when mortality, due to the depressing effect of a growing population on levels of living, will increase and reach and fluctuate around the level of natality. The "intermediate régime" is not well defined. Under it, according to Landry, economic factors will affect fertility through nuptiality. In order to maintain certain levels of living which have been acquired and become customary, marriage will be postponed or foregone. Population growth will be affected and population will tend towards a level below the maximum. In the "modern régime" caused by the "demographic revolution", economic factors no longer play the role they had in earlier stages. The decline in birth rates is general under this régime and the result of conscious family limitation, indicating also a change in the aspirations of man concerning his conditions. Although the increase in levels of living itself may have contributed to shaping such attitudes and certain interrelations between population and economy remain, there is no more a "law of population" which tends to determine an equilibrium. On the other hand, the decrease of fertility is not necessarily indefinite or inevitable.<sup>261</sup>

107. Thompson, in an attempt to generalize the demographic experience of Europe into a theoretical framework which could apply to other areas as well, grouped the nations of the world into three groups according to the level of their birth and death rates. Starting with

<sup>260</sup> Landry, "Les trois théories principales de la population" (1909, 1934 ed.); and his *La révolution démographique* ... (1934).

<sup>261</sup> Landry, *Traité de démographie* (1949), pp. 535-547.

the countries which were at a demographically more advanced stage, he distinguished:

(a) Countries with very rapidly declining birth and death rates, with the former declining more rapidly so that the growth rate is also declining;

(b) Countries with declining birth rates and death rates for certain classes, but with death rates declining as rapidly or more rapidly than the birth rate, producing a stable or even increasing growth rate, and

(c) Countries where both birth and death rates are less controlled, but where there is evidence that the death rates are coming under control faster than birth rates, producing the likelihood of a very rapid increase in numbers in the future.<sup>262</sup> Blacker identified five stages of demographic evolution:

(a) The high, stationary stage characterized by high birth rates and death rates;

(b) The early expanding stage with high birth rates and high but decreasing mortality rates;

(c) The late expanding stage with falling birth rates but more rapidly decreasing mortality;

(d) The low stationary stage, with low birth rates balanced by equally low mortality; and

(e) The declining stage with low mortality, lower natality and deaths exceeding births.<sup>263</sup>

108. Notestein stated that the growth of Europe in the modern era involved initially declining mortality produced by the process of modernization as a whole, including rising levels of living and new controls over disease. Fertility responded more slowly to modernization, but ultimately began a decline through the widespread use of contraception under the impact of such factors as growing individualism and rising levels of aspiration developed in urban industrial living. Noting that the more rapid response of mortality than of fertility to the forces of modernization is probably inevitable, he distinguished three demographic types or stages of demographic evolution:

(a) Populations with incipient decline or "transition completed" (United States, Europe, Australia), characterized by a fertility rate declining to or even below the replacement level;

(b) A transitional type of population (Soviet Union, Japan, some countries in Latin America) with a rate of growth which is still relatively rapid, but where a decline in the birth rate is well established; and

(c) Populations with high growth potentials or transitional growth not yet begun (most of the countries in Africa, Asia and Latin America), where fertility remains high with no tendency to decline and where the high, but declining death rate is the main growth factor.

<sup>262</sup> Thompson, "Population" (1929); his *Population and Peace in the Pacific* (1946), chap. 2; and his *Plenty of People* (1948), chap. 6.

<sup>263</sup> Blacker, "Stages in population growth" (1947). Davis, "Population and resources" (1950), argued that another stage should be added to those distinguished by Blacker and Thompson: relatively low and stable natality remaining above mortality and permitting a significant rate of increase.

He was of the opinion that the study of the beginnings of economic development and demographic transition in certain non-European countries suggested that the principles drawn from the European demographic transition would be widely applicable in the world.<sup>264</sup>

109. The process of demographic transition in the course of economic development as based on the experience of the presently industrialized countries has been summarized by Coale and Hoover. The agrarian low-income economy, they stated, is characterized by high birth and death rates, the former being relatively stable and the latter fluctuating in response to varying fortunes. Then, as the economy progresses to become more interdependent, specialized and market-dominated, the average death rate begins a continuing decline under the impact of better organization and improved medical knowledge and care. Somewhat later the birth rate begins to fall. The birth and death rates pursue a more or less parallel downward course with the decline of the birth rate lagging behind. Finally, as further reductions in the death rate become harder to obtain, the birth rate again approaches equality with the death rate and a more gradual rate of growth is re-established, with, however, low risks of mortality and small families as the typical pattern. Mortality rates then become relatively stable from year to year and birth rates respond to voluntary decisions rather than deeply embedded customs and may fluctuate from year to year.<sup>265</sup>

110. While the idea of a demographic transition has been widely adopted and is frequently used as a generalized description of the evolutionary process, a number of writers have emphasized its limitations as a theory. It has been argued that since the transition theory is linked to the experience of Western countries, whose historical demographic trends were by themselves far from uniform,<sup>266</sup> it is unlikely that it provides more than vague suggestions about factors which may determine growth in other countries.<sup>267</sup> Cowgill, for instance, distinguishes different types of cycles of population growth determined by different patterns of behaviour of birth and death rates which may diverge from the sequence assumed in the transition theory.<sup>268</sup> Billig, dealing separately with the stages of demographic evolution in the capitalist and socialist countries, maintains that the

<sup>264</sup> Notestein, "Population: the long view" (1945); his "Economic problems of population change" (1953); and also his "The population of the world in the year 2000" (1956).

<sup>265</sup> Coale and Hoover, *Population Growth and Economic Development* . . . (1958), pp. 10-13.

<sup>266</sup> On the different forms and "turning points" in demographic transition, see Pavlik, "Nastin populacniho vyvojestveta" (1964); and his "Les problèmes de la révolution démographique" (1967). Van de Walle and Knodel, "Demographic transition and fertility decline" (1967), analysing data for European countries, concluded that a simple statement of transition theory and the threshold hypothesis was incapable of describing the actual experience of Europe satisfactorily.

<sup>267</sup> Van Nort and Karon, "Demographic transition re-examined" (1955); Hauser and Duncan, "Demography as a body of knowledge" (1959).

<sup>268</sup> Cowgill, "The theory of population growth cycles" (1949). See also Mackensen, "Theoretical considerations regarding differential transition" (1967).

process of demographic evolution in the socialist countries should be studied on the basis of the experiences of those countries, particularly that of the Soviet Union. Reviewing the stages of development of the Soviet population, he explains them as a result of social transformations and the progress of industrialization.<sup>269</sup> Valentei also questions whether industrialization has the same influence in socialist countries as in others and, like some non-Marxist writers, also challenges the contention that the experience of western capitalist countries is valid—as is claimed—for the economically less developed countries of Asia and Africa.<sup>270</sup> With respect to countries undergoing transitional growth, a number of writers have pointed out that at least the tempo of change in them differs considerably from that observed in countries which completed the transition earlier, especially as far as the rapidity of the decline in mortality is concerned and also in regard to the fact that in some western countries fertility fell before any major decline in mortality occurred.<sup>271</sup>

111. Another and more fundamental criticism of the transition theory is that as a theory it is unsatisfactory. Transition theory, it is argued, is not a theory, but a description of historical events that have occurred in the developed countries with some regularity. It has only suggested certain major complexes of factors which presumably influence the components of population growth, and thus raises serious questions as to its explanatory and predictive value. As it is, the theory is an interpretation of turning points in demographic evolution rather than a system of logically consistent and explicit relationships that provide a basis for pertinent deductions and predictions of future developments.<sup>272</sup> These limitations of the theory, however, were not overlooked by those propounding it. Notestein noted, for instance, that not all the components of the process of modernization could be listed and no precise weights could be assigned to factors which could be isolated. On the other hand, he held that the theory of the broad process of population change seems to have been sufficiently tested to prove its general validity, but that what was needed was knowledge at lower levels of generality.<sup>273</sup> Other writers also have contended that the theory of demographic transition provides a satisfactory framework and means for wider empirical generalizations.<sup>274</sup> For such a development

the explanation of fertility trends and especially of the onset of fertility decline appears to be the crucial factor.<sup>275</sup>

## 2. POPULATION AND ECONOMIC DEVELOPMENT

112. After the relative neglect of population in the writings of the neo-classical school of economics, the interest of economists in the population factor revived with the emergence and ensuing discussion of the stagnation theory. This theory stressed the potentially negative effects of declining population growth on economic progress in the economically advanced countries.<sup>276</sup> The main impetus for the increased interest in population on the part of economists in the recent period is, however, to be found in the predominant place the problems of economic development of the less advanced countries occupy in contemporary economic analysis. Two factors are responsible for this increased interest. In addition to the development problems emanating from existing imbalances between population and resources, there are others created by the unprecedented high rates of population growth characteristic of most developing countries. Although there is more or less a general agreement that economic development is intertwined with population problems and that prevailing patterns of population growth in the developing countries have important economic repercussions, there have been relatively few attempts to introduce population as an integral factor into the study of economic growth. Even where population has entered into development theory and models, it has done so mostly in the form of an independent or exogenous variable and there are only a few cases where a systematic attempt has been made to integrate economic and population theory. In addition, in the instances where such attempts were made, views on the role of population continued to be heavily influenced by Malthusian theory.<sup>277</sup>

113. The relevance of Malthusian theory for modern economic and population theory was discussed by Peacock on the basis of a "model" containing the fundamental Malthusian assumptions and hypotheses. The latter, according to the author, were:

(a) Population is an increasing function of the average output per head of population;

(b) The supply of labour is an increasing function of the level of population; and

(c) The application of successive increments of labour to the fixed supply of capital and land will, after a certain point, result in a declining product per head of population. From these hypotheses, and an assumption concerning the subsistence level of living, it would follow that population always tends to the level which will be just supported at a minimum subsistence. There is, however, Peacock asserts, no reason why these hypotheses and assumptions

<sup>269</sup> Billig, *O prawach rozwoju ludności* (1963).

<sup>270</sup> Valentei, *Reaktsionnye teorii narodonaseleniia perioda ...* (1963), part 3.

<sup>271</sup> Taeuber, "The future of transitional areas" (1952); Hauser and Duncan, "Demography as a body of knowledge" (1959); Glass, "Fertility and population growth" (1966). Robinson, "The development of modern population theory" (1964), while noting some of these aspects does nevertheless assert the validity of the theory.

<sup>272</sup> Hauser and Duncan, "Demography as a body of knowledge" (1959). Valentei, *Reaktsionnye teorii narodonaseleniia ...* (1963); Glass, "Population growth and population policy" (1965); Gutman, "In defense of population theory" (1960).

<sup>273</sup> Notestein, "Economic problems of population change" (1953).

<sup>274</sup> Vance, "Is theory for demographers?" (1956); Moore, "Sociology and demography" (1959).

<sup>275</sup> Concepción and Murphy, "Wanted: a theory of the demographic transition" (1967), see an evolution in this direction, particularly in the recent attempts to formulate new theories of fertility decline. See also chap. IV of this study.

<sup>276</sup> Several aspects of the stagnation thesis are discussed in chap. XIII.

<sup>277</sup> Levine, "Economic science and population theory" (1965).



should be accepted. He particularly questions the assumption that population is a function of output and that the latter is in turn indirectly, as implied in the last two hypotheses, a function of the size of the population. From the view point of economic theory, Peacock states, the important question is to what extent production depends on population and the supply of labour. The crucial issue for population theory, however, is whether population can be considered a function of production or more specifically a function of average income per head. As the historical experience of western countries suggests, population, instead of being positively associated with level of income—as assumed in Malthusian theory—may in fact be a decreasing function of income. Nevertheless, even though the relation between population and levels of living as postulated in Malthusian theory is highly questionable, this does not mean that there is no relation between population and material conditions. Actually, the spread of preventive checks, which disproved Malthus's assertion that the biological principle of "the passion between the sexes" was the determinant of reproduction, gave added significance to economic factors. With the introduction of these checks the question of choice in the procreation of children becomes important. The motives for having children are reflected in economic choices, the cost of having children being measured in terms of the alternatives forgone.<sup>278</sup>

114. Coontz attempted to formulate a theory of population growth consistent with the thesis of the classical school that the demand for labour governs its supply. He assumed mortality to be directly related to fertility, while taking the generally observed inverse relation between fertility and economic status or income as the point of departure for explaining fertility. Considering the wealthy, he argued that the reasons for high fertility among them had disappeared even at an early stage of development since the labour of children and wives was of relatively little importance. Among the poorer classes, as long as there existed a demand for child labour, parents acted rationally in having a large number of children. The birth rates of the poor would decline only when the demand for this type of labour declined and the average quality of the labour demanded increased.<sup>279</sup>

115. Among the theories and models of economic development in which population appears as an integrated variable is that developed by Leibenstein. Leibenstein argues that the quasi-stable equilibrium, characteristic for the backward subsistence economy, can only be overcome by a strong displacement or stimulus, since the income-raising forces of a positive displacement (such as technological progress, emigration and, especially, a fortuitous increase in capital) set in motion other forces which tend to depress income (such as increased consumption, pressure on resources, institutional rigidities and particularly, population growth). Unless the displacement is strong enough and beyond the maximum of the income-depressing factors, reaching the so-called critical minimum

effort, the economy will return to its subsistence equilibrium. In this scheme Leibenstein assigns great importance to population as an endogenous variable. Population growth, through the relations which exist between its basic determinants (fertility and mortality) and income, is regarded as a function of levels of living. Mortality is thought to be negatively related to income, the reasoning being that higher wages, better food, shelter, medical care etc. associated with an increase in income will lower mortality. Fertility is determined by a great number of factors, but up to a certain point motivations for larger families will predominate. After that, fertility is likely to decline with further gains in income. In explaining the factors which create the motivations for smaller rather than for larger families, Leibenstein holds that both in the less developed and in the developed economies, parents are rational in their decisions and will desire an extra child only when the costs are smaller than the satisfactions. He distinguished three types of utility which can be derived from an additional birth: the utility of a child as a source of personal pleasure to parents; as a future productive agent contributing to the family income, and as a potential source of the parents' security during old age. These utilities would be weighted against the costs of an additional child—including the direct costs of maintenance, food and clothing and the indirect costs of opportunities forgone, such as the limited possibilities for mothers of young children to work, lost earnings during gestation and lowered mobility for the family. While in subsistence economies the utility of an additional child may outweigh its costs, in the course of economic development these utilities and costs are affected in a manner conducive to the establishment of the small family norm. These changes take the form of income effects involving the lower income of and decreased opportunities for child labour; the greater security at higher income at old ages and the higher direct and indirect costs of children; the survival effect related to the income effect and to the implications of an initial fast decline in infant mortality; mortality declines at higher ages in a later stage, and the occupational distribution effect related to the specialization and division of labour. These motivations to fertility reduction, according to Leibenstein, cannot be expected to develop in the early stages of improvement. Thus, when as the result of a positive displacement, mortality declines in response to the increased income, fertility may not immediately follow and a fertility lag arises. Where the displacement is not strong enough, fertility will not decline and the economy, under the pressure of the income-decreasing effects of a higher population growth, will return to a stationary state. Thus only where the displacement is such that decreasing utility and increasing costs for an additional child will take effect and be realized, will fertility decline and population growth slow down. The income-raising factors thus having been stimulated beyond the maximum of the income-depressing forces, the economy is on its way to development.<sup>280</sup>

<sup>278</sup> Peacock, "Theory of population and modern economic analysis" (1956).

<sup>279</sup> Coontz, *Population Theories and the Economic Interpretation* (1957).

<sup>280</sup> Leibenstein, *A Theory of Economic-Demographic Development* (1954), especially chap. 6; and, particularly, his *Economic Backwardness . . .* (1957). See also Abraham-Frois, *Essai sur les problèmes d'investissement . . .* (1962), part 1, chap. 1.

116. A model similar to that of Leibenstein, but with a less complete treatment of population variables, was formulated by Nelson. According to Nelson, many of the under-developed countries are caught in the low-level equilibrium trap characterized by a stable equilibrium level of *per capita* income at or close to subsistence requirements. Capital formation is low and if the capital stock is accumulating, population is rising equally fast, thus precluding the possibility of increases in the amount of capital per worker. Nelson's model is built around three basic variables: income, investment and population growth. Since the model is short-run, changes in the birth rate are ignored and changes in population growth can result only from mortality. Mortality is supposed to be determined by the level of *per capita* income until the latter reaches a certain level beyond which it has little effect on mortality. Assuming production to be a function of capital stock, including land and population, Nelson shows that *ceteris paribus* average income per head can increase only if the rate of capital formation exceeds that of population growth. Small injections of capital may have no permanent effect since the consequent increase in income will tend to be swamped by population increase and only massive capital formation would make it possible to escape the equilibrium trap.<sup>281</sup>

117. A different interpretation of economic development and the role of population is found in Jorgenson's two-sector model. His basic hypothesis concerns the existence of two economic sectors—the advanced modern, or manufacturing, and the backward, traditional or agricultural—with different production functions. He assumes diminishing returns in agriculture; constant returns in industry and constant neutral technological change in both sectors. Capital formation is determined by the growth of the manufacturing labour force, by the terms of trade between the two sectors, and by the Malthusian law of population. More specifically, population growth depends on the supply of food *per capita* and the force of mortality. The latter is assumed given and can be altered only by changes in medical science. The birth rate depends on the supply of food *per capita*, but may attain a biological or social maximum provided the supply of food is sufficient. Taking the case where there is only the agricultural sector and distinguishing, moreover, between a situation where population growth is at its maximum and where it is still below that level and a function of *per capita* income, Jorgenson determines under which conditions a low-level equilibrium trap will exist and shows that, given diminishing returns, under these circumstances only the introduction of new techniques or measures of birth control would make it possible to escape this trap. When output per head is increasing, however, an agricultural surplus is generated and the development of the manufacturing sector becomes possible. This process is accompanied by a continuous change in production and by a transfer of population towards the manufacturing sector. Population will grow at its maximum rate and in the absence of technological change, capital and output will grow at the same rate.

<sup>281</sup> Nelson, "A theory of the low-level equilibrium trap ..." (1956).

Jorgenson concludes that the critical conditions separating the economy caught in the low-level equilibrium trap from that capable of sustained growth is the existence of a persistent agricultural surplus, the sufficient condition being that technological progress increases more rapidly than the combined effects of diminishing returns in agriculture and population growth.<sup>282</sup>

118. A different approach was taken by Hagen, who contended that a satisfactory population theory should account for three types of population growth—high population growth due to high birth rates and declining death rates caused by exogenous factors, such as improved public health; high population growth due to high birth rates and declining death rates resulting from increasing income and technological progress; and low population growth due to low birth and death rates but with a slight rise in birth rates as observed recently in developed countries. In his model Hagen stressed the role of technological progress and formulated two hypotheses on fertility. The first one, the standard of living effect, assumed that above some level of income, fertility may decline. The second, the desire to perpetuate the family, supposed that the level of birth rates is determined by that of the death rate in so far as the former is adjusted to the latter by the desire of the typical family to have two children to grow up to parenthood. The basic long-run rate of growth of population is thus fairly low but positive. However, the desire to have at least two children is not rational. It is embedded and a fertility lag will result when death rates are declining. This lag varies with the speed and conspicuousness of the decline in the death rate but the lag may be between some fifteen years up to several generations. The effect of exogenous declines in death rates in a system at the subsistence level, as in many developing countries, may cause *per capita* income to fall to a lower subsistence level. The reasoning is that when improved medical and health measures are introduced, it becomes possible for the population to reproduce itself at a lower level of income and the traditional Malthusian mechanisms will work. At the previous subsistence level population will grow and *per capita* income will decline progressively until the new, lower subsistence level is reached. Compared to the exogenously determined decline in the death rate, technological progress has not been fast enough to absorb its effect. Rapid technological progress would be sufficient to avert a decline in *per capita* income and eventually would produce a reduction in the birth rate.<sup>283</sup>

119. A view on population in the process of economic development different from that expressed by most other writers can be found in the writings of Hirschman. Although not developing a population theory in the strict sense of the word, he held that population pressure could be considered among the forces that may stimulate development. He formulated two propositions: first,

<sup>282</sup> Jorgenson, "The development of a dual economy" (1961). See also Cotta, *Analyse quantitative de la croissance ...* (1967), pp. 17-36.

<sup>283</sup> Hagen, "Population and economic growth" (1959). For a critical review, see Higgins, *Economic Development* (1959), pp. 318-323.



population pressure on living standards will lead to activities designed to maintain or restore the traditional standard of living; and secondly, such activities cause an increasing ability to control the environment and to organize the society for development. Such efforts are likely to be successful if a margin of possible improvements exist or if, as Hirschman argues, under-development is a state where labour, capital, entrepreneurship, etc. are

potentially available but need to be mobilized. Although recognizing that as an inducement mechanism population pressure ranks as the least attractive alternative, Hirschman still maintains that it presents the developmental forces with an opportunity to assert themselves.<sup>284</sup>

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<sup>284</sup> Hirschman, *The Strategy of Economic Development* (1958), pp. 176-182.

## Chapter IV

### FERTILITY

1. Human fertility, as a complex process responsible for the biological maintenance of society, constitutes an essential aspect of demographic studies. Within the limits established by physiological factors, a multiplicity of economic, social and cultural factors are the ultimate determinants of fertility levels and of their variations in different societies. A clear dichotomy of current fertility levels has been observed between countries classified as developed or developing according to their level of economic and social development. On the average, fertility is about twice as high in the developing as in the more developed regions of the world, and the distribution of countries by fertility level is distinctly bi-modal, with relatively few countries at intermediate levels. The study of the factors related to high fertility levels, and those associated with fertility decline, assumes great importance in view of the high rate of population growth now experienced by most developing countries that is generally considered to be a deterrent to their rapid economic development.

2. After presenting information on levels and trends of fertility in the various areas of the world, this chapter reviews the current state of knowledge regarding the limits imposed by physiological factors affecting fertility, and then discusses the customs and practices which influence fertility by way of such variables as age at marriage and use of contraception. The subsequent sections examine the underlying factors associated with the long-term decline of fertility in industrialized countries, and with the different levels of fertility currently prevailing in high-fertility, developing countries and among different segments of population within countries. Finally, there is a discussion of prospects for future fertility change in high-fertility and low-fertility countries.

#### A. Levels and trends of fertility

3. According to a United Nations study, the "countries with birth rates above 30 and gross reproduction rates above 2.0 are found almost exclusively in Africa, Asia and Middle and South America, while countries with rates below these levels are located, with few exceptions, in the economically more advanced regions".<sup>1</sup> For the

<sup>1</sup> United Nations, *Population Bulletin* ... (1965), pp. 1-2. The crude birth rate is generally computed as the number of births in a year per thousand of the mid-year population. The gross reproduction rate is defined as the average number of live daughters that would be born to a hypothetical female birth cohort surviving to the end of the reproductive age span and subjected to a specified set of age-specific fertility rates (i.e., the number of births per 1,000 women in each age group).

TABLE IV.1. ESTIMATED CRUDE BIRTH RATES AND GROSS REPRODUCTION RATES FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-1970<sup>a</sup>

Major areas and regions	Crude birth rate (births per 1,000 population)	Gross reproduction rate
World total .....	34	2.3
Developing regions .....	41	2.7
More developed regions .....	19	1.3
Africa .....	47	3.1
Western Africa .....	49	3.2
Eastern Africa .....	47	3.1
Middle Africa .....	45	2.9
Northern Africa .....	47	3.2
Southern Africa .....	41	2.7
Asia (excluding the USSR) .....		
East Asia .....	32	2.0
Mainland region .....	33	2.1
Japan .....	18	1.0
Other East Asia .....	35	2.5
South Asia .....	44	3.0
Middle South Asia .....	44	3.0
South-East Asia .....	44	3.0
South-West Asia .....	44	3.1
Europe (excluding the USSR) .....	18	1.3
Western Europe .....	18	1.3
Southern Europe .....	19	1.3
Eastern Europe .....	17	1.2
Northern Europe .....	18	1.3
Latin America .....	38	2.7
Tropical South America .....	40	2.8
Middle America (mainland) .....	44	3.1
Temperate South America .....	26	1.8
Caribbean .....	35	2.4
Northern America .....	19	1.4
Oceania .....	24	1.7
Australia and New Zealand .....	20	1.4
Melanesia .....	42	2.9
Polynesia and Micronesia .....	40	2.9
USSR .....	18	1.2

SOURCE: United Nations, *The World Population Situation in 1970* (1971), p. 18.

<sup>a</sup> For the developing regions, the figures are estimates of the order of magnitude and are subject to a substantial margin of error.

world as a whole, the estimated crude birth rate was about 34 in 1965-1970; it was about 41 in the developing regions and 19 in the more developed regions (see table IV.1). Among the developing regions, the birth rate was estimated to be highest in Africa (47), as compared with 44 in South Asia, 38 in Latin America and 32 in

East Asia. There are a few countries of low fertility within these regions, most notably Japan and Israel in Asia, and Argentina and Uruguay in Latin America. Average crude birth rates in the principal more developed regions in 1965-1970 ranged from 18 in Europe and the USSR to 24 in Oceania. Exceptions to the prevailing low levels of fertility in these regions include Albania and the non-European population of Oceania.<sup>2</sup>

#### 1. AREAS OF LOW FERTILITY

4. Countries with currently low fertility (i.e., crude birth rates below 30 or gross reproduction rate below 2.0) have all moved from a previously much higher level of fertility in the course of development. Research on eighteenth-century history suggests, however, that crude birth rates were mostly less than 40 and, on occasion, as low as 30 in Northern and Western Europe well before the major decrease in fertility started.<sup>3</sup> Crude birth rates of about 37 in pre-revolutionary France, 32 to 35 in Sweden, and 29 to 33 in Norway in the eighteenth century have been estimated. In Finland the rate rose as high as 44 to 45 between 1750 and 1765, but was below 40 in the earlier decades of the century.<sup>4</sup> With the exception of the Finnish rate, these values for the crude birth rate are below the level currently experienced in the majority of developing countries. In the United States and Canada, crude birth rates were much higher than in Europe in the eighteenth and early nineteenth centuries. The very high level of fertility among early settlers in Canada has been brought out by the investigations of Henripin,<sup>5</sup> while Coale and Zelnik have written that "the birth rate in the United States at the beginning of the nineteenth century was markedly higher than ever recorded for any European country and is equalled in reliably recorded data only by such unusually fertile populations as the Hutterites and the inhabitants of the Cocos-Keeling Islands".<sup>6</sup> Birth rates in the 1850s in the United States were between 42 and 43, and then declined steadily to under 35 by 1878; reductions continued up to 1933, when the low level of 16.7 was reached.<sup>7</sup> In the USSR and Eastern Europe, birth rates before the start of the fertility decline were also higher than in eighteenth-century Northern and North-Western Europe. In the second half of the nineteenth century the Russian crude birth rate was nearly 50, and as late as 1913 stood at 47, while in

Bulgaria, Poland, Romania and Yugoslavia the rate was around 40 in the early years of the twentieth century.<sup>8</sup>

5. Ryder provides the following rough time-table for the passage of a number of countries into the low-fertility category: 1830s — France; 1840s — Ireland; 1880s — Switzerland, Belgium; 1890s — Sweden, Denmark, England and Wales, Scotland, Australia, New Zealand; 1900s — Netherlands, Norway, Germany, United States; 1910s — Canada, Finland, Austria, Hungary, Czechoslovakia; 1920s — Italy, Spain, Portugal; 1930s — Poland, Bulgaria, Romania; 1940s — USSR; 1950s — Japan, Yugoslavia.<sup>9</sup> Other countries with low fertility include Argentina, with a crude birth rate below 30 since the late 1920s; Uruguay, with a trend rather similar to that of Argentina but with insufficiently reliable statistics to pinpoint its date of entry into the low-fertility category; Israel, where the crude birth rate has been below 30 since 1954; and China (Taiwan), Hong Kong, Mauritius, Puerto Rico, Singapore, and Trinidad and Tobago, whose crude birth rates dropped below 30 in recent years.<sup>10</sup>

6. The trend in crude birth rates since 1900 for a number of low-fertility countries is shown in table IV.2. Among these countries, birth rates fell through the 1920s until the mid-1930s, but with some irregularity in the USSR, and with the German rate showing an early recovery from the very low level of the depression years, perhaps as a result of legislation favourable to family formation. Since the Second World War, crude birth rates in Northern and Western Europe and countries of European settlement in North America and Oceania have been generally higher than in the 1930s. However, the decline continued in Eastern and Southern Europe, the USSR and Japan, all areas in which the birth rate before the Second World War was still relatively high.

7. A narrowing of the range of crude birth rates of low-fertility countries has been particularly noticeable since 1960, and by 1969 nearly half the countries shown in table IV.2 had crude birth rates between 16 and 18. Some of these countries which had relatively high fertility in the post-war period, such as Canada, New Zealand, the Union of Soviet Socialist Republics and the United States, experienced falls of 3 to 8 points in their crude birth rates between 1960-1964 and 1969. On the other hand, in Austria, Denmark, Sweden, Switzerland and the United Kingdom (England and Wales), where fertility was somewhat below the average level for low-fertility countries in the 1950s, crude birth rates rose in the early 1960s. By the end of the 1960s, however, a downward trend was in evidence in all of these countries.

8. In most low-fertility countries the trend of the gross reproduction rate has been generally similar to that of the crude birth rate, with a decline through the 1920s and the early 1930s followed by a levelling off or a slightly increasing trend continuing through the early 1940s.<sup>11</sup> Trends in the gross reproduction rates for a number of

<sup>2</sup> While the average crude birth rate for Australia and New Zealand was only 20, for the remainder of Oceania it was above 40.

<sup>3</sup> Detailed analytical studies of fertility in Europe prior to the late eighteenth century have been made only in respect of a few villages or groups of villages in France, England and Flanders, and of the aristocracy. Such studies include Gautier and Henry, *La population de Crulai* ... (1958); Ganiage, *Trois villages de l'Île-de-France* ... (1963); Sogner, "Aspects of the demographic situation ..." (1963); Hollingsworth, *The Demography of the British Peerage* (1964); Henry, *Anciennes familles genevoises* ... (1956).

<sup>4</sup> Biraben, "L'évolution de la fécondité ..." (1966), p. 3. See also Gille, "The demographic history of the Northern ..." (1949); Jutikkala, "Finland's population movement ..." (1965).

<sup>5</sup> Henripin, *La population canadienne* ... (1954).

<sup>6</sup> Coale and Zelnik, *New Estimates of Fertility* ... (1963), p. 35.

<sup>7</sup> *Ibid.*, pp. 21-23.

<sup>8</sup> United Nations, *Population Bulletin* ... (1965), pp. 90-99.

<sup>9</sup> Ryder, "Fertility in developed countries ..." (1967), p. 105.

<sup>10</sup> United Nations, *Demographic Yearbook, 1965* ... (1966), table 12; and ———, *1969* ... (1970), table 12.

<sup>11</sup> United Nations, *Recent Trends in Fertility* ... (1958), p. 25.

TABLE IV.2. CRUDE BIRTH RATES FOR MORE DEVELOPED COUNTRIES, 1900-1969  
(Births per 1,000 population)

Period <sup>a</sup>	Northern Europe						Western Europe					
	Denmark	Finland	Ireland	Norway	Sweden	United Kingdom (England and Wales)	Austria <sup>b</sup>	Belgium	Federal Republic of Germany <sup>c</sup>	France	Netherlands	Switzerland
1900-1904	29.0	31.3	23.1	28.5	26.4	28.2	35.7	27.9	34.3	21.2	31.5	28.2
1905-1909	28.4	31.0	22.7	26.7	25.6	26.7	34.3	25.1	32.3	20.1	30.0	26.4
1910-1914	26.4	28.2	22.7	25.3	23.7	24.3	23.9 <sup>d</sup>	22.5	28.2	19.0	28.2	23.8
1915-1919	23.8	23.3	20.6	24.0	20.8	20.9	15.3 <sup>d</sup>	13.6	16.0	11.4	25.7	18.9
1920-1924	22.6	25.4	20.5	23.5	20.3	21.3	22.6 <sup>e</sup>	21.1	23.1	19.9	26.7	20.0
1925-1929	19.8	22.8	20.3	18.5	16.3	17.1	18.4	18.9	19.1	18.5	23.4	17.8
1930-1934	17.9	20.0	19.5	15.7	14.4	15.3	15.1	17.6	16.3	17.3	21.7	16.7
1935-1939	17.9	20.2	19.4	15.0	14.5	14.9	14.7	15.5	19.4	15.1	20.3	15.4
1940-1944	20.3	20.1	20.9	17.7	17.7	15.5	19.1	13.8	17.4 <sup>d</sup>	14.7	21.8	17.9
1945-1949	21.6	27.0	22.5	20.8	19.0	18.0	16.7	17.3	16.9 <sup>d</sup>	20.3	25.9	19.4
1950-1954	17.9	22.8	21.4	18.7	15.5	15.5	15.0	16.7	16.1	19.5	22.1	17.3
1955-1959	16.8	19.9	21.1	18.1	14.5	15.9	16.8	17.0	16.9	18.4	21.3	17.5
1960-1964	17.0	18.1	21.9	17.3	14.5	17.9	18.5	17.0	18.3	18.0	20.9	18.5
1965	18.0	16.9	22.1	17.8	15.9	18.1	17.9	16.4	17.9	17.8	19.9	18.8
1966	18.4	16.7	21.6	17.9	15.8	17.7	17.6	15.9	17.8	17.6	19.2	18.3
1967	16.8	16.6	21.1	17.6	15.4	17.2	17.4	15.3	17.2	17.0	18.9	17.7
1968	15.3	15.7	21.0	17.6	14.3	16.9	17.2	14.8	16.3	16.7	18.6	17.1
1969	14.6	14.5	21.5	17.6	13.5	16.3	16.5	14.6	15.0	16.7	19.2	16.5

Period <sup>a</sup>	Eastern Europe						Southern Europe				
	Bulgaria	Czechoslovakia	German Democratic Republic <sup>c</sup>	Hungary <sup>b</sup>	Poland <sup>b</sup>	Romania <sup>b</sup>	Greece <sup>f</sup>	Italy	Portugal	Spain	Yugoslavia
1900-1904	40.7	35.1	34.3	37.4	...	39.6	35.2	32.6	32.0	35.1	...
1905-1909	42.5	32.9	32.3	36.3	40.1	40.1	33.6	32.6	33.5	33.7	39.2 <sup>g</sup>
1910-1914	39.0	29.6 <sup>d</sup>	28.2	35.2	38.2 <sup>h</sup>	41.8 <sup>d</sup>	...	31.8	33.7	31.1	37.8 <sup>e,g</sup>
1915-1919	26.4	22.4 <sup>i</sup>	16.0	21.9 <sup>h</sup>	30.5 <sup>i</sup>	40.0 <sup>h</sup>	...	22.7	30.2	29.0	...
1920-1924	39.6	26.8	23.1	30.2	34.3	37.6	31.4	30.1 <sup>d</sup>	33.0	30.0	35.3 <sup>d</sup>
1925-1929	34.2	22.9	19.1	26.6	32.9	35.4	32.4	27.2	31.7	28.7	33.9
1930-1934	30.3	19.7	16.3	23.2	28.9	32.9	32.4	24.5	29.3	27.5 <sup>e</sup>	33.0
1935-1939	24.1	17.1	19.4	20.1	25.4 <sup>d</sup>	30.0	29.6	23.2	27.1	22.0	27.9
1940-1944	22.1	20.8	17.4 <sup>d</sup>	19.3 <sup>d</sup>	...	26.0 <sup>i</sup>	15.0	20.7	24.5	22.0	...
1945-1949	24.6	22.4	12.7 <sup>d</sup>	19.5	28.4 <sup>e</sup>	24.9 <sup>d</sup>	18.3	21.1	25.6	22.2	28.2 <sup>e</sup>
1950-1954	21.7	22.0	16.6	21.1	30.1	24.9	19.7	18.3	24.1	20.3	28.8
1955-1959	18.7	18.5	16.1	17.8	27.1	22.9	19.3	18.0	24.2	21.3	24.8
1960-1964	16.9	16.3	17.4	13.6	20.0	16.7	18.1	18.9	24.1	21.6	22.0
1965	15.3	16.4	16.5	13.1	17.3	14.6	17.7	19.2	22.9	21.3	20.9
1966	14.9	15.6	15.7	13.6	16.7	14.3	17.9	18.9	22.2	20.9	20.3
1967	15.0	15.1	14.8	14.6	16.3	27.4	18.7	18.1	21.5	21.0	19.5
1968	16.9	14.9	14.3	15.1	16.2	26.3	18.2	17.6	20.6	20.4	19.0
1969	17.0	15.5	14.0 <sup>j</sup>	15.0	16.3	23.3	17.4	17.6	19.8	20.2	18.8

TABLE IV.2. CRUDE BIRTH RATES FOR MORE DEVELOPED COUNTRIES, 1900-1969 (continued)  
(Births per 1,000 population)

Period <sup>a</sup>	Northern America		South America	Oceania		Asia	Soviet Union (USSR) <sup>m</sup>
	Canada	United States <sup>b</sup>	(Argentina)	Australia	New Zealand <sup>1</sup>	(Japan)	
1900-1904	...	...	...	26.7	26.3	32.2 }	47.2
1905-1909	...	...	37.2	26.8	27.3	32.3 }	
1910-1914	...	...	37.4 <sup>e</sup>	28.1	26.2	33.8	44.7
1915-1919	...	24.1	33.5	25.8	24.3	32.5	31.3
1920-1924	28.1	22.8	32.0	24.4	23.0	35.1	38.2
1925-1929	24.5	20.1	29.9	21.6	20.2	34.1	42.8
1930-1934	22.2	17.6	26.8	17.6	17.5	31.9	34.3
1935-1939	20.4	17.2	24.0	17.2	17.4	29.3	37.6
1940-1944	23.2	19.9	24.1	19.5	21.4	30.1	31.2 <sup>1</sup>
1945-1949	27.0	23.4	25.1	23.1	25.1	30.2	...
1950-1954	27.7	24.5	25.2	23.0	24.5	23.7	26.4
1955-1959	27.8	24.6	24.1	22.6	24.9	18.2	25.3
1960-1964	25.2	22.4	22.6	21.9	24.4	17.2	22.4
1965	21.4	19.4	21.4	19.7	21.5	18.6	18.4
1966	19.3	18.4	20.9	19.3	21.1	13.8	18.2
1967	18.1	17.8	22.3	19.4	21.1	19.4	17.4
1968	17.5	17.5	...	20.0	21.3	18.5	17.2
1969	17.6	17.7	...	...	21.2	18.3	17.0

SOURCES: Adapted from United Nations, *Population Bulletin* ... (1965), table 6.2. For early years, data are mainly from Kuczynski, *The Balance of Births and Deaths, vol. 1* ... (1928) and *vol. 2* ... (1931); and Bunle, *Le mouvement naturel de la population* ... (1954). For later years, data are mainly from United Nations, *Demographic Yearbook, 1965* ... (1966), table 12; *1966* ... (1967), table 7; and *1969* ... (1970), table 12. Where applicable, additional sources are indicated in footnotes.

... Not available.

<sup>a</sup> For early years in particular, some of the figures pertain to periods which differ slightly from those specified in the table stub.

<sup>b</sup> Major territorial changes may affect the comparability of the series. For details, see original sources.

<sup>c</sup> Data for 1900-1944 pertain to territory of pre-war Germany.

<sup>d</sup> Four-year average.

<sup>e</sup> Three-year average.

<sup>1</sup> Prior to 1955, estimates from Valaoras, "Mortality and fertility control in Greece" (1968), p. 354; see also his "A reconstruction of the demographic ..." (1960).

<sup>m</sup> For Serbia only.

<sup>n</sup> Two-year average.

<sup>1</sup> For one year only.

<sup>1</sup> Including East Berlin.

<sup>k</sup> Prior to 1945, data are for expanding area. For details, see original sources.

<sup>1</sup> Excluding Maoris. Data for 1960-1969 compiled from New Zealand, Department of Statistics, *Monthly Abstract of Statistics: January 1968* (1968), pp. 5, 8; and *December 1970* (1970), pp. 13, 16.

<sup>m</sup> Prior to 1935, estimates based on Uralis, *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 16-34; beginning 1935, official rates from USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Narodnoe khoziaistvo* ... (1969), p. 36. Prior to 1915, for European part of country only. Time period of rates differs from that indicated in stub for 1900-1914 and 1935-1944; see source. A series of rates which differ from those shown here for some periods has been estimated by Biraben in his "Essai sur l'évolution démographique de l'URSS" (1958).

TABLE IV.3. GROSS REPRODUCTION RATES FOR SELECTED DEVELOPED COUNTRIES, 1946-1967

Country	1946-1949	1950-1954	1955-1959	1960-1964	1963	1964	1965	1966	1967
Australia .....	1.47	1.53	1.65	1.64	1.62	1.53	1.45	1.40	1.39
Austria .....	1.12	1.01 <sup>a</sup>	1.20	1.35	1.38	1.35	1.31	1.30	1.27
Belgium .....	1.20	1.14	1.20	1.28	1.30	1.32	1.27	1.23	1.17
Canada .....	1.69	1.77	1.90	1.82	1.80	1.72	1.55	1.37	1.26
Czechoslovakia .....	1.42	1.44	1.30	1.18	1.22	1.22	1.15	1.08	1.01
Denmark .....	1.36	1.24	1.24	1.25	1.29	1.26	1.27	1.27	1.14
Finland .....	1.66	1.47	1.36	1.29	1.29	1.24	1.17	1.14	1.09
France .....	1.46	1.34	1.32	1.38	1.41	1.42	1.38	1.35	1.29
Hungary .....	1.26 <sup>b</sup>	1.30	1.16	0.91	0.88	0.87	0.88	0.91	0.97
Italy .....	1.37	1.16	1.14	1.21	1.23	1.30	1.28	1.22	...
Japan .....	2.20 <sup>c</sup>	1.46	1.04	0.94	0.96	0.92	1.04	0.77	1.08
Netherlands .....	1.74	1.50	1.51	1.55	1.55	1.55	1.48	1.41	1.37
Norway .....	1.28	1.25	1.38	1.40	1.42	1.42	1.41	1.39	1.36
Portugal .....	1.59	1.51	1.50	1.52 <sup>a</sup>	1.50	1.52	1.48	1.45	...
Romania .....	...	...	1.34	1.02 <sup>a</sup>	0.98	0.95	0.92	...	1.78
Sweden .....	1.22	1.09	1.10	1.11	1.12	1.21	1.17	1.15	1.10
Switzerland .....	1.24	1.15	1.15	1.24	1.31	1.29	1.23	1.19	1.15
Union of Soviet Socialist Republics .....	...	...	1.37 <sup>b</sup>	1.27	1.23 <sup>d</sup>	1.20 <sup>d</sup>	1.20 <sup>d</sup>	1.19 <sup>d</sup>	1.17 <sup>d</sup>
United Kingdom (England and Wales) .....	1.20	1.06	1.18	1.36	1.38	1.40	1.36	1.33	1.28
United States .....	1.47	1.60	1.77	1.69	1.62	1.56	1.43	1.34	1.26

SOURCES : United Nations, *Population Bulletin* ... (1965), table 6.3; *Demographic Yearbook, 1965* ... (1966), table 30; *1969* ... (1970), table 31; Ryder, "Fertility in developed countries ..." (1967); files of the Statistical Office of the United Nations; national statistical publications.

... Not available.

<sup>a</sup> Four-year average.

<sup>b</sup> Three-year average.

<sup>c</sup> For one year only.

<sup>d</sup> Two-year average for specified and subsequent year.

these countries since the Second World War are given in table IV.3. With one exception, the most recent rates shown in the table (those for 1967) vary between 1.0 and 1.4, a much smaller range than that of the late 1930s.<sup>12</sup>

9. Fertility trends in Japan did not parallel those characteristic of European populations. Morita has shown that nineteenth-century official birth rates considerably understated the true fertility level, and he estimates that birth rates were in the low 30s in the latter half of the nineteenth century; thereafter they began to climb.<sup>13</sup> According to Taeuber, there is some evidence of fluctuations in the first part of the present century, with some reduction between 1915 and 1919, followed by a marked rise in the early nineteen-twenties. The small declines noted thereafter were not sufficient to constitute the country's entry into the low-fertility category, as rates continued in the high 20s and low 30s. It was only after widespread fertility controls made their appearance in the late 1940s that signal reductions took place, and birth rates well under 30 were not recorded until the 1950s.<sup>14</sup>

10. Tables IV.2 and IV.3 show that, in the middle 1960s, fertility was lowest in Hungary, where the crude birth rate averaged around 14 and the gross reproduction rate was consistently below unity. The only other countries with gross reproduction rates below unity in one or more years of this period were Romania and Japan.<sup>15</sup> The fertility level in the USSR exceeded that in most

countries of Western Europe before 1960, but subsequent declines brought the gross reproduction rate to 1.17 by 1967.

11. The broad demographic aspects of the decline in fertility from a high to a low level have been summarized by Ryder on the basis of still incomplete data as follows:

"The primary demographic source of the fall in fertility was a decline in the mean completed parity of married women from the neighbourhood of seven [children] to a level below three. Parity distributions were progressively attenuated at the higher levels, with a tendency toward a pronounced mode at two. From a timing standpoint, the decline was achieved by cessation of childbearing at progressively earlier marital durations rather than by delayed initiation of marital fertility or longer birth intervals."<sup>16</sup>

12. The trend towards low-parity families is illustrated by the distribution of Norwegian marriages by year of marriage and number of children. Henry has analysed selected Norwegian census data relating to women married in their twenty-fifth year in the form shown in table IV.4. For women married between 1876 and 1890, the average number of children born alive exceeded six; for women married in 1930, the average number of children born alive was 2.65. This reduction in mean completed family size was achieved by reductions in the percentage of high-parity families and increases in the proportion of families with none or few children.<sup>17</sup> In Czechoslovakia, an analysis of population census data for 1930, 1950 and

<sup>12</sup> United Nations, *Population Bulletin* ... (1965), table 6.3.

<sup>13</sup> Morita, "Estimated birth and death ..." (1963).

<sup>14</sup> Taeuber, *The Population of Japan* (1958), pp. 231-238.

<sup>15</sup> The high fertility level shown for Romania in 1967 is discussed in section C.

<sup>16</sup> Ryder, "Fertility" (1959), p. 410.

<sup>17</sup> Henry, "La fécondité des mariages en Norvège ..." (1958), p. 137.

TABLE IV.4. DISTRIBUTION OF NORWEGIAN MARRIAGES OF COMPLETED FERTILITY BY NUMBER OF LIVE-BORN CHILDREN WHERE THE WIFE WAS MARRIED IN HER TWENTY-FIFTH YEAR

Number of live-born children	Year of marriage						
	1876-1885	1890	1900	1910	1920	1925	1930
0 .....	41	48	46	69	63	101	71
1 .....	33	41	46	81	121	177	189
2 .....	39	63	80	124	226	252	292
3 .....	65	76	102	148	195	185	199
4 .....	72	100	118	129	140	118	117
5 .....	93	95	111	123	105	72	63
6 .....	115	104	117	98	56	47	30
7 .....	126	112	107	73	43	20	18
8 .....	146	118	108	71	22	14	8
9 .....	117	105	79	46	15	5	7
10 or more .....	153	138	86	38	14	9	6
TOTAL	1,000	1,000	1,000	1,000	1,000	1,000	1,000

SOURCE: Henry, "La fécondité des mariages en Norvège ..." (1958), p. 139.

1961, made it possible to trace the structure of completed fertility of five-year marriage cohorts since the eighteen-seventies. These data reveal a decrease in the average number of children per married woman from 6.4 to 2.2 in Czech regions, and from 6.1 to 3.2 in Slovak regions.<sup>18</sup> Data from a 1960 fertility survey carried out in the USSR showed substantial reductions in completed fertility for successive female birth cohorts, beginning with the 1895-1899 cohort, as well as changes in age patterns of childbearing.<sup>19</sup> The post-war period has seen a reversal in the trend toward childless and one-child families in such Western European countries as Norway, Switzerland, France and Italy, together with a large increase in families with two or three children, a very slight increase in those with four or five children, and little change in the small proportion of families with six or more children. Present trends in Western Europe are such that mean family size appears to be moving toward an average of 2.5 or 2.6 children per marriage.<sup>20</sup>

13. In Canada and the United States, as in Western Europe, there are fewer couples with no children, or only one, and more with moderate-sized families of two, three or four.<sup>21</sup> Campbell provides as an illustration of this trend the fact that 45 per cent of the women born in the United States between mid-1908 and mid-1909 had had no children or only one by age 50, as compared with only 24 per cent of the women born between mid-1927 and mid-1928 by age 35. Nor has the rise in completed

fertility in Canada and the United States since the Second World War in any sense been brought about by an increase in the proportion of couples with large families.<sup>22</sup>

14. Since the First World War, the relative contribution to the level of fertility on the part of women over 35 years of age in industrialized countries has continuously decreased and the magnitude of the decreases in fertility in the 1920s and the 1930s was progressively greater with the increased age of women. The "baby boom" in a number of low-fertility countries following the Second World War was a reflection of increased fertility among younger women. In most cases downward trends in the rates among women in older ages continued.<sup>23</sup>

15. In low-fertility countries women's childbearing tends to be concentrated in a narrower range of ages than in high-fertility countries. In fact, it has been shown that, on the average, three-fifths of total fertility in countries with gross reproduction rates below 2 results from births to women between 20 and 29 years of age, whereas in high-fertility countries the corresponding percentage is less than one half.<sup>24</sup> Recent age-specific fertility rates for a number of low-fertility countries are given in table IV.5. Three patterns can be observed: an early-peak fertility type (e.g. Hungary, Romania and the United States) in which the 15-19 age group of women makes a relatively large contribution to fertility and the peak occurs at ages 20-24; a broad-peak type (for example Australia, Canada, New Zealand and the United Kingdom (England and Wales)) where fertility within each country for the age groups 20-24 and 25-29 is nearly equal; and a late-peak type (for example Italy, the

<sup>18</sup> Jureček, "Ukazatele plodnosti žen z výsledků sčítání lidu" (1966), p. 2.

<sup>19</sup> For women 45 to 49 years of age, average family size had declined from 5.0 for the 1895-1899 birth cohort, to 3.4 for the 1910-1914 cohort. Boyarsky *et al.*, *Kurs demografii* (1967), p. 216. Similar changes have been observed in the Ukraine. See Steshenko, "Opyt primeneniia metoda kogort dlia ..." (1966).

<sup>20</sup> Biraben, "Prevailing fertility situation ..." (1967).

<sup>21</sup> Keyfitz, writing of Canada, says that "... all statistically recognizable groups seem to be converging on a norm. People exercise their increasing freedom to have the same number of children as their neighbours, in the narrow range of two to four, and to have them at the same ages." Keyfitz, "New patterns in the birth rate" (1962), pp. 41-42.

<sup>22</sup> Campbell, "Recent fertility trends ..." (1967), p. 201.

<sup>23</sup> United Nations, *Recent Trends in Fertility* ... (1958), pp. 17-24. The diminishing contribution of older women to total fertility between 1938-1939 and 1962-1963 in the Soviet Union is clearly shown in Vostrikova, "Female fertility and methods of studying ..." (1967), p. 241. A similar trend for Greece between 1934-1938 and 1956-1960 is shown in Valaoras, Polychronopoulou and Trichopoulos, "Control of family size in Greece ..." (1965), pp. 268-269.

<sup>24</sup> Compiled from United Nations, *Population Bulletin* ... (1965), table 7.2.

TABLE IV.5. AGE-SPECIFIC BIRTH RATES FOR SELECTED DEVELOPED COUNTRIES  
(Annual births per 1,000 women in each age group)

Country	Year	Age of women (in years)						
		15-19 <sup>a</sup>	20-24	25-29	30-34	35-39	40-44	45-49 <sup>b</sup>
Australia	1965	47.5	179.4	189.0	110.2	53.0	15.0	1.1
Austria	1965	56.7	158.6	154.5	100.0	50.3	15.5	1.3
Belgium	1965	30.3	164.9	165.1	96.9	47.7	13.6	1.0
Canada <sup>c</sup>	1965	49.6	192.4	185.3	121.0	66.2	21.8	2.0
Czechoslovakia	1965	45.2	193.4	134.8	65.8	27.2	6.9	0.5
Denmark	1965	49.3	174.8	163.4	87.2	38.3	9.1	0.8
Finland	1965	33.7	139.0	143.1	90.4	51.9	19.2	2.3
France	1965	27.9	176.9	180.8	108.0	53.2	16.4	2.0
Hungary	1965	42.2	147.7	100.6	47.8	18.2	4.7	0.4
Ireland	1966	13.5	128.2	232.5	213.0	144.4	54.9	4.3
Italy	1964	13.4	100.4	174.0	130.2	73.6	28.9	3.3
Japan	1965	3.3	112.3	203.1	86.4	19.3	3.0	0.2
Netherlands	1965	21.0	140.3	207.2	138.2	72.9	23.9	2.1
New Zealand	1965	58.6	231.2	214.2	119.3	61.6	19.5	1.4
Norway	1965	41.0	179.9	177.1	111.6	57.7	17.7	1.4
Portugal	1965	28.3	140.6	174.8	124.3	91.4	46.9	3.4
Romania	1965	52.6	140.7	99.8	53.5	25.1	8.9	0.8
Spain	1960	9.6	107.1	191.1	141.2	84.0	29.5	3.5
Sweden	1965	48.7	140.9	154.0	89.3	39.3	9.9	0.7
Switzerland	1965	22.0	133.4	179.0	110.4	51.8	15.6	1.3
Union of Soviet Socialist Republics	1964-1965	23.7	157.6	138.9	95.5	50.9	20.3	4.2
United Kingdom (England and Wales)	1965	44.8	176.3	178.1	101.5	48.4	12.5	0.9
United States	1965	71.3	196.8	162.5	95.0	46.4	12.8	0.8

SOURCES: Compiled from United Nations, *Demographic Yearbook*, 1965 ... (1966); ———, 1966 ... (1967); ———, 1967 ... (1968); national statistical publications.

<sup>a</sup> Including births to women under fifteen years of age.

<sup>b</sup> Including births to women fifty years and over.

<sup>c</sup> Excluding Newfoundland.

Netherlands, Spain and Switzerland) in which the peak occurs at ages 25-29. These patterns are closely related to age at marriage.<sup>25</sup> Japan and Ireland are shown to be exceptional, the former because of the unusually high proportion (48 per cent in 1964) of total fertility contributed by women in a single age group, that from 25 to 29,<sup>26</sup> and the latter because of the relatively high fertility of the 30-34 age group.<sup>27</sup>

## 2. AREAS OF HIGH FERTILITY

16. Adequate birth registration data are still lacking for many developing countries, and it has been necessary to estimate their fertility levels from census and survey data where possible. As a result of the growing abundance of such data and through the application of new analytical techniques,<sup>28</sup> estimates of fertility levels have recently

become available for many high-fertility countries in Africa, Asia and Latin America, though in some cases these estimates are of a relatively low order of reliability. The very high birth rate estimated for Africa (47 per 1,000 population in 1965-1970) is based to a large extent on census and sample survey data, and is subject to considerable error. For Nigeria, which has the largest population of any country on the continent, the age structure of the population, as divided into five broad age groups in the 1952-1953 census reports, has thus far provided the only basis for estimating fertility levels, and little reliance can be placed on the crude birth rate estimate of 53-57 from this source.<sup>29</sup> More recent analysis,

even under conditions of changing mortality. Given age distributions from successive population counts, or an age distribution from one population count and additional information such as the growth rate of the population, it is possible to derive estimates of vital rates. See, for example, United Nations, *Methods of Estimating Basic Demographic ...* (1967), and ———, *Le concept de population stable ...* (1966). Other advances have resulted from the extension of sampling procedures for obtaining vital rates, for example through periodic surveys of households or continuous recording of events. See Ahmed and Krotki, "Simultaneous estimations of population growth ..." (1963); Das Gupta, "Determination of fertility level ..." (1958); India, *Fertility and Mortality ...* (1963); Arretx G., "A method of estimating demographic rates ..." (1967).

<sup>29</sup> This estimate was obtained by calculating various age ratios from the census data and comparing them with corresponding ratios in stable population models, assuming levels of mortality that appeared to be appropriate for Nigeria. United Nations, *Population Bulletin ...* (1965), p. 32.

<sup>25</sup> See Acasádi, "Demographic variables ..." (1967), p. 184.

<sup>26</sup> Present-day fertility patterns in Japan are characterized by a small number of births with long intervals during the early marriage period, and almost complete restriction of births after ten years. Aoki, "Showa 37-nen dai 4-ji shussanryoku chosa kekka ..." (1965).

<sup>27</sup> Age-specific fertility rates for women in their thirties are higher in Ireland than in any other low-fertility country, despite the comparatively large proportion of Irish women remaining single at these ages; thus, a comparison of fertility rates for married women only would show an even greater differential between Ireland and other low-fertility countries.

<sup>28</sup> One technique involves the application of the concept of the stable population, since it has been shown that the age structures of population with unchanging fertility remain relatively stable,



however, has confirmed that fertility in Nigeria is high, though probably not as high as the rates mentioned above would indicate.<sup>30</sup> Sample surveys have recently provided estimates of fertility levels in many countries of former French Africa for which such measures were previously lacking; however, various tests applied to some of these data have suggested the types of errors which may afflict them.<sup>31</sup>

17. The birth rate for East Asia shown in table IV.1 reflects the rather moderate estimate for mainland China, the world's most populous country, where little is known about fertility levels and trends. Based on fragmentary information, estimates of China's birth rate have ranged from about 35 to 45 per 1,000 population; the United Nations has considered a figure near the lower limit more probable for the early 1960s.<sup>32</sup> Reliable vital registration data are lacking also for India, which comprises about half the population of South Asia. However, sufficient information is available from other sources to document a birth rate in the low 40s for that country.<sup>33</sup> Less certain are the fertility levels of such large populations as those of Pakistan and Indonesia. For Pakistan, neither the existing vital registration system nor recent population censuses have so far yielded satisfactory data for estimating the birth rate; various recent estimates have generally placed the crude birth rate at around 50 or above.<sup>34</sup> One estimate based on information obtained in the 1961 census of Indonesia suggests a crude birth rate in the neighbourhood of 43, while different assumptions applied to the same census data have suggested a higher rate.<sup>35</sup>

18. In Latin America adequate vital registration data are available for a larger segment of that region's population than is the case in Africa and Asia. The region's largest country, Brazil, has no comprehensive vital registration, however, although all available measures indicate high rates of fertility, especially in the rural areas. According to Mortara, the birth rate in the early 1950s was between 42 and 44. A variety of other fertility indices also indicate prevailing high levels, but the possibility of some slight declines in recent years is not ruled out.<sup>36</sup> Fertility levels in tropical South America as a whole are above the average for the Latin American region, as are those of the Central American mainland.

Mexico, the largest country in the latter region, has good vital registration data indicating a crude birth rate of around 44.

19. The data which have recently become available for the world's developing countries suggest surprisingly wide variations in fertility levels between one subregion and another. Thus, in Africa, there appears to be a belt of very high fertility extending across West Africa from Guinea and Mali to Niger and Nigeria, composed of countries whose gross reproduction rates are estimated at 3.3 or above, and in Latin America equally high gross reproduction rates have been estimated for Costa Rica, El Salvador, Guatemala and Honduras. On the other hand, there is a zone of much lower fertility centred in the Congo Basin in Africa, and countries of only moderately high fertility are found in the Caribbean area and the temperate zone of South America. In Asia, a group of countries in the south-east, including the Philippines, Cambodia, Thailand and the East Malaysian states of Sabah and Sarawak, have estimated gross reproduction rates of 3.2 and higher. There is a Chinese cultural zone of rather moderate fertility, with gross reproduction rates not exceeding 2.8. This zone includes China (Taiwan), Hong Kong and Singapore, and it probably includes mainland China. Pakistan appears to have very high fertility, but a zone of somewhat lower fertility, with estimated gross reproduction rates of 2.5 to 2.7, covers India, Nepal, Burma and Ceylon.<sup>37</sup> Weaknesses in the existing bases for making estimates of the fertility level in many of these areas must, however, be emphasized.

20. Reliable data for studying long-term fertility trends are not available for a representative group of high-fertility countries. Those countries for which reasonably accurate trend data are available are, for the most part, geographically small, and many have attained a comparatively more advanced level of economic and social development. As can be seen from table IV.6, in some of these countries there has been a noticeable downward trend in fertility, either over a long period of time, as in Puerto Rico and Chile, or more recently, as in Mauritius, Trinidad and Tobago, China (Taiwan) and Singapore. In Jamaica, the birth rate appears to have increased during the 1950s, though by the late 1960s it had fallen. Mexico is shown to have experienced a remarkably stable birth rate over a long period of time and the same was true of the coloured population of South Africa until very recently. Also falling into the group of countries with rather stable fertility are Thailand, the Philippines and the United Arab Republic; while there are no reliable time series of birth statistics for these countries, the available evidence does not suggest a downward trend in their birth rates.<sup>38</sup> Various estimates of long-term fertility trends in India indicate either that

<sup>30</sup> See Coale, "Estimates of fertility ..." (1966).

<sup>31</sup> See Nadot, *Fécondité: niveau* (1966), pp. 33-58.

<sup>32</sup> See United Nations, *World Population Prospects ...* (1966), pp. 34, 52-54; ———, *Population Bulletin ...* (1965), pp. 62-63; Aird, "Present and prospective population ..." (1960); Taeuber, "The conundrum of the Chinese birth rate" (1964); United States, Bureau of the Census, *The Size, Composition, and Growth ...* (1961), particularly pp. 79-85.

<sup>33</sup> The birth rate for the inter-censal period 1951-1960 has been estimated at about 42. See India, *Vital Statistics of India for 1961* (1964), pp. xxxix-xl. See also Coale and Hoover, *Population Growth and Economic Development ...* (1959), pp. 46-50.

<sup>34</sup> See, for example, Robinson, Seltzer and Hashmi, "Quasi-stable estimates ..." (1965), p. 648; Zelnik, "An estimate of the birth rate in Pakistan ..." (1967).

<sup>35</sup> Kannisto, *Population Increase in Indonesia* (1963), p. 13; United Nations, *Population Bulletin ...* (1965), p. 61.

<sup>36</sup> Mortara, "The development and structure of Brazil's population" (1954), p. 129, and his "The Brazilian birth rate ..." (1954), pp. 414 ff.; also Tietze, "Human fertility in Latin America" (1958).

<sup>37</sup> United Nations, *Population Bulletin ...* (1965), p. 3.

<sup>38</sup> United Nations, *Population Bulletin ...* (1965), pp. 28, 51; El-Badry, "Trends in the components of population growth ..." (1965), pp. 144-148. See also Gille, "Twentieth century levels and trends ..." (1967). Another study, based on applications of quasi-stable population theory, suggested that among the developing countries of Latin America more had experienced upward than downward trends in the level of fertility after the Second World War. Rele, *Fertility Analysis through Extension ...* (1967), table 11.

TABLE IV.6. CRUDE BIRTH RATES FOR SELECTED DEVELOPING COUNTRIES, 1920-1969  
(Births per 1,000 population)

Period	Ceylon	Chile	China (Taiwan)	Jamaica	Malaysia, West (formerly Malaya)	Mauritius	Mexico	Puerto Rico	Singapore	South Africa (coloured population)	Trinidad and Tobago
1920-1924 ..	39	42	42	38	...	37	a	...	29	...	33
1925-1929 ..	41	42	44	36	...	38	a	...	33	...	32
1930-1934 ..	38	41	46	34	35 <sup>b</sup>	31	45	41 <sup>c</sup>	39	...	30
1935-1939 ..	36	37	45	32	41	34	44	39	46	46 <sup>b</sup>	32
1940-1944 ..	37	36	42 <sup>c</sup>	32	40 <sup>d</sup>	34	44	40	45 <sup>d</sup>	44	36
1945-1949 ..	38	36	40 <sup>b</sup>	31	43 <sup>c</sup>	42	44	41	46 <sup>b</sup>	46	39
1950-1954 ..	39	34	46	35	44	46	44	37	46	47	38
1955-1959 ..	37	36	43	39	44	41	45	34	43	46	38
1960-1964 ..	35	35	37	40	40	39	44	31	36	47	37
1965 .....	33	33	33	39	37	35	44	30	31	44	33
1966 .....	32	32	32	39	37	35	44	28	30	44	30
1967 .....	32	31	29	36	35	31	43	26	27	43	28
1968 .....	32	...	29	34	35	31	44	25	25	40	28
1969 .....	...	...	28	33	...	28	42	25	23	...	...

SOURCES: United Nations, *Demographic Yearbook*, 1965 ... (1966), table 12; ... (1967), table 7; ... (1969 ... (1970), table 12; and ... (1965), pp. 49-51, 74-77.

... Not available.

<sup>a</sup> Registration data notably incomplete.

<sup>b</sup> Three-year average.

<sup>c</sup> Four-year average.

<sup>d</sup> Two-year average.

the birth rate has shown only a moderate decline since earlier in the century, or else that it has remained practically unchanged.<sup>39</sup>

21. In analysing birth rate trends for developing countries, care should be taken to avoid interpreting a reduction in the birth rate over a period of a very few years as a certain indication that the population concerned is moving permanently to a lower level of fertility. A recent United Nations study found "Few instances ... of long-continued upward or downward trends in high-fertility countries, resulting in large changes comparable to the past declines in countries where fertility is now low. In this sense, the data imply that the levels of fertility in high-fertility countries generally have probably been relatively stable during recent decades. On the other hand, it seems that rather large short-term variations and appreciable longer-term increases and decreases have not been uncommon. Some reservations should therefore be attached to the assumption often made in studies of the demography of high-fertility countries, that their fertility has generally remained nearly constant for long periods in the past."<sup>40</sup>

22. In high-fertility countries, women in the early and late periods of the reproductive cycle contribute relatively more to total fertility than do their counterparts in low-fertility countries. Thus, women over 35 were found to contribute 21 per cent, and women under 20 years 10 per cent, of total fertility, on average, whereas the corresponding proportions in low-fertility countries were only about 15 per cent and 6 per cent, respectively. Recent age-specific birth rates for a number of high-

fertility countries are given in table IV.7. It is seen that even in the peak childbearing ages fertility rates are higher in developing countries than in those that are more developed. The high fertility rates shown for women under 20 in such countries as India, Jamaica and Venezuela are related to marital status patterns in those countries, as is the greater concentration of childbearing at older ages in Singapore (see section C below). In Puerto Rico, where there has been for a decade a gradual decline to a moderate level of fertility, the figures of age-specific fertility for the older women tend to be noticeably low; this is an illustration of the fact that a fertility decline in its early stages usually affects women over 35 years of age much more than younger women. The data on age-specific fertility for African populations, derived mainly from sample surveys, indicate a distinctive pattern in that the proportion of total fertility contributed by women under 20 years of age exceeds that in most other parts of the world, a finding related to prevailing customs of early marriage.<sup>41</sup>

## B. Physiological variables affecting fertility

23. Fecundity refers to "the capacity ... to participate in reproduction (i.e., the production of a live child)", whereas fertility "means actual reproductive performance".<sup>42</sup> Although fecundity cannot be measured directly in statistical terms, the study of the many physiological factors involved makes it possible to assess in general terms the childbearing capacity of human populations.

<sup>41</sup> Data in this paragraph are based on United Nations, *Population Bulletin* ... (1965), chap. 7, and table IV.7 of the present study.

<sup>42</sup> United Nations, *Multilingual Demographic Dictionary* (1958), para. 621. It is, however, important to note that demographers writing in French and Spanish use the terms *fécondité* and *fecundidad*, respectively, in the sense in which the term "fertility" is used in English, and *fertilité* and *fertilidad* to correspond to "fecundity".

<sup>39</sup> See, for example, Coale and Hoover, *Population Growth and Economic Development* ... (1959), pp. 45-50; Davis, *The Population of India and Pakistan* (1951), p. 69; Ghosh, "The trend of the birth rate in India ..." (1956), pp. 62, 67; Saxena, "Estimates of birth rate ..." (1967).

<sup>40</sup> United Nations, *Population Bulletin* ... (1965), p. 5.

TABLE IV.7. AGE-SPECIFIC BIRTH RATES FOR SELECTED DEVELOPING COUNTRIES  
(Births per 1,000 women in each age group)

Region and country	Year	Gross total fertility (sum of age-specific rates)	Age of women (in years)						
			15-19 <sup>a</sup>	20-24	25-29	30-34	35-39	40-44	45-49 <sup>a</sup>
Africa									
Chad .....	1963-1964	1,027	162	268	218	159	121	60	39
Congo (Brazzaville) <sup>b</sup> .....	1960-1961	1,019	136	251	219	177	132	74	30
Congo, Democratic Republic of ....	1955-1957	993	136	265	232	168	92	70	30
Dahomey .....	1961	1,374	197	335	306	254	166	86	29
Guinea .....	1955	1,401	239	334	311	246	171	69	31
Mauritius .....	1965	1,102	85	291	273	233	155	58	7
Niger .....	1959-1960	1,440	197	341	306	259	191	99	47
South Africa (coloured population) ..	1961	1,282	123	331	307	240	178	82	21
Upper Volta .....	1960-1961	1,185	151	297	259	220	155	84	19
Asia									
Ceylon .....	1963	1,007	53	227	277	239	158	46	7
China (Taiwan) .....	1965	965	37	261	325	195	100	41	6
India .....	1958-1959	1,038	145	263	244	188	128	50	20
Malaysia, West (formerly Malaya) ...	1956-1958	1,327	120	328	338	260	178	80	23
Singapore .....	1957	1,313	78	303	355	289	195	81	12
Latin America									
Chile .....	1965	866	77	201	214	175	134	55	10
El Salvador .....	1961	1,351	144	324	328	273	189	73	20
Jamaica .....	1960	1,124	155	299	267	213	132	50	8
Mexico .....	1960	1,284	105	299	314	271	200	74	21
Panama .....	1960	1,052	140	287	269	187	122	39	8
Puerto Rico .....	1960	933	97	280	235	155	107	50	9
Trinidad and Tobago .....	1965	903	107	246	234	164	114	33	5
Venezuela .....	1961	1,317	143	333	322	248	188	65	18

SOURCES: Compiled from United Nations, *Population Bulletin* ... (1965); *Demographic Yearbook*, 1965 ... (1966); and —, 1966 ... (1967); Nadot, *Fécondité: niveau* (1966), pp. 18-21; national statistical publications.

<sup>a</sup> Wherever possible, rates include births to women under fifteen years and fifty years and over, respectively.

<sup>b</sup> Now known as the People's Republic of the Congo.

Data, when available, on population groups with extremely high birth rates help to establish estimates of the effective upper limits of human fertility, which at the same time may be regarded as minimum estimates of human fecundity. Some such estimates from demographic literature are presented at the beginning of this section. The remainder of the section is devoted to a review of the principal physiological factors with the particular end in view of examining the possible influence of variations in fecundity on fertility trends and levels.

### 1. MAXIMUM FERTILITY RATES

24. Many attempts have been made to estimate the upper limit of human fertility. Kuczynski considered that crude birth rates have probably never exceeded 65 per 1,000 population.<sup>43</sup> In pre-revolutionary Russia the birth rate in several provinces was over 60.<sup>44</sup> Crude birth rates of this magnitude are, however, only possible when childbearing commences at a very young age. Coale and Tye have estimated that in a community such as the Hutterites, among whom fertility is very high but child-

bearing does not commence on average until women are in their early twenties, the crude birth rate would not exceed 56.<sup>45</sup> In the United States in the early days of growth a favourable age distribution and nearly universal marriage combined to give a crude birth rate above 50.<sup>46</sup>

25. More instructive than the crude birth rate are measures of fertility based on women of reproductive ages. In developing a model of a population "likely to be bearing children at a rate which could not be far from the physiological upper limit", Glass and Grebenik took the fertility of rural Irish women who, according to the 1911 census, had been married for 30-35 years. Total fertility for these women varied with age at marriage. For those marrying under age 20 it was 8.81, and for those marrying at 20-24 it was 8.04. At the other extreme, women marrying at ages 40-44 showed a total fertility of only 2.05.<sup>47</sup> Cocos Island women marrying at age 14 or 15 had averaged 10.82 children at age 45, 10.29 children when married at 16, 9.32 when married at 17, 8.75 when married at 18, 7.31 when married at 19, and 6.60 when

<sup>43</sup> Kuczynski, *The Measurement of Population Growth* ... (1936), p. 102.

<sup>44</sup> Rashin, *Naselenie Rossii za 100 let* ... (1956), pp. 167-168.

<sup>45</sup> Coale and Tye, "The significance ..." (1961), pp. 638, 646.

<sup>46</sup> Ryder, "Fertility" (1959), p. 410.

<sup>47</sup> Glass and Grebenik, *The Trend and Pattern* ... (1954), vol. 1, pp. 270-271.

married at 20 or 21.<sup>48</sup> Among the Hutterites, an average of 11.9 confinements per woman were recorded for women whose last child was born when they were 45 or over; for those bearing their last child when aged 40-44, the mean number of confinements was 10.9.<sup>49</sup>

## 2. AGE LIMITS OF THE REPRODUCTIVE PERIOD

26. The commencement of the period of potential fertility in the female is usually taken as the age of menarche, that is, the onset of the first menstruation. The presence in the blood of certain hormones secreted by the pituitary glands initiates the menstrual cycle. However, menarche is merely one stage in the gradual process of adolescence, and the first menstruation does not always signify firm establishment of the ovulatory cycle. The fact that as long a period as three years may separate the onset of menstruation from the establishment of the regular ovulatory cycle has led to the formulation of the theory of adolescent sterility, which is illustrated by the apparently low fertility among young unmarried females in certain primitive societies, despite the practice of premarital sexual activity.<sup>50</sup> Indian experience tends to confirm this theory. Several surveys in that country show that women in their late teens at first cohabitation bore a child after relatively short intervals, in contrast to women whose marriages were consummated at an earlier age.<sup>51</sup>

27. Menarcheal age is not a constant, but varies both in time and between countries. According to data assembled by Tanner, "menarche in Europe has been getting earlier during the last hundred years by between three or four months per decade" and now stands at about thirteen years. Various environmental changes (among which nutrition is the most obvious) are thought to be chiefly responsible for this change, although genetical factors may also play a role. Data for Chinese girls in Hong Kong illustrate the influence of both the environmental and genetical factors: menarcheal age for rich girls is nine months earlier than for poor girls, although even the latter have menarche no later than most better-off Europeans. Indeed, the Chinese in Hong Kong have one of the earliest recorded menarches, while the genetic threshold for East Europeans is perhaps below that for West Europeans. At one time it was believed that menarcheal age was lower in hot than in temperate climates, but today climate is not considered to have much influence, if any; relevant information on this score, however, is sparse. The fact reported by Tanner that no group in the world "is currently known in which menarche occurs

anything like as late as in Europe a century ago"<sup>52</sup> suggests that earlier age at menarche coupled with early age at marriage in the high-fertility countries today may account in part for their higher level of fertility compared with that found in Europe just prior to the fall of fertility. During the fall, however, the effect of declining menarcheal age, while it could not have been very great owing to the late average marrying age prevailing at that time, must have been to retard somewhat the decrease in fertility that was in process.

28. There is less information on changes in the age at menopause than on changes in the age of menarche. It should be noted that the birth of the last child is usually at a markedly lower age than menopause, and this is to be expected even in high-fertility communities in view of the gradual decline in fecundity with advancing age.<sup>53</sup> Pearl found that mean age at menopause in twenty series of data ranged from 44.0 years to 49.4 years,<sup>54</sup> while Kamat and Kamat reported a mean age at menopause of 42.2 years for Indian women.<sup>55</sup> According to Tanner, the very few inquiries made in the United Kingdom on the subject indicated that the menopause age had been pushed back and that at the present time it might be nearly 50 years on average.<sup>56</sup> To the extent that economic and social development is associated with a later age at menopause and thus with higher fecundity, this is another factor that would have slowed down the historical decline in fertility in countries of currently low fertility.

29. The attainment of sexual maturity is not so protracted in the case of the male as for females. On the other hand, there is no definite physiological event or change in the male with which the cessation of the capacity to reproduce can be identified. The male span of reproductive capacity is considerably longer than that of the female. Despite this longer span, it is necessary to recognize the possibility that the "... apparent decline of fecundity in women with advancing age may be in part a function of declining fecundity in men ...".<sup>57</sup>

## 3. POST-PARTUM STERILITY

30. It is now generally accepted that women undergo a period of sterility after the birth of a baby, and that the length of this period varies from one woman to another. Experts differ in their estimates of the mean length of post-partum sterility. Tietze noted that in a sample of Hutterite women, among whom there was little premarital intercourse, the average interval between age at

<sup>48</sup> Smith, "The Cocos-Keeling Islands ..." (1960), p. 111.

<sup>49</sup> Tietze, "Reproductive span ..." (1957), p. 93.

<sup>50</sup> Hartman, "On the relative sterility ..." (1931); Ashley-Montagu, *Adolescent Sterility* ... (1946); and his *The Reproductive Development of the Female* ... (1957), pp. 80-165.

<sup>51</sup> Lorimer, "Capacity for procreation ..." (1954), p. 47; Chandrasekaran, "Physiological factors affecting ..." (1963), p. 92. See also Sovani and Dandekar, *Fertility Survey of Nasik* ... (1955), pp. 80 ff.

<sup>52</sup> Tanner, "The trend ..." (1965), pp. 49 ff. For rich girls in Hong Kong the mean age is 12.5 years, for "average" girls 12.8 years, and for poor girls 13.3 years. Lee, Chong and Chan, "Sexual maturation of Chinese girls ..." (1963), p. 391. Among Ashanti girls, menstruation usually begins about the sixteenth year. Fortes, "A demographic field study in Ashanti" (1954), pp. 296-297.

<sup>53</sup> Thus Eaton and Mayer found for the Hutterites that the probability of a woman conceiving in a given year diminished rapidly after the age of 38. Eaton and Mayer, *Man's Capacity to Reproduce* ... (1954), pp. 24-26.

<sup>54</sup> Pearl, *The Natural History of Population* (1939), p. 51.

<sup>55</sup> Kamat and Kamat, "Diet and fecundity in India" (1959), p. 117.

<sup>56</sup> Tanner, "The trend ..." (1965), p. 60.

<sup>57</sup> Lorimer, *Culture and Human Fertility* ... (1954), p. 49.

marriage and age at first confinement was about 18 months and the average interval between subsequent births was 25.5 months. These figures, adjusted to take account of foetal deaths, suggest a mean post-partum sterility of about 6.3 months.<sup>58</sup> James, taking into account the fact that coital rates decrease with increasing duration of marriage, considered 6.1 months as a plausible estimate.<sup>59</sup>

31. Studies of populations which are presumed to practise little or no deliberate birth limitation have shown that the birth interval is much shorter following an infant death in the first month or two of life than when the infant survives the first year or two. In the Cocos Islands, for instance, the birth interval after a neo-natal death averaged 1.70 years, while the interval averaged 2.45 years after the birth of an infant surviving the first two years of life.<sup>60</sup> This and other studies have attributed the apparent reduction in the period of post-partum sterility following the early death of an infant to the practice of breast-feeding, which is believed to prolong the period of post-partum amenorrhoea.<sup>61</sup> Various scholars have commented upon the apparent widespread custom of lactation in pre-industrial societies, the effect this practice would have in holding fertility levels down and the likelihood that a decrease in the duration of breast-feeding would constitute a factor tending to increase fecundity during the period when fertility is in its phase of secular decline.<sup>62</sup> A more recent study, however, has questioned the extent of the influence of breast-feeding on birth intervals, and thereby on fertility levels. Knodel and Van de Walle, in their analysis of data from Bavaria, Baden and Hesse prior to the historical decline of fertility in these regions, found that, "even if the physiological connection between lactation and amenorrhoea is strong, it is not an important factor in explaining the variations in regional fertility in these German states" because the relatively high inverse correlation existing between breast-feeding and fertility virtually disappears when infant mortality is held constant, whereas the high correlation between infant mortality and fertility persists even in those areas where lactation was not widespread and there was "little opportunity for mortality to influence fertility by interrupting lactation".<sup>63</sup>

#### 4. INVOLUNTARY FOETAL MORTALITY AND OTHER FORMS OF STERILITY AND SUB-FECUNDITY

32. In addition to the universal forms of sterility and sub-fecundity—such as sterility before and after the reproductive age span, declining fecundity towards the

end of the span and post-partum sterility—there exists a variety of pathological conditions, diverse and difficult to classify logically,<sup>64</sup> which affect the fecundity only of certain individuals in a society. These may be of genetic or congenital origin, or they may result from certain diseases. Among the genetic factors are lethal types which inhibit intra-uterine survival of the foetus, thereby resulting in miscarriage or foetal death. Genetic factors may also be indirectly responsible for sub-fecund states or complete sterility. Congenital disorders can impair fertility by producing some organic malfunction of the reproductive system, such as that resulting from congenital syphilis.

33. One such kind of sterility or sub-fecundity about which much has been written is involuntary foetal mortality. The index most commonly used for measuring foetal mortality is the ratio of late foetal deaths (i.e. those occurring after six months of pregnancy) to total births, or less frequently to live births. Observations on involuntary foetal loss for the first six months of pregnancy are few in number. French and Bierman used the results of observation of about 3,000 pregnancies in Hawaii in the period 1953-1956 to calculate monthly foetal loss ratios, and found that foetal mortality is very high early in pregnancy, after which there is a steep drop until the rate becomes stabilized after the sixth month.<sup>65</sup> On the basis of this survey and other evidence, Bourgeois-Pichat suggested that on average about 30 per cent of conceptions result in foetal death, and that the elimination of such deaths might increase the gross reproduction rate by about half that amount, or by 15 per cent.<sup>66</sup> For lack of adequate data, his calculations were based on rather arbitrary assumptions, and he emphasized the necessity of further research. Of particular relevance to the study of factors affecting fertility is Bourgeois-Pichat's assumption that, whereas the foetal mortality of the first six months is "a kind of biological mortality", the level of the plateau reached at the end of six months is influenced by environment and "is highest when the conditions are least favorable".<sup>67</sup> Thus, the improved environment associated with economic and social development would promote lower foetal mortality and, thereby, higher fertility; here then is another factor which would have exerted an opposite effect during the transitional decline in fertility.

34. Among the diseases associated with sub-fecundity are the venereal diseases, malaria and plague. There is some indication that venereal disease might have played a part in the relatively low fertility among females involved in "visiting unions" in the West Indies.<sup>68</sup> Venereal diseases are known to be widespread in large

<sup>58</sup> Tietze, "Reproductive span ..." (1957), p. 92.

<sup>59</sup> James, "Fecundability estimates ..." (1964), p. 185.

<sup>60</sup> Smith, "The Cocos-Keeling Islands ..." (1960), pp. 114-115.

<sup>61</sup> Gautier and Henry, *La population de Crulai* ... (1958), pp. 149-154; Henripin, "La fécondité des ménages ..." (1954), pp. 74-84; Potter *et al.*, "Applications of field studies ..." (1965). For a discussion of the effects of breast-feeding on post-partum sterility, see Tietze, "The effect of breastfeeding ..." (1963).

<sup>62</sup> See, for example, Henry, "Caractéristiques démographiques des pays sous-développés ..." (1956), pp. 170-171.

<sup>63</sup> Knodel and Van de Walle, "Breast feeding, fertility and infant mortality ..." (1967), p. 127.

<sup>64</sup> Some of these conditions are discussed in Penrose, "Genetical aspects of human infertility" (1963), p. 94.

<sup>65</sup> French and Bierman, "Probabilities of fetal mortality" (1962).

<sup>66</sup> Elimination of foetal deaths would not increase fertility by as much as 30 per cent, since the period of post-partum sterility and the duration of pregnancy are longer in the case of a live birth.

<sup>67</sup> Bourgeois-Pichat, "Relation between foetal-infant mortality and fertility" (1967).

<sup>68</sup> Roberts, "Some demographic considerations of West Indian federation" (1957), p. 284.

parts of Africa, and are believed to be responsible in part for the particularly low fertility of certain tribes.<sup>69</sup> It has been contended that malaria produces involuntary abortions and stillbirths.<sup>70</sup> In India, differentials in fertility have been noted which may have some association with the control of malaria.<sup>71</sup> On the other hand, Newman's investigation of the effects of the control of malaria on vital rates in Ceylon and Guyana found no conclusive evidence of a relationship between the eradication of the disease and levels of fertility.<sup>72</sup> Outbreaks of plague have also been followed by periods of low fertility, in Catalonia following the epidemic of 1650 and in the parish of Colyton in Devon, England, following the violent outbreak of 1645-1646. In these two instances, both of which have been the subject of detailed analysis, low fertility persisted for several decades.<sup>73</sup>

35. Quantitative data on the incidence of sterility attributable to the separate factors discussed above are not available in a form that would permit trends within countries or differences among countries to be identified. Even the total incidence of sterility from all causes is often difficult to determine for a particular population. In populations in which marriage is nearly universal and which do not practise deliberate family limitation, inferences of sterility and sub-fecundity are sometimes made indirectly from data on the childbearing experience of females. Although the proportion of women who remain childless diminishes with advancing age, it may remain appreciable in some of these populations. Romaniuk found, in analysing the results of a 1956-1957 sample survey in the Democratic Republic of the Congo, that in certain districts of the country around 35 per cent of the women over 45 years old had borne no children, while in other districts the proportion was as low as 5 per cent. Over the country as a whole, the data indicated that an average of 20 per cent of women who attained the age of 45 had never had a child.<sup>74</sup> Exceedingly high rates of childlessness were also found among Afro-Arab women in Zanzibar, especially in the urban area.<sup>75</sup>

36. Data obtained from a number of censuses and sample surveys in Africa show a clear inverse relation between the percentage of women beyond age 45 years or thereabouts reported as having borne no children during their lifetime and the estimated level of fertility among these countries, childlessness being most frequent

where fertility is relatively low, and *vice versa*.<sup>76</sup> In India, the National Sample Survey found that 7.5 per cent of couples had had no children after twenty-two years of marriage, and estimates of sterility at about this level have come from many other countries.<sup>77</sup> The frequency of involuntary sterility can be as low as 3 or 4 per cent. Grabill and Glick report that in 1910 only about 3 per cent of Russian-born females in the United States who had ever been married were childless at the end of the childbearing period.<sup>78</sup> Canadian census data for 1941 indicate that, in rural Quebec, where completed fertility of women who married before their twentieth birthday was exceedingly high, only 4.0 per cent of these women were childless.<sup>79</sup> Unfortunately, estimates of sterility based on the proportion of childless women at the end of the reproductive age span cannot be used for ascertaining the extent to which secular changes in fertility are due to changes in sterility in societies which practise deliberate birth limitation.

37. The kinds of changes reviewed above in the physiological factors affecting reproduction would have tended to affect fertility during the transition, if at all, by increasing rather than decreasing it.<sup>80</sup> Nevertheless, the literature on fertility decline contains a number of theories or hypotheses which attempt to account for some or all of the decline in terms of physiological or psychophysiological factors. For example, there were the much-discussed theories of Spencer<sup>81</sup> and other nineteenth-century authors that fertility declines by a natural biological law as the level of living rises. In the early decades of the present century, biological views were elaborated by Gini, who considered that nations have a period of vigour followed by a time of decay which manifests itself by a decline in fertility. The inhabitants lose the desire to procreate, but, unaware of their lowered fecundity, they use contraceptives to prevent births which they are biologically incapable of having.<sup>82</sup> For most demo-

<sup>69</sup> United Nations, *Population Bulletin* ... (1965), pp. 23-24.

<sup>77</sup> Das Gupta *et al.*, *Couple Fertility* (1955), p. 45. However, data of this kind must be used with caution on account of a tendency among older women to forget the children born to them who died in infancy or to misinterpret the census or survey question to refer to children now alive and who still live with them. In the 1960 Mexican census, for example, 29 per cent of women aged 50 and over were reported as childless, whereas the corresponding figure for women aged 40 to 49 years and therefore not yet at the end of the reproductive span was only 22 per cent. Carleton, *Crecimiento de la población* ... (1966), p. 55.

<sup>78</sup> Grabill and Glick, "Demographic and social aspects of childlessness ..." (1959), pp. 62-63.

<sup>79</sup> Lorimer, *Culture and Human Fertility* ... (1954), p. 29.

<sup>80</sup> In recent decades, the crude birth rates in certain of the lesser developed Central Asian Republics of the USSR have risen: between 1940 and 1963, for example, from 29.4 to 40.6 in Azerbaijan SSR, from 30.6 to 35.1 in Tajik SSR, from 33.6 to 36.2 in Uzbek SSR. Valentei, *Teoria i politika narodonaseleniia* (1967), p. 162. While improved registration and changes in age structure contributed to these increases, it is believed that improved health conditions, which, as indicated above, may have operated in the past as a force for increased fertility during the period of transitional decline, were also a factor.

<sup>81</sup> Spencer, *A New Theory of Population* ... (1852); and his *The Principles of Biology*, vol. 2 (1867, 1883 ed.), part 6, chaps. 12-13.

<sup>82</sup> Gini, "The cyclical rise and fall of population" (1930).

<sup>69</sup> France, Secrétariat d'Etat aux relations avec les Etats de la Communauté, *Données de base sur* ... (1961), p. 59; Griffith, "Gonorrhoea ..." (1963); Cameroon, *Enquête démographique* ... (1963), p. 29; Roberts and Tanner, "A demographic study ..." (1959), p. 78.

<sup>70</sup> Clarke, "Some impressions of the Muruts ..." (1951), p. 456.

<sup>71</sup> United Nations, *The Mysore Population Study* ... (1961), pp. 83-84.

<sup>72</sup> Newman, *Malaria Eradication and Population Growth* ... (1965).

<sup>73</sup> Nadal Oller, "La contribution des historiens catalans ..." (1961), pp. 92-94; Wrigley, "Family limitation in pre-industrial England" (1966), p. 85.

<sup>74</sup> Romaniuk, "Fécondité et stérilité des femmes congolaises" (1963), p. 115.

<sup>75</sup> Blacker, "Population growth and differential ..." (1962), pp. 264-266.

graphers, Gini's thesis is so speculative that it is scarcely worth refuting.

38. More recently a biological explanation for declining birth rates has been presented by Castro, who considered that consumption of proteins brings down fertility, while protein deficiency keeps it high. His main evidence is a table showing meat consumption and fertility for a number of countries, and indeed the meat-eating peoples of the world are those with the fewest children.<sup>83</sup> Castro did not consider the possibility that both the eating of meat and the reduction of family size go hand-in-hand with improved socio-economic status. As evidence against Castro's analysis, various studies have indicated that well-nourished women in developed countries would have at least as high fertility as the impoverished in developing countries were it not for the practice of contraception among the former.<sup>84</sup> Henry has pointed to the very high fertility of the Hutterites, as an argument that, in the absence of voluntary birth limitation, fertility does not necessarily fall when diet improves.<sup>85</sup>

39. A number of authors have suggested that various factors in modern life may have reduced reproductive capacity, such as an increase in alcoholism or venereal disease,<sup>86</sup> the excessive practice of sports by women, the employment of women in factories,<sup>87</sup> the frequent bathing with soap by women (since soap is a spermicide)<sup>88</sup> and a decrease in sexual intercourse due to the excessive nervous strain of modern urban life.<sup>89</sup> Some of these factors have been suggested as having a contributory influence rather than as causing the major part of the decline in family size. None of them has been accepted generally, and some have been heavily criticized. For example, it has been pointed out that there is no proof that the frequency of alcoholism or venereal disease increased during the period when the birth rate declined.

40. Although the physiological factors affecting fertility from one point of view are distinct from and exert their effect apart from the social, economic and cultural factors, many physiological factors are genuine variables either in the sense of displaying variation among different populations or of varying over time within populations, and these changes or variations are to some extent subject to the influence of social and economic conditions. Both the extent to which the individual physiological factors may vary as well as the extent to which they may be affected by socio-economic factors are not yet well understood and constitute areas for further research.

### C. Customs and practices affecting fertility

41. The physiological factors discussed above, along with certain customs and practices relevant to fertility,

<sup>83</sup> Castro, *The Geography of Hunger* (1952), pp. 70-72, 161-162.

<sup>84</sup> Notestein, Kirk and Segal, "The problem of population control" (1963), pp. 126-127.

<sup>85</sup> Henry, "Caractéristiques démographiques des pays sous-développés ..." (1956), p. 159.

<sup>86</sup> Brentano, "Die Malthussche Lehre ..." (1909), pp. 600-601.

<sup>87</sup> González Galé, "Bajo de natalidad" (1939), p. 1030.

<sup>88</sup> Hogben, *Genetic Principles* ... (1931), pp. 187-189.

<sup>89</sup> Hankins, "Has the reproductive power of western peoples declined?" (1932), pp. 187-188.

have been classified as "intermediate" variables in that they constitute the variables "... through which any social factors influencing the level of fertility must operate".<sup>90</sup> The present section consists of a review of the non-physiological intermediate variables—the customs and practices—and their relation to fertility, using as a frame of reference the widely-known Davis and Blake classification<sup>91</sup> of intermediate variables. Attention is given principally to those variables which have been most investigated and which are thought to be largely responsible for differences in fertility level among high-fertility populations or for the dramatic shift from high to low fertility that has taken place in the countries where economic development is most advanced.

42. One of the advantages of the Davis-Blake framework is that it helps bring into sharper focus existing differences in research interests. Fertility trends and differences are sometimes studied in terms of general or over-all fertility, with attempts made to isolate the variable or variables responsible for the observed changes or differences. On the other hand, changes in legitimate fertility, because they reflect changes resulting from deliberate birth control, are often the primary focus of study. Such different approaches sometimes lead to non-comparable and apparently contradictory conclusions. In the field of differential fertility, for example, generalization has become exceedingly difficult because some investigators describe differentials in terms of general fertility whereas others work only with marital fertility and sometimes maintain that a differential is not genuine unless age at marriage is held constant.

### 1. THE INTERMEDIATE VARIABLE FRAMEWORK

43. The Davis-Blake classification of the "intermediate variables" affecting fertility is as follows:<sup>92</sup>

<sup>90</sup> Davis and Blake, "Social structure and fertility ..." (1956), p. 211.

<sup>91</sup> *Ibid.*

<sup>92</sup> Davis and Blake, "Social structure and fertility ..." (1956), p. 212. Most writers on this subject distinguish a set of factors corresponding to the Davis and Blake intermediate variables, even though the designation "intermediate" may not always be used, or the variables always arranged in the same order or listed so exhaustively. Freedman and Nag incorporate the Davis and Blake variables directly into their work. [Freedman, "Fertility; statement by the Moderator" (1966), pp. 37 and 48; Nag, *Factors Affecting Human Fertility* ... (1962), pp. 10-11.] Sauvy also identifies a class of variables similar to the Davis and Blake variables, which, except for certain types of sterility, he calls the "social factors" of fertility. [Sauvy, *Théorie générale de la population* ... (1966), vol. 2, chap. 7.] Ulanis calls them "causes" of fertility as distinct from the more fundamental "factors". [Ulanis, "Dynamics of the birth rate ..." (1967), pp. 237-238.] Coale and Henry's use of the intermediate variables in the formulation of the concepts of natural and controlled marital fertility are discussed in paras. 46-48 below. Kozlov groups the intermediate variables into three classes: physiological, nuptiality and family planning variables. [Kozlov, "Some causes of the high fertility ..." (1967), p. 156.] The British Royal Commission on Population discussed the role of the nuptiality variables, and then of the voluntary and involuntary causes of the fall in family size (essentially the voluntary and involuntary variables of Davis and Blake). [United Kingdom, Royal Commission on Population, *Report* (1949), chaps. 3 and 4.]



I. Factors affecting exposure to intercourse ("intercourse variables")

A. Those governing the formation and dissolution of unions in the reproductive period

1. Age of entry into sexual unions
2. Permanent celibacy: proportion of women never entering sexual unions
3. Amount of reproductive period spent after or between unions:
  - (a) When unions are broken by divorce, separation or desertion;
  - (b) When unions are broken by death of husband

B. Those governing the exposure to intercourse within unions

1. Voluntary abstinence
2. Involuntary abstinence (from impotence, illness, unavoidable but temporary separations)
3. Coital frequency (excluding periods of abstinence)

II. Factors affecting exposure to conception ("conception variables")

A. Fecundity or infecundity, as affected by involuntary causes

B. Use or non-use of contraception:

- (1) By mechanical and chemical means;
- (2) By other means

C. Fecundity or infecundity, as affected by voluntary causes (sterilization, subincision, medical treatment etc.)

III. Factors affecting gestation and successful parturition ("gestation variables")

A. Foetal mortality from involuntary causes

B. Foetal mortality from voluntary causes

44. This framework divides the intermediate variables into three broad groups corresponding to three easily identifiable phases of the reproductive process: sexual intercourse, conception and parturition. As the authors emphasize, each one of the eleven intermediate variables is a variable in the sense that "it can operate either to reduce or enhance fertility". Consequently, the level of fertility of a population results from the joint effect of its values on all eleven variables. Further, a population, even though it may have a high fertility value on some variables, for example universal marriage at an early age, may none the less have a low or moderate fertility level because of low fertility values on other variables, such as the use of contraceptives or recourse to abortion (voluntary foetal mortality). Two populations may have approximately the same level of fertility despite very different values on all or most of the intermediate variables.<sup>93</sup>

45. Attention is called to another threefold classification into which the intermediate variables fall: some are designated as "voluntary" in that they constitute deliberate behaviour intended to exercise control over fertility;<sup>94</sup> the "involuntary" variables describe behaviour that is

unavoidable or beyond the control of the individual; the remaining variables are neither one nor the other because they are often not primarily directed towards the regulation or non-regulation of fertility. These distinctions, despite certain inconsistencies and difficulties in application, have proved useful in different kinds of research problems.

46. For example, Henry has developed the concepts of "natural" fertility and controlled fertility as a guide in the formulation of his investigations. Natural fertility, proposed as an improvement over the concept of maximum biological capacity (which, in practice, cannot be measured), is the fertility which exists in the absence of deliberate birth control. Populations displaying natural fertility have high fertility values on all four of the voluntary variables, that is to say such populations have little or no contraception, sterilization, induced abortions or voluntary abstinence from intercourse. In practice, Henry restricts his studies to the natural fertility of married women, in order to avoid the important although often unpremeditated effects on fertility of differences in nuptiality (variables number 1, 2 and 3).<sup>95</sup> Various writers, such as Bourgeois-Pichat and Coale, in addition to Henry, have discussed the relative importance of the different intermediate variables in accounting for observed historical differences in the natural fertility of married couples.<sup>96</sup>

47. Controlled fertility refers to all those differences or changes in the fertility of married couples produced by one or more of the intermediate variables involved in deliberate birth control. Coale and his team of international experts, working on the history of the decline of fertility in Europe, have adopted these concepts of Henry as working tools. One of the provisional hypotheses of the Coale project is that everywhere in Europe in the not-too-remote past populations were characterized by natural fertility among married couples. It is further hypothesized that the major fertility declines that followed are attributable essentially to the adoption of controlled fertility. Trends in marital fertility are being investigated for evidence of increased control of fertility with due caution for the recognized fact that all declines in marital fertility need not necessarily imply a spread in fertility control.<sup>97</sup>

48. The Coale project also takes into consideration the three intermediate variables relating to nuptiality by conceptually distinguishing in its research the separate effects on declining general fertility of changes in nuptiality and of increased recourse to controlled fertility.<sup>98</sup> Davis himself, with his "theory of the multiphasic response" has used the intermediate variables in a similar manner to advance a different hypothesis, "generally overlooked because of our preoccupation with the contraceptive issue", that Japan and the countries of north-west Europe reacted to the "persistent excess of births over deaths with virtually the entire range of possible responses.

<sup>93</sup> Davis and Blake, "Social structure and fertility ..." (1956), p. 213.

<sup>94</sup> While only three of the variables—voluntary abstinence, voluntary fecundity or infecundity, and voluntary foetal mortality—are explicitly labelled as voluntary, it is implicit that the use of contraception (although not always its non-use) also belongs in this category.

<sup>95</sup> Henry, "Some data on natural fertility" (1961), pp. 81-82.

<sup>96</sup> Bourgeois-Pichat, "Social and biological determinants ..." (1967); Coale, "The voluntary control ..." (1967), pp. 164-165.

<sup>97</sup> Coale, "The decline of fertility in Europe ..." (1967), pp. 4-7.

<sup>98</sup> *Ibid.*



... each industrializing nation tended to postpone marriage, to increase celibacy, to resort to abortion, to practise contraception in some form, and to emigrate overseas".<sup>99</sup>

## 2. AGE OF ENTRY INTO SEXUAL UNIONS (AGE AT MARRIAGE); PERMANENT CELIBACY

49. Of the variables relating to nuptiality, age at marriage and the proportion of persons in a population who never marry are the two believed to be the most significant in accounting for observed variations in fertility levels, and considerable research into their effect on fertility has been conducted and is still in process. Historically, a close interdependence has tended to exist between these two variables in the sense that, for a given population, a high fertility value on one variable (i.e., early age at marriage) is generally found to be associated with a high fertility value on the other (i.e., a small proportion of never-married) and vice versa;<sup>100</sup> it is therefore convenient to discuss them together.

50. There is an important difference between the two variables, however. Although permanent celibacy, to the extent that it is not offset by a higher incidence of illegitimacy, tends to have relatively the same depressing effect on fertility in both high-fertility and low-fertility populations, the effect of age at marriage is greatest in high-fertility populations where the practice of family planning is largely unknown and family size is closely related to the duration of marriage spent in the reproductive age span. It has been maintained that, in the absence of illegitimate births, a rise in the age at marriage in such populations can yield a marked reduction in fertility.<sup>101</sup> Agarwala has calculated that the Indian birth rate might be reduced as much as 30 per cent by 1991-1992 if all Indian women married after the age of nineteen.<sup>102</sup> Coale and Tye have shown, taking data relating to Chinese and Malays in Singapore as an illustration, that postponement of marriage can reduce crude birth rates and population growth even when completed family size is not thereby reduced.<sup>103</sup> In countries of moderate fertility levels, a more modest association has been found between age at marriage and size of family.<sup>104</sup> In low-fertility countries, on the other hand, a close relation between fertility and age at marriage cannot be observed.<sup>105</sup>

51. Hajnal, in his study of European marriage patterns, established on a solid empirical basis that the countries of Europe west of an imaginary line running roughly from Leningrad to Trieste, were characterized at the end

of the nineteenth century by a pattern of late age at marriage and a high incidence of permanent celibacy which, for convenience, he termed the "European" pattern. With the exception of intermediate patterns in Greece, Hungary and the overseas countries of European colonization (such as the United States), the European marriage pattern "... is unique for all large populations for which data exist or reasonable surmises can be made ...". In Northern and Western Europe some three-quarters of the women were still single by age 20 to 24, whereas elsewhere in Europe three-quarters were usually married in this age group; similarly, the proportion of women remaining single around their fiftieth birthday was nowhere below 10 per cent and often above 15 per cent in the "European" pattern, but scarcely ever reached as high as 5 per cent in Eastern Europe and was often of negligible dimensions elsewhere.<sup>106</sup> The later age at marriage and the higher proportions of never-married often shown by marital status data for countries in Latin America and the Caribbean are probably attributable in large part to the many consensually married persons in these countries who are often reported as unmarried.<sup>107</sup>

52. Hajnal also marshalled evidence which "suggests the general conclusion that the European pattern originated before the eighteenth century", although most probably not before the beginning of modern times in the sixteenth century.<sup>108</sup> This runs counter to the theses advanced in some earlier writings on this subject that the growth of urbanization, the lengthening period of education, the increasing proportion of women working outside their homes and other factors would make for an increasing age at marriage.<sup>109</sup>

53. As Hajnal points out, however, his thesis is not new. Many writers from Malthus on have attributed at least in part to low nuptiality the relatively low level of fertility in Europe prior to the Industrial Revolution compared with the developing countries today.<sup>110</sup> Based

<sup>106</sup> Hajnal, "European marriage patterns ..." (1965), pp. 101-106.

<sup>107</sup> *Ibid.*, p. 105; United Nations, *Demographic Yearbook*, 1962 ... (1963), table 13; ———, 1963 ... (1964), table 34; also, Hollingsworth, "The marriage rate ..." (1966), pp. 4-5.

<sup>108</sup> Hajnal, "European marriage patterns ..." (1965), pp. 107, 134. Census data cross-tabulating age and marital status cannot be found for most countries before the middle of the nineteenth century, although for Norway and Denmark this information is available as far back as the beginning of the nineteenth century and back to 1750 in the case of Sweden. Other types of evidence, therefore, have to be resorted to. According to the Royal Commission, barriers to marriage, reflecting fears of overpopulation, existed in many parts of Europe up to the eighteenth century. [United Kingdom, Royal Commission on Population, *Report* (1949), p. 35.] Knodel has noted that legal restrictions on marriage were imposed in many German states in the seventeenth and eighteenth centuries in order to combat growing pauperism. [Knodel, "Law, marriage and illegitimacy ..." (1967), pp. 279-280.] Pauperism was also a problem even in the sixteenth century in England. Dunlop quotes the Common Council of London in 1556 as giving "the over hastie marriages and over sone setting up of householdes of and by the young folk of the said citie" as a justification for establishing the requirement that guild apprentices must be twenty-four years of age before coming out of servitude. [Dunlop, *English Apprenticeship* ... (1912), pp. 69-70.]

<sup>109</sup> Westermarck, *A Short History of Marriage* (1930), pp. 48-52.

<sup>110</sup> Hajnal, "European marriage patterns ..." (1965), p. 130. See also para. 4 above.

<sup>99</sup> Davis, "The theory of change ..." (1963), pp. 350-351.

<sup>100</sup> Hajnal, "European marriage patterns ..." (1965), pp. 101-104.

<sup>101</sup> Leasure, "Malthus, marriage and multiplication" (1963). An increase in age at marriage was found to be one of the factors contributing to a lowering of the birth rate in Armenia and Azerbaijan, where actual fertility had been close to fecundity in the early decades of the twentieth century. Siffman, "Age at marriage ..." (1967).

<sup>102</sup> Agarwala, "Effect of a rise ..." (1967), p. 172.

<sup>103</sup> Coale and Tye, "The significance ..." (1961), p. 645.

<sup>104</sup> Jureček, "Věk snoubenců a plodnost manželství" (1960), p. 10.

<sup>105</sup> Acsádi, "Demographic variables ..." (1967), pp. 183-185.

on estimates provided by Henry, the legitimate gross reproduction rate in Sweden in 1750 would have been 40 per cent higher if Sweden had had the marital structure of Algeria in 1948.<sup>111</sup> What is original in Hajnal's work is that he has systematically compared the countries of northern and western Europe with all the other countries of the world and then pushed the historical analysis as far back into the past as possible.<sup>112</sup>

54. Much has been written about the Indian institution of child marriage. Only 5 per cent of females in the age group 20 to 24 were still single according to the 1931 census of India (including Pakistan).<sup>113</sup> Hindu tradition decrees that a girl should marry before she attains puberty.<sup>114</sup> A gradual decline in the frequency of child marriage has been noted since the late nineteenth century in response to changing public sentiment as well as the enactment of legislation, the most recent being the revision of the Hindu marriage law in 1955, which established the minimum age for girls at 15 and boys at 18.<sup>115</sup> Henry has suggested that the prohibition of remarriage for widows may explain the apparently lower level of fertility in India (as compared with many other developing countries) despite the prevailing early marriage age.<sup>116</sup> Other possible explanations which have been mentioned are the Hindu custom of women returning to their parents' home for confinement and the ruses that parents often use to keep their daughters at home long after the marriage ceremony.<sup>117</sup>

55. In societies where there is much illegitimacy, the relationship between age at marriage and level of fertility is less definite. Marriage in such societies may cement or give legal sanction to unions long in existence. This is common in the Caribbean and in much of Latin America,<sup>118</sup> and it results in very high average ages at formal marriage. The available evidence suggests that unstable forms of marital unions tend to depress fertility in the

West Indies. In Guyana, Jamaica and Trinidad, the fertility of common-law marriages has been shown to be less than that of formal marriages, while "visiting" unions (i.e., unions in which the partners do not cohabit regularly) are of still lower fertility.<sup>119</sup> On the other hand, data from fertility surveys in a number of Latin American cities indicate that for women in common-law marriages, the average number of live births is higher than for formally married women in Caracas, Mexico City, Panama and Rio de Janeiro, lower in Bogotá, and about the same in Buenos Aires and San José. Further analysis of the results of these surveys will, however, be necessary to determine the effect of different forms of marital status on fertility.<sup>120</sup>

56. One of the most controversial aspects of nuptiality concerns its historical role in the transition from high to low fertility which has accompanied the process of economic development. Davis, in his theory of the multiphasic response referred to above, has shown that postponement of marriage—but not celibacy—is one adjustment adopted by the Japanese in order to reduce their fertility. "The proportion ever married among girls aged 15-19 fell from 17.7 in 1920 to 1.8 per cent in 1955, and for women 20-24 it fell from 68.6 to 33.9."<sup>121</sup> Standardization techniques have shown that the crude birth rate in Japan, which fell from 32.3 per thousand in 1930 to 17.2 in 1960, would have fallen only to 24.4 if the female marital structure had not changed during the interval.<sup>122</sup>

57. According to Davis, a change in nuptiality patterns was one of the "responses" contributing to the transitional decline in fertility in northern and western Europe. However, the relationship between nuptiality patterns and fertility levels during the major decline in these areas is not clear. The data which Davis presents for Ireland support his hypothesis, as nuptiality there fell precisely during the period when fertility was declining. Ireland was an extreme example of the European marriage pattern, since age at marriage and the proportion never married rose to higher levels there than in any other country. In Sweden, on the other hand, the proportion of women ever married in the younger ages (15 to 29 years) fell sharply between 1750 and 1870, but levelled off after that,<sup>123</sup> i.e., just around the time when the major decline in fertility began.<sup>124</sup>

58. Preliminary results from the Coale research project mentioned earlier have been published for five countries (Norway, France, and England and Wales, in addition to Ireland and Sweden). Coale's index of the proportion

<sup>111</sup> Henry, "Caractéristiques démographiques des pays sous-développés ..." (1956), pp. 162-163.

<sup>112</sup> The United Nations made an analysis of nuptiality patterns only for the industrialized countries and carried the historical analysis back only to 1920. See United Nations, *Recent Trends in Fertility* ... (1958), chap. 4. Henry compared earlier nuptiality patterns in two European countries (Sweden in 1750 and France in 1851) with twentieth-century nuptiality in seven selected territorial units in Asia and North Africa. [Henry, "Caractéristiques démographiques des pays sous-développés ..." (1956), p. 161.]

<sup>113</sup> Hajnal, "European marriage patterns ..." (1965), p. 104.

<sup>114</sup> For a detailed discussion of Hindu marriage customs, see Altekari, *The Position of Women in Hindu Civilisation* ... (1956).

<sup>115</sup> United Nations, *The Mysore Population Study* ... (1961) p. 88. Agarwala ["Social and cultural factors ..."] (1964), pp. 100-101] has shown that average age at marriage rose from 12.5 years in 1891 to 15.6 years in 1951, while Das Gupta *et al.* [*Couple Fertility* (1955)] estimated that average age at marriage rose from under 13 years for the 1910 marriage cohort to 14.6 years in rural areas and to 16.3 years in urban areas for the 1946-1951 cohort. Chandrasekaran and George ["Mechanisms underlying the difference ..."] (1962), p. 73] also found evidence of a rise in age at marriage for the cohorts they studied.

<sup>116</sup> Henry, "Caractéristiques démographiques des pays sous-développés ..." (1956), p. 170.

<sup>117</sup> Davis-Blake, "Parental control, delayed marriage ..." (1967), p. 134; Kirk, "Factors affecting Moslem natality" (1967), p. 151.

<sup>118</sup> Mortara, *Le unioni coniugali libere* ... (1961); and his *Nuovi dati sulle unioni* ... (1965).

<sup>119</sup> See Roberts, "Some aspects of mating ..." (1955); Roberts and Braithwaite, "Fertility differentials by family ..." (1960).

<sup>120</sup> Miró, "Some misconceptions disproved ..." (1966), pp. 622-623.

<sup>121</sup> Davis, "The theory of change ..." (1963), pp. 347-348.

<sup>122</sup> Compiled from Yamaguchi, *Zenkoku no saiseisan ni kansuru shihyo* ... (1967), pp. 5, 7, 9.

<sup>123</sup> Davis, "The theory of change ..." (1963), p. 359.

<sup>124</sup> Sweden, Statistiska Centralbyrån, *Statistisk tidskrift*, 1907 (1907), p. 22.

of married women,<sup>125</sup> presented for 1870, 1900, 1930 and 1960, shows the three additional countries to be more consistent with the Swedish nuptiality pattern than with the Irish. In all of the countries except Ireland, this index appears relatively constant between 1870 and 1930, and then, from 1930 to 1960, it rises at least 15 per cent in all the countries (including Ireland).<sup>126</sup>

59. Pending more complete returns from the research of Coale and his associates, Ryder's characterization of the demographic transition in western Europe and its overseas heirs in North America and Oceania appears best to describe the existing state of knowledge. Taking into account the recent increases in nuptiality (in the form of lower age at marriage and/or higher proportions of ever-married) that have taken place once the control of marital fertility has been acquired, he distinguishes four phases in the following sequence: "high nuptiality and high marital fertility; low nuptiality and high marital fertility; low nuptiality and low marital fertility; and finally high nuptiality and low marital fertility". The countries falling outside the Northern and Western European pattern of low nuptiality are in a position to abbreviate the sequence by omitting the two intermediate stages and passing directly from high nuptiality and high marital fertility to high nuptiality and low marital fertility. Apparently the countries of Eastern Europe have already made the transition in this way, while Japan and probably the Soviet Union have not.<sup>127</sup>

### 3. AMOUNT OF REPRODUCTIVE PERIOD SPENT AFTER OR BETWEEN UNIONS

60. As has already been pointed out, the proportion of women currently married in each reproductive age group does not depend exclusively on the average age at which women marry and the proportion who never marry. It is also affected by the incidence of divorce, separation and death of spouse, by the extent to which divorcees and widows remarry and separated persons become reunited, and by the amount of time elapsing before remarriage.<sup>128</sup>

61. There exists also another nuptiality variable, polygamy, which does not fit well into the Davis and Blake

framework. There has been considerable discussion and some research into the possible effects of this practice on fertility. Most of the speculation leans towards the hypothesis that polygamy (the marriage of one man with several women) depresses fertility levels partly because of lower coitus rates per wife and a stricter observance of customs relating to sexual abstinence. The research that has been done in this area for the most part supports the hypothesis,<sup>129</sup> although a number of studies have shown no systematic inverse relationship between fertility levels and polygamy.<sup>130</sup> Interest in the subject, however, is largely academic as there are no sizable populations in which the practice of polygamy, with its potential for lower fertility, is extensive enough to have a significant impact on over-all fertility.

62. The total impact of the divorce rate on fertility is problematical. On the one hand, divorce clearly reduces the proportion of the reproductive period during which women are exposed to intercourse, and would thus tend to have a depressing effect on fertility. The magnitude of this effect depends on the extent of remarriage and the amount of time elapsing before remarriage. On the other hand, divorce may promote higher fertility by permitting sterile unions to be replaced by fruitful ones. The fact that a high proportion of divorced couples are childless<sup>131</sup> may be evidence that sterility has led to marital dissolution. Rowntree and Carrier remark that, "When childbearing was the expected sequel to marriage, involuntary sterility may have been a compelling motive for divorce".<sup>132</sup> Analyses of the relationship between fertility and divorce are sometimes oriented towards establishing the hypothesis that children constitute a deterrent to divorce. In societies where large families are valued, the threat of divorce may affect fertility by encouraging the wife to bear many children "to hold her husband, for children are a bond. The fear of divorce is ever present, but the chance of being divorced is greatly reduced with each additional child."<sup>133</sup> However, evidence of the relationship between marital stability and family size must be qualified by the fact that the number of children is a function of the duration of the union.<sup>134</sup> Divorce may contribute to higher fertility by making it possible for a

<sup>125</sup> This nuptiality index is essentially a weighted ratio of married women to all women in the reproductive ages. By its use of currently married women instead of ever-married women, it takes into account all three of the Davis and Blake nuptiality variables and, therefore, is affected not only by variations in age at marriage and in permanent celibacy, but also by variations in the time spent outside matrimony during the reproductive period (due to divorce, separation, death of spouse etc.).

<sup>126</sup> Coale, "Factors associated . . ." (1967), p. 209.

<sup>127</sup> Ryder, "The character of modern fertility" (1967), p. 30.

<sup>128</sup> Because human fertility is more conveniently studied in terms of female fertility, the Davis and Blake framework of intermediate variables does not include the dissolution of unions through the death of the wife as a factor affecting fertility. Female fertility rates (except for the less frequently used net reproduction rate) remain essentially unchanged by the death of wives, since these wives no longer make a contribution either to the numerator or the denominator of the ratio of births to population from which the rates are calculated. This simplification of defining fertility in terms of female reproductive behaviour is not consistently followed, however, and a certain amount of confusion can be found in the literature on this score.

<sup>129</sup> Muhsam, "Fertility of polygamous marriages" (1956), pp. 9-12; Dorjahn, "Fertility, polygyny . . ." (1958), p. 857; Romaniuk, "Fécondité et stérilité des femmes congolaises" (1963), pp. 110-111; Congo (Brazzaville), Service de statistique, and France, Service de Coopération, *Enquête démographique, 1960-1961* . . . (1965), pp. 52-53; Chad, Service de statistique, and France, Service de Coopération, *Enquête démographique au Tchad, 1964* . . . (1966), vol. 1, pp. 138-139.

<sup>130</sup> Busia, "Some aspects of the relation . . ." (1954), p. 347; France, Ministère de la France d'outre-mer, *Etude démographique par sondage en Guinée* . . . , vol. 1 [n.d.], pp. 42-43; Gabon, Service de statistique, and France, Service de Coopération, *Recensement et enquête démographiques, 1960-1961* . . . (1965), p. 92.

<sup>131</sup> For instance, 60 per cent of the divorces in Turkish cities are those of couples without children, according to Cillov, "Tendances des mariages . . ." (1963), p. 190. In the United States in 1960, 24 per cent of divorced women aged 35 to 44 were childless. Glick, "Marriage and family variables . . ." (1967), p. 211.

<sup>132</sup> Rowntree and Carrier, "The resort to divorce . . ." (1958), p. 228.

<sup>133</sup> Cleland, "A population plan for Egypt" (1944), p. 132.

<sup>134</sup> Jacobson, "Differentials in divorce . . ." (1950), p. 243.

number of persons to marry who would otherwise remain single. The hypothesis has also been advanced that "... a first marriage may more readily be contracted if the situation is viewed as one in which there is the possibility of a relatively easy divorce in the event of marital failure".<sup>135</sup>

63. It has been noted that, all other factors remaining constant, declining mortality during the demographic transition would have the effect of raising fertility, because fewer wives would be widowed before the end of their reproductive period; the combination of lower death rates and higher birth rates would result in an acceleration of the crude rate of natural increase. In reality, the effect of declining widowhood has often been to temper somewhat the declines in fertility resulting from the spread of family limitation practices or from modifications in some of the other intermediate variables which have either accompanied or followed declining mortality.

64. The effects of declining mortality on widowhood and fertility during the demographic transition are difficult to measure because the data are not usually available that would permit allowance to be made for the remarriage of widows. Using the large body of historical statistics available for Sweden, Ryder has demonstrated graphically the effects on fertility of improved mortality. An analysis of data for five-year female birth cohorts revealed that, despite a marked decline in nuptiality beginning early in the nineteenth century, the effects on fertility were "... practically nullified by contemporaneous changes in mortality" tending to increase the mean marital duration. Ryder's cohort index of "the proportion of total person-years married" (essentially the number of reproductive years spent in marriage as a proportion of the total number of reproductive years) actually declined gradually from 52 per cent to 48 per cent, whereas under the assumption of fixed mortality, the index would have declined sharply from 54 per cent to 44 per cent.<sup>136</sup>

65. In developed countries with low mortality rates, the proportion of widowed among women of reproductive age is small, and the effects of widowhood on total fertility are marginal. Where mortality rates are relatively high, however, as is the case in many developing countries, customs relating to the remarriage of widows may have an important bearing on fertility levels. The custom of discouraging remarriage of widows is particularly associated with Hindu tradition in India. Historically, the practice of suttee involved the immolation of the widow on the funeral pyre with her husband. Despite the banning of this custom in 1829, reluctance to remarry continued, even though an act was passed legalizing the remarriage of Hindu widows in 1856.<sup>137</sup> Some students of Indian population hold that the tradition of discouraging remarriage plays an important part in keeping fertility in India down to moderate levels when compared with

many high-fertility countries, and the decline in this tradition, it is considered, may bring an increase in the level of fertility.<sup>138</sup> Agarwala, however, maintains that the restriction "... was observed only by the upper castes and widow remarriages have always been common among the lower castes",<sup>139</sup> while Dandekar, on the basis of a demographic study of six Indian rural communities, found that widow remarriage depended largely on age at widowhood, the relationship being, of course, inverse.<sup>140</sup>

#### 4. VOLUNTARY ABSTINENCE (SOCIAL TABOOS ON SEXUAL INTERCOURSE)<sup>141</sup>

66. Taboos on sexual intercourse are observed among several societies, at times and under circumstances when its performance is deemed dangerous or unclean, in particular during menstruation, pregnancy, the post-partum period, and on certain ceremonial and religious occasions. Some of these taboos clearly do not affect fertility. Nag states, however, that Moslem and Hindu women in the West Bengal area of India are expected to abstain from intercourse on particular days of the year considered to be auspicious in their respective religions. Among the Hindus, the number of such days in the year varies from about eighty to nearly one hundred.<sup>142</sup> Admittedly, the influence on fertility of even this form of abstinence is difficult to demonstrate. Kirk, noting that ritual abstinence is apparently less common among Moslems than among Hindus, observes that this, together with their less frequent practice of post-partum abstinence, "may explain the somewhat higher birth rates of Moslems than Hindus in the Indian subcontinent ...".<sup>143</sup>

67. In order for taboos on sexual intercourse after childbirth to have any noticeable effect on fertility, the period of restraint must be relatively long, perhaps at least four months. Thus, Nag found a negative correlation between the duration of post-partum abstinence and the level of fertility when comparing fertility levels for population groups whose period of post-partum abstinence was one year or less with those groups who abstained for more than a year.<sup>144</sup> According to Fortes, Ashanti women are secluded for forty days after childbirth and then given a further forty days of convalescence. Such a custom is unlikely to affect fertility. Fortes contrasts this practice with "... the widespread African custom which prohibits intercourse between the parents of a nursing child until it is able to walk ...".<sup>145</sup> There is indication that such customs are eroding and Henry has noted this as one among several factors which in the course of industrialization would tend to promote higher fertility.<sup>146</sup>

<sup>138</sup> Davis, "Human fertility in India" (1946), p. 251.

<sup>139</sup> Agarwala, "Mean ages at marriage ..." (1963), p. 149.

<sup>140</sup> Dandekar, "Widow remarriage ..." (1963), p. 206.

<sup>141</sup> The "rhythm" method, which may also be classed as voluntary abstinence, is included among the means of contraception by Davis and Blake.

<sup>142</sup> Nag, "Family type and fertility" (1967), pp. 161-162.

<sup>143</sup> Kirk, "Factors affecting Moslem natality" (1967), p. 151.

<sup>144</sup> Nag, *Factors Affecting Human Fertility* ... (1962), p. 79.

<sup>145</sup> Fortes, "A demographic field study in Ashanti" (1954), p. 265.

<sup>146</sup> Henry, "Caractéristiques démographiques des pays sous-développés ..." (1956), p. 170.

<sup>135</sup> Ryder, "Measures of recent nuptiality ..." (1963), p. 294.

<sup>136</sup> Ryder, "The influence of declining ..." (1955). Declining mortality in fact also appears to have contributed to raise fertility in another way at the same time—by increasing the ratio of males to females in the young adult ages and, therefore, by making marriage to some degree more probable for these females.

<sup>137</sup> Nag, *Factors Affecting Human Fertility* ... (1962), p. 103.

Roberts and Tanner refer to the decay of the former general restriction on intercourse during the nursing period of a child in coastal Tanganyika, and cite the current restriction in this area as one of forty days after childbirth.<sup>147</sup>

#### 5. FOETAL MORTALITY FROM VOLUNTARY CAUSES (ABORTION)

68. Current knowledge of the extent of induced abortion is very limited, and is even less accessible for the past. The first systematic data are beginning to come from some of the countries which have liberalized abortion legislation, and particularly from Hungary, Czechoslovakia and Japan,<sup>148</sup> but any attempts to assess the number of abortions in countries where the operation is illegal must, at best, be plausible estimates with no claim to accuracy.<sup>149</sup> There are indications of its use under a wide variety of circumstances in primitive societies.<sup>150</sup> According to Landry, abortion, like various other methods of birth control, has been known since time immemorial, although its practice before the transition from high to low fertility had been very restricted.<sup>151</sup> It appears to have become an important factor influencing the level of fertility in almost all of the more developed countries in the transition period.<sup>152</sup> According to Carr-Saunders, "The opinion of those most closely in touch with the situation, such as doctors, seems to be that there has been in Germany and some other European countries a considerable, and perhaps a large, increase in this practice" while the birth rate was falling.<sup>153</sup> Sutter calls attention to the rapid development of the practice of self-abortion towards the end of the nineteenth century in the large cities of France. Resort to this practice apparently resulted from the increasingly repressive character of legislation against abortion which made it both more dangerous and more expensive to resort to an intermediary.<sup>154</sup>

69. In the socialist countries of Eastern Europe, with the exception of Albania and Eastern Germany, abortion has been legalized at various dates from 1955 onwards,<sup>155</sup>

<sup>147</sup> Roberts and Tanner, "A demographic study ..." (1959), p. 79.

<sup>148</sup> For a study of induced abortions in Hungary, see, for example, Miltényi, "A művi vetélések demográfiai jelentősége" (1964); for Czechoslovakia, see Srb and Kučera, "Potratovost v Československu v letech 1958-1962" (1963); for Japan, see Muramatsu, "Medical aspects ..." (1967), pp. 67-79.

<sup>149</sup> For estimates of the incidence of induced abortion in some Western European countries prior to 1940, see Glass, *Population Policies and Movements in Europe* (1940), pp. 54, 163, 279. See also Calderone, *Abortion in the United States* ... (1958), p. 180.

<sup>150</sup> Devereux, *A Study of Abortion in Primitive Society* ... (1960), pp. 7-24.

<sup>151</sup> Landry, *La révolution démographique* ... (1934), pp. 31-32.

<sup>152</sup> Freedman, "Fertility; statement by the Moderator" (1966), pp. 37-38.

<sup>153</sup> Carr-Saunders, *World Population* ... (1936), p. 98.

<sup>154</sup> Sutter, "Sur la diffusion ..." (1960), p. 347.

<sup>155</sup> In the USSR in 1955, in Bulgaria, Poland, Hungary and Romania in 1956, in Czechoslovakia in 1957, and in Yugoslavia in 1960. Mehlan, "The socialist countries of Europe" (1966), p. 207. In the German Democratic Republic, the indications for legal abortion, which were somewhat liberalized in 1947, were in 1950 restricted to medical and eugenic reasons. See Mehlan, "Die Abortsituation in der Deutschen Demokratischen Republik" (1961).

on the general principle that a woman is entitled to have an undesired pregnancy terminated in a hospital or other institution. Statistics on abortion trends are not available from the USSR or Romania, but trends in the abortion rates in Bulgaria, Czechoslovakia, Hungary, Poland and Yugoslavia are presented in table IV.8. In discussing the effects of abortions on fertility, Klinger notes that "... in those countries where fertility was low before abortion was legalized, i.e., Bulgaria, Czechoslovakia and Hungary, the number of births began to decrease at a faster rate. On the other hand, in countries with higher fertility (Soviet Union, Poland, Yugoslavia) the decline in fertility started later, and with the exception of Poland, the rate of decline was lower ...". Countries with higher abortion rates were found to have lower birth rates.<sup>156</sup> In Romania, the abrupt revocation of the liberal abortion law in the last quarter of 1966 was followed by a sharp rise in the birth rate.<sup>157</sup>

70. Japan is another country which has legalized abortion under specified conditions in the post-war period. The idea of limiting births is not, however, new to the Japanese people, and it has been shown above that only moderately high fertility levels prevailed even in the nineteenth century. Before and during the Second World War the Government followed a pro-natalist policy, but this was reversed in 1948 with the passing of the Eugenic Protection Law, which, as revised in 1952, permits the termination of pregnancies "... if the health of the mother is endangered by the continuation of pregnancy or the delivery due to physical or economical reasons".<sup>158</sup> The very large reduction of fertility in the Japanese population between 1950 and 1956 was achieved mainly as the result of the use of abortion, but more recently contraceptive methods have been gaining popularity with the active encouragement of the Government.<sup>159</sup> From 1949 to 1958 the crude birth rate declined from 32.8 to 18.0, while during the same period the number of abortions per 1,000 population rose from 3.0 to 12.3. In 1958 there were 1.6 million births and 1.1 million abortions.<sup>160</sup> There is, however, a large incidence of

<sup>156</sup> Klinger, "Demographic effects of abortion legislation ..." (1967), p. 90. See also Mehlan, "The socialist countries of Europe" (1966), p. 212. For additional discussion of the significance of the legalization of abortion in Eastern Europe, see the following: Szabady, Tekse and Pressat, "La population des pays socialistes européens" (1966); Mauldin, "Fertility control in communist countries ..." (1960), pp. 187 ff.

<sup>157</sup> The birth rate climbed to 38-39 (computed on an annual basis) in July-August of 1967, the first months when the full effects of the new legislation were felt. By comparing these rates with the corresponding rates for 1966, Pressat estimates that there were 170 induced abortions for every 100 live births in the earlier period, and that the high birth rates experienced under the new legislation offer proof of the low level of contraceptive practice. Pressat, "La suppression de l'avortement légal ..." (1967). The rate has since been falling back again somewhat and averaged 29.5 for the first quarter of 1968. Romania, Direcția Centrală de Statistică, *Buletin statistic trimestrial*, N<sup>o</sup>. 1 (1968), p. 5.

<sup>158</sup> Taeuber, *The Population of Japan* (1958), p. 269.

<sup>159</sup> See Koya, *Pioneering in Family Planning* ... (1963), pp. 17 ff. On the increase in contraceptive practices, see Population Problems Research Council, *Reports of the 1st to 8th National Survey on Family Planning* (1950-1965).

<sup>160</sup> Tietze, "The current status ..." (1960), p. 443.

TABLE IV.8. INDUCED (LEGALIZED) ABORTION RATES AND RATIOS IN SELECTED COUNTRIES OF EASTERN EUROPE

Year	Induced abortions per 1,000 women 15-49 years old					Induced abortions per 100 live-births				
	Bulgaria	Czechoslovakia	Hungary	Poland	Yugoslavia	Bulgaria	Czechoslovakia	Hungary	Poland	Yugoslavia
1954	1	1	6	...	...	1	1	7	...	...
1955	...	1	14	0	...	...	1	17	0	...
1956	...	1	33	3	...	...	1	43	2	...
1957	16	2	49	5	...	22	3	74	5	...
1958	19	19	58	6	...	27	26	92	6	...
1959	23	25	61	11	11	33	36	101	11	13
1960	27	28	65	21	16	39	41	111	23	18
1961	34	29	69	20	22	50	43	121	23	25
1962	38	28	66	20	...	57	41	126	23	...
1963	41	22	70	...	...	63	30	131	...	...

Source: Klinger, "Demographic effects of abortion legislation ..." (1967), p. 91.

unreported induced abortion in Japan, and Muramatsu, taking 1955 as the year for analysis, has estimated that the total incidence of induced abortion may have amounted to twice the reported number.<sup>161</sup> In recent years the number of abortions has been falling,<sup>162</sup> probably as a result of the more widespread and effective use of contraception.<sup>163</sup>

71. In Latin America there are indications that the incidence of abortion is high, especially in cities, and constitutes a serious health problem because of the unsanitary conditions under which the illegal operation is often performed. Requena, in his study of abortion in Latin America, has developed the hypothesis that abortion is an intermediate phase of the process by which different sectors of a population in the course of economic and social development pass from uncontrolled fertility to family planning by contraception. The distinction between abortion and contraception is likened to that between curative and preventive medicine, the latter implying a mature and conscious attitude towards the problem. From studies in Chile, it appears that women begin to have recourse to abortion as they pass from the lowest to a medium socio-economic-cultural level. With still further education and participation in the economic and social life of the country, they increasingly acquire the foresight to use contraception for family limitation, resorting to abortion only in the event of contraceptive failure. The question is raised by Requena whether it is possible for the countries of Latin America to proceed directly from uncontrolled fertility to control by contraception instead of recapitulating the experience of Japan and the socialist countries of Eastern Europe.<sup>164</sup>

<sup>161</sup> Muramatsu, "Effect of induced abortion ..." (1960), p. 166.

<sup>162</sup> Muramatsu, "Medical aspects ..." (1967), p. 69.

<sup>163</sup> See, for example, Honda, "Senzen sengo no fufu shussan-ryoku ..." (1959); and Koya, *Pioneering in Family Planning* ... (1963).

<sup>164</sup> Requena, "Condiciones determinantes del aborto inducido" (1966); and his "Chilean programme of abortion control ..." (1967). In response to these problems a programme of comparative surveys on the incidence of induced abortions and the use of contraceptives in urban areas of a number of Latin American countries has been initiated by the United Nations Latin American Demographic Centre (CELADE).

## 6. VOLUNTARY INFECUNDITY (STERILIZATION)

72. Surgical sterilization is a device for permanently preventing conception. While the operation may be performed on either sex, it is a more simple procedure in the case of the male. In neither sex does it interfere with subsequent sexual performance or pleasure. Although sterilization is usually intended to be permanent, the male operation can often be reversed should the individual desire it.<sup>165</sup>

73. Japan is one of the countries where sterilization has been used as a means of fertility control. The Eugenic Protection Law of 1948 provided for sterilization essentially on eugenic grounds, but the protection of the life and health of the mother is also a prescribed ground for its application. From 1949 to 1965 over half a million sterilizations were performed under this Law, the great majority of them on women; the number of sterilizations moved up from some 5,700 in 1949 to reach a maximum of 44,500 in 1956 and then to decline gradually to 27,000 in 1965, but these official figures probably understate considerably the true incidence of sterilization, which may be from five to ten times as high.<sup>166</sup> Sterilization of males as a means of family planning has been given much importance in India, particularly in certain states.<sup>167</sup> In Puerto Rico, *La Operación*, as sterilization is called, has spread because of the willingness of medical workers to urge its acceptance on females.<sup>168</sup>

## 7. USE OR NON-USE OF CONTRACEPTION

74. Contraception, covering all non-permanent measures to prevent coitus from resulting in conception, can be divided into two broad classes—chemical-mechanical or appliance methods, and natural or non-appliance

<sup>165</sup> See Phadke, "Place of sterilization ..." (1964); Wood, "Female sterilization" (1964); and Ferber, "Male sterilization" (1964).

<sup>166</sup> Taeuber, *The Population of Japan* (1958), pp. 269, 281-282; and Muramatsu, "Medical aspects ..." (1967), pp. 79-82.

<sup>167</sup> The incidence of sterilization appears to be highest in Madras. See Repetto, "India: a case study ..." (1968). On the subject of sterilization in India, see also Dandekar, "Vasectomy camps in Maharashtra" (1963); Raina, "India" (1966).

<sup>168</sup> Hill, Stycos and Back, *The Family and Population Control* ... (1959), pp. 126-127, 180-181.



methods. The three non-appliance methods are *coitus interruptus* (withdrawal), the rhythm method, which consists of the avoidance of intercourse during the woman's fertile period, and total abstinence. *Coitus interruptus* is practised in many societies, both primitive and modern, and reference to its use in Genesis attests to its ancient establishment.<sup>169</sup> Among the chemical-mechanical methods are the condom or sheath used by the male; female methods include the diaphragm, the oral contraceptives introduced in the 1950s, the newly developed intra-uterine devices, jellies, creams and foams, as well as a variety of older and rather ineffective devices (e.g., the douche).

75. It is now generally accepted that contraception was the principal intermediate variable responsible for the shift from high to low fertility during the late nineteenth and early twentieth century. But, as Freedman has pointed out, evidence for the spread of contraception is largely by inference since "we have almost no historical trend data bearing directly on family planning practices".<sup>170</sup> The KAP-type of fertility survey (contraceptive knowledge, attitudes and practice) originated after the fertility reduction had been achieved so that in the course of the decline no attempt had been made to observe changes in contraceptive practice. Two sets of retrospective, longitudinal data from England are perhaps unique in the glimpse they afford. According to the Lewis-Faning 1949 study of a not very representative hospital population, the proportion of women ever having practised birth control increased progressively from only 15 per cent for women married prior to 1910 to 66 per cent for the 1935-1939 marriage cohort whose fertility was still incomplete. Furthermore, the proportion of women having used birth control was greater among those social classes whose fertility was lower.<sup>171</sup> Data from a fairly representative national sample in the 1959-1960 Marriage Survey showed similarly that among persons married before 1930 only 53.7 per cent had ever practised contraception, as compared with 72.8 per cent among persons married between 1940 and 1949.<sup>172</sup>

76. Among the types of indirect evidence on the role of contraception in the decline of fertility, the principal one has probably been the widespread general impression that the practice of birth control and abortion has increased greatly and that many people could have had more children if they so desired. Several features of the decline have been interpreted as pointing to the operation of family limitation: the speed of the decline, the pattern of its spread in neighbouring areas, in socio-economic groups and in religious groups, the greater decline in rates of child-bearing at long durations than at short

durations of marriage, the greater decline of fertility rates among older women than among younger women, and the increase in the apparent effect of economic fluctuations on fertility rates. In addition, data from numerous fertility surveys in recent years have generally shown that the use of contraception is much less frequent in high-fertility populations than in populations where fertility is low. In Turkey 28 per cent of the population were using some method of family limitation, according to a survey conducted in 1963.<sup>173</sup> In India, the Mysore Survey established that in Bangalore City in 1952 only 12 per cent of all couples reported having attempted to use some method of family limitation, abstinence being the method most frequently relied on.<sup>174</sup> Blake reports that 37 per cent of a non-clinic sample of Jamaican women had used some method of birth control, including abstinence.<sup>175</sup> In Lebanon among educated city dwellers more than 80 per cent of the women report some use of contraceptives.<sup>176</sup> Similarly, data from a survey of fertility in seven cities of Latin America showed, in general, an inverse relationship between the level of fertility and the proportion of married women ever having used contraceptives; the city with the lowest fertility—Buenos Aires—had the highest use of contraception (77.6 per cent) whereas Mexico City, where fertility was highest, had the lowest use of contraception (37.5 per cent).<sup>177</sup>

77. There has also been considerable interest in the findings of research into the *kinds* of contraceptive methods used during the decline of fertility in the West, and the implications of these findings with regard to the perspective for fertility in the high-fertility regions of the world today. Attention has centred on two aspects: the predominance, especially in Europe as opposed to the United States, of male methods such as withdrawal or the condom,<sup>178</sup> and the somewhat related point that the methods adopted required on the whole a high degree of sustained motivation.<sup>179</sup> The dramatic development of highly effective female contraceptive methods requiring a lesser degree of motivation has enhanced the possibility of a more rapid acceptance of family planning in the high-fertility countries where attitudes towards contraceptive practice are ambivalent and motivation is frequently reported as weak, but the question has also been raised whether the men in these reportedly male-dominated societies will find such methods acceptable and will readily relinquish their prerogatives in these matters.<sup>180</sup>

<sup>169</sup> Genesis, 38:7-10. See also Himes, *Medical History of Contraception* (1936), pp. 70-72.

<sup>170</sup> Freedman, "American studies ..." (1962), p. 212.

<sup>171</sup> Lewis-Faning, *Report on an Enquiry into Family Limitation* ... (1949), pp. 52, 58, and chap. 6.

<sup>172</sup> Pierce and Rowntree, "Birth control in Britain ..." (1961), p. 153. Longitudinal data of this kind for the United States are available only beginning with cohorts married in 1928 or later when the decline in fertility had already virtually spent its course. Freedman, Whelpton and Campbell, *Family Planning, Sterility and Population Growth* (1959), p. 213.

<sup>173</sup> Berelson, "Turkey ..." (1964), p. 4.

<sup>174</sup> United Nations, *The Mysore Population Study* ... (1961), p. 166.

<sup>175</sup> Blake, *Family Structure in Jamaica* ... (1961), p. 228.

<sup>176</sup> Yaukey, *Fertility Differences in a Modernizing Country* ... (1961), p. 66.

<sup>177</sup> Miró, "Some misconceptions disproved ..." (1966), p. 628.

<sup>178</sup> Kirk, "Possible lessons from historical experience ..." (1959); Stycos, "A critique of the traditional ..." (1962), pp. 492 ff.; Pierce and Rowntree, "Birth control in Britain ..." (1961), pp. 128-130; Sauvy, "Essai d'une vue d'ensemble" (1960), p. 382; Freedman, "Family planning programs today ..." (1966), p. 819; Siebert and Sutter, "Attitudes devant la maternité ..." (1963), pp. 669-670.

<sup>179</sup> Sauvy, *Théorie générale de la population* ... (1966), vol. 2, p. 213.

<sup>180</sup> Freedman, "Family planning programs today ..." (1966), pp. 815-819.

#### D. Factors related to past declines of fertility in areas where fertility is low

78. Any review of the factors responsible for past reductions of fertility in areas of low fertility must be prefaced by the acknowledgement that the phenomenon is not yet well understood, in part because of its extreme complexity and in part also because serious scientific interest and study in it did not begin until after the event had taken place. Most of the really relevant information was not collected and, except for what can be reconstructed by inference from other available historical data, is probably lost forever.<sup>181</sup> The historical decline of fertility is generally attributed to a complex of factors related to the process of modernization, economic development and industrialization, but attempts to identify these factors precisely and to organize them into a systematic classificatory scheme have not proved very satisfactory. The fundamental, underlying factors most frequently proposed (such as urbanization, improved levels of education, social mobility and declining mortality) are admittedly overlapping and heterogeneous. Furthermore, agreement is lacking as to the relative importance of each of these underlying factors and their mode of interaction with each other as variables influencing the level of fertility.

79. The absence of a systematic theory of the determinants of fertility in terms of which relevant data can be accumulated is generally recognized. One of the authors of the Indianapolis Study has admitted that "one of the weaknesses [of the study] was that the twenty-three hypotheses set up for testing were not bound together by any organizing theory".<sup>182</sup> A Steering Committee on the Development of Plans for New Studies in Fertility formed in the United States in 1953, was unable, after a year of intensive work, to develop an acceptable theoretical framework which could integrate the hypotheses of future fertility surveys.<sup>183</sup> Similarly, the absence of "systematized theoretical generalizations" in the analysis of factors affecting fertility and the resulting practice of giving equal weight to all factors ("the eclectic theory of 'equal factors'") has been deplored by Kozlov.<sup>184</sup>

80. It is possible to distinguish two principal approaches which have been employed to investigate the transitional decline from high to low fertility. The first of these approaches, that of *differential fertility*,<sup>185</sup> is based on the observation that the decline from previously high levels of fertility did not usually proceed uniformly among all sectors of a population. It identifies and investigates characteristics which differentiate those sectors of the population which were in the vanguard of the secular change in fertility, the assumption being that these groups experienced differential exposure to the effects of the underlying determining factors. The second

approach studies the whole vast range of changes in the social and economic organization of society that appear to have been associated with economic development, in order to select those changes which can most plausibly be said to have affected fertility trends.

81. Both these approaches, unfortunately, have produced very limited results, largely due to the unavailability of the requisite data covering the period just prior to and during the first stages of declining fertility. The differential fertility approach, quantitative and inductive in nature, has perforce been obliged to restrict its analysis to available data (usually population census-type characteristics<sup>186</sup> such as urban-rural residence, level of education and occupation) not pin-pointed towards and for the most part only indirectly related to the study of fertility. The resulting differentials have been put to various uses: some analysts have treated the differential characteristics as causal factors in the decline in fertility; others have employed them as indices or indicators of the true but unknown factors;<sup>187</sup> others have fastened their attention on the socio-economic status differentials and have formulated the "cultural lag" theory according to which "... the decline in family size began among the well-to-do, the urban and the educated [who] were the first to adopt the rational attitudes towards fertility needed to utilize the means of fertility control ... The poorer, the less-urbanized, and less-educated elements of the population followed this lead, but apparently after a considerable time lag";<sup>188</sup> others, recognizing that the cultural lag theory is more a description of *how* the decline occurred, than an explanation of *why* it occurred, have attempted to supplement it by establishing a relationship between each differential characteristic and the explanatory factors obtained through the second approach.<sup>189</sup>

82. The second approach, essentially deductive in its search for hypothetical factors affecting fertility, has been forced to limit itself mostly to qualitative and speculative analysis in the absence of relevant data. It has yielded a rich harvest of convincingly plausible hypotheses whose validity can rarely be verified with any degree of precision. The themes which recur most frequently generally relate to the economic and social changes which transformed

<sup>186</sup> See, for example, Ryder, "Fertility" (1959), pp. 413-414. This kind of information, supplemented by a wide range of social and psychological characteristics of household members, continues to be collected in the KAP fertility surveys that began with the Indianapolis Study shortly before the outbreak of the Second World War. Various demographers have commented on the limited usefulness of data of this kind for the purpose of understanding the fundamental factors affecting fertility trends. According to Davis, field surveys "cannot substitute for historical and statistical studies encompassing long-run changes" because they suffer from the inevitable limitation of covering only a brief time period and produce a strong "tendency to psychologize and thus overlook sociological determinants of reproduction ..." [Davis, "The sociology of demographic behavior" (1959), pp. 319-323]. In the opinion of Jaffe, "no study dealing only (or almost exclusively) with the individual and his immediate family will be very productive of findings". [Jaffe, "Book review of *Social and psychological factors affecting fertility*, vol. 5" (1960), p. 167.]

<sup>187</sup> United Nations, *Population Bulletin* ... (1965), chap. 9.

<sup>188</sup> Johnson, "Differential fertility in European countries" (1960), pp. 59-60. See also Ryder, "Fertility" (1959), pp. 412, 425.

<sup>189</sup> United Nations, *Population Bulletin* ... (1965) p. 123.

<sup>181</sup> Freedman, "The transition from high ..." (1965), p. 425.

<sup>182</sup> Kiser, "The Indianapolis Study of Social ..." (1962), p. 161.

<sup>183</sup> Kiser, "General objectives and broad areas ..." (1955); Mishler and Westoff, "A proposal for research ..." (1955); Westoff et al., *Family Growth in Metropolitan America* (1961), pp. 7-8.

<sup>184</sup> Kozlov, "Some causes of the high fertility ..." (1967), p. 155.

<sup>185</sup> United Nations, *Population Bulletin* ... (1965), p. 122.



the functions of the family and children during the transition from pre-industrial to urban-industrial society.<sup>190</sup>

83. Although there are wide variations in concept and terminology which affect different authors' presentation of the fundamental, underlying factors relating to the economic and social structure, a tendency has been emerging to identify, in between the intermediate variables affecting fertility and the fundamental factors, another group of variables referring to attitudes and motivations towards fertility. These variables are frequently designated the cultural factors affecting fertility. Among the economic and social factors themselves, special emphasis is usually given to the family and its changing functions and structure as a variable influenced by the other underlying economic and social factors, which in turn affects the cultural factors.

## 1. CULTURAL FACTORS

84. The term culture is used in a variety of senses, by demographers, sociologists and anthropologists.<sup>191</sup> Cultural factors affecting fertility are intended here to refer broadly to all motivational aspects of reproductive behaviour, although principally to the institutionalized norms and values of a society by which individuals are guided in their actions relating to the number of children they have. Included, for example, are the "social norms" concerning family size and each of the intermediate variables which Freedman analyses in his discussion of the Davis and Blake framework.<sup>192</sup> These social norms are similar to Kozlov's "complex of ideological factors" which he describes as having been formed around the institution of the large family and which found their support in "public opinion, moral canons, the rules of marriage and, lastly, the precepts of religion, which, of course, did not create the tradition but only strengthened established national customs".<sup>193</sup> Lorimer has defined the term "cultural values" as referring to "attitudes and interests which are, in part, engendered by a particular social structure and which in turn motivate and direct the activities of the individuals who form a society".<sup>194</sup>

85. The concept of cultural factors has here been widened to encompass the information from recent fertility surveys on individual attitudes towards family size and reproductive practices.<sup>195</sup> The relationship between individual values and attitudes on the one hand and social norms on the other hand is not yet well understood. "Empirical studies of social norms or values about

family size are . . . mainly a postwar product of sample surveys",<sup>196</sup> and "there is a serious lack of knowledge of the circumstances under which an apparent consensus about fertility in a population . . . really has normative force in directing what behavior ought to be in the society".<sup>197</sup>

86. Religious teachings relating to fertility are thought by many to lend important support to traditional large family values. It is also often assumed that a decline of religious interest has been conducive to the limitation of family size. Inferred is the notion that religious interest has declined as traditional values have given way to rationalist modes of thinking. Thus, the control of family size is believed to lie less within the jurisdiction of religious institutions and increasingly within the domain of the family itself.<sup>198</sup>

87. Certain attempts have been made to measure the association between attitudes towards religion and fertility, since changed attitudes, to a greater extent than a decline in institutional affiliation, are believed to be associated with the decline in family size. In France the patterns of fertility of various regions with differences in the attitude of the population towards the Catholic Church have been studied. In departments where attachment to religion was strong, fertility was in general above the average. However, this study failed to establish that the decline in fertility for the period 1860-1935 was associated with adherence to religion.<sup>199</sup>

88. There has been much discussion as to how much and what kinds of changes are required in pre-industrial areas in order that motivation in favour of small families may develop.<sup>200</sup> Many writers believe that the decline of fertility in European society involved profound changes in motivation.<sup>201</sup> However, because of the paucity of data relating to the decline of fertility in those countries where fertility has already fallen to low or moderate levels,<sup>202</sup> views about how much of a modification in motivation occurred are of necessity largely conjectural and based on indirect inferences from such sources as the meagre data on the kinds of family limitation methods that were used.<sup>203</sup>

89. In the United Kingdom, the modern movement of family limitation did not begin until the last quarter of the nineteenth century, although there is evidence that a latent desire for smaller families existed before that time. It was only under the cumulative impact of "... the

<sup>190</sup> See, for example Sauvy, *Théorie générale de la population* . . . (1966), vol. 2, pp. 131-132; United Kingdom, Royal Commission on Population, *Report* (1949), pp. 38-44; Coale, "Factors associated . . ." (1967), p. 208.

<sup>191</sup> For a review and critique of existing definitions of culture, see Jaeger and Selznick, "A normative theory of culture" (1964).

<sup>192</sup> Freedman, "The sociology of human fertility . . ." (1961/62), p. 39.

<sup>193</sup> Kozlov, "Some causes of the high fertility . . ." (1967), p. 158.

<sup>194</sup> Lorimer, *Culture and Human Fertility* . . . (1954), p. 198.

<sup>195</sup> As Davis has pointed out, this kind of information is frequently thought of as cultural even when, as sometimes happens, investigators fail to relate these values to their institutional setting in the social structure. [Davis, "The sociology of demographic behavior" (1959), p. 322.]

<sup>196</sup> Freedman, "The sociology of human fertility . . ." (1961/62), p. 46.

<sup>197</sup> *Ibid.*, p. 47.

<sup>198</sup> Freedman, "The sociology of human fertility . . ." (1961/62), p. 56; United Kingdom, Royal Commission on Population, *Report* (1949), p. 38; Myrdal, *Nation and Family* . . . (1945), pp. 54-56.

<sup>199</sup> Ariès, *Histoire des populations françaises* . . . (1948), pp. 463-464. See also Bourgeois-Pichat, "Un nouvel indice de mesure . . ." (1948), pp. 310-311.

<sup>200</sup> Freedman, "Next steps in research . . ." (1962), p. 598.

<sup>201</sup> See, for example, Myrdal, *Nation and Family* . . . (1945), pp. 51-54; Lorimer, *Culture and Human Fertility* . . . (1954), p. 248.

<sup>202</sup> Freedman, "The transition from high . . ." (1965), pp. 417, 425.

<sup>203</sup> Coale, "The voluntary control . . ." (1967), p. 168; Sauvy, *Théorie générale de la population* . . . (1966), vol. 2, p. 225.

profound [social and economic] changes that were taking place in the outlook and ways of living of the people . . .", however, that the psychological barriers to birth control were broken down. The move towards family planning received a powerful impetus from the publicity surrounding the trials of Bradlaugh-Besant in 1877-1888 for spreading birth control propaganda, as well as from improvements in contraceptive methods.<sup>204</sup>

90. The importance of motivation for the successful practice of family limitation is stressed by Sauvy, who distinguishes three stages through which couples pass in their attitude with regard to having children: "(a) positive desire to have many children, (b) positive desire for a limited number of children, but absence or insufficiency of positive motivation requisite for satisfying this desire, (c) positive motivation sufficiently strong to limit the number of children".<sup>205</sup>

91. The motivational factor is not always taken into consideration in writings on factors affecting past declines in fertility. Sometimes it is merely stated that the population responded to the underlying social and economic factors, or that changes in the social and economic factors "... are followed by conscious efforts on the part of parents themselves to regulate the size of their families",<sup>206</sup> without indicating whether a change in motivation was involved. One demographer who specifically affirms his opinion that the change in motivation was relatively small in the change-over from high to low fertility defends his view on the basis of changes in the structure and functions of the family.<sup>207</sup>

## 2. ECONOMIC AND SOCIAL FACTORS

92. As was explained earlier, any selection of underlying factors affecting fertility trends is necessarily of an arbitrary nature and in this respect reflects the lack of agreement and even confusion found in the literature. The economic and social factors selected for review here are as follows: (a) family functions and structure, (b) relationship between mortality and fertility, (c) rising levels of living and increased costs of children's upbringing, (d) levels of education, (e) social mobility, (f) urbanization, and (g) industrialization.

93. It must be stressed that a whole complex of interacting factors is responsible for the change from high to low fertility, and attempts to associate the decline exclusively with a particular factor have not proved satisfactory. As Coale points out, "Fertility fell in Spain, Bulgaria and other Southern and Eastern European countries when mortality was still very high; in many countries rural fertility declined as early and as much as urban fertility; in some countries industrialization was far advanced before marital fertility fell, in others a major decline preceded substantial industrialization . . . In European national experience, the only factor appar-

ently always changing at the same time that fertility declined was literacy, but the onset of fertility decline has no consistent relationship with the proportion literate at the time."<sup>208</sup>

### (a) Family functions and structure

94. Many authors who have written on the social and economic factors responsible for the transitional decline of fertility either implicitly or explicitly attribute to the family, because of its unique social role in the bearing and raising of children, special significance apart from that of the other factors relating to social structure.<sup>209</sup> In a variety of ways, changes in society at large wrought changes in the structure and functions of the family, making the large family a liability rather than an asset.

95. With growing urbanization and industrialization, the family by and large lost its function as an economic unit; this, together with the enactment of child labour laws and the extension of compulsory education, drastically modified the economic usefulness of children to parents as a source of cheap manpower. At the same time, new extra-familial roles for both husband and wife began to compete with the traditionally-defined parental roles. In an increasingly impersonal society, the family emerged as one of the few loci for personal affective relations. As the father of the family lost his traditional authority and with the growing emancipation of women, the companionate aspect of marriage became emphasized over the reproductive aspect and the parent-child relationship shifted from one of exploitation in quantity to that of cultivation in quality.<sup>210</sup> At a time when the costs of child-rearing were becoming ever more burdensome, average family size was also increasing as a result of declining mortality.

96. The nuclear family was highly sensitive to these new conditions, as it alone had to bear full responsibility for the care and maintenance of increasing numbers of surviving children for longer periods of time. But not only did the structure of the European family facilitate the relatively prompt perception of family interests under the altered conditions of living; it also permitted the ensuing widespread, spontaneous response in the form of modified reproductive behaviour.<sup>211</sup> In societies with a different family structure, such as those of many of

<sup>208</sup> Coale, "Factors associated . . ." (1967), p. 208.

<sup>209</sup> Lorimer, *Culture and Human Fertility* . . . (1954); United Kingdom, Royal Commission on Population, *Report* (1949), pp. 38-41; Sauvy, *Théorie générale de la population* . . . (1966), vol. 2, pp. 185-186; Breznik, "Female fertility in industrialized . . ." (1967), p. 197; Freedman, "The sociology of human fertility . . ." (1961/62), p. 56.

<sup>210</sup> Sauvy points to the development of "puericulture" (i.e., the art or science of rearing and educating children) during the fertility decline in France as evidence of the increased value and importance of the individual child. [Sauvy, *Théorie générale de la population* . . . (1966), vol. 2, pp. 131, 229.] According to Ariès, there took place around the seventeenth century "... a major transformation of the family: the latter fell back upon the child, and its life became identified with the increasingly sentimental relationship between parents and children". [Ariès, *Centuries of Childhood* . . . (1962), p. 370.]

<sup>211</sup> Lorimer, *Culture and Human Fertility* . . . (1954), pp. 201-202, 248-251; Ryder, "The character of modern fertility" (1967).

<sup>204</sup> United Kingdom, Royal Commission on Population, *Report* (1949), pp. 35-41.

<sup>205</sup> Sauvy, *De Malthus à Mao Tsé-Toung* (1958), pp. 212-213.

<sup>206</sup> Sadovaksova, "Birth control measures . . ." (1967), p. 111.

<sup>207</sup> Ryder, "Fertility" (1959), p. 425; and his "The character of modern fertility" (1967), p. 32.

the high-fertility countries of today, large family norms are slower to respond to changes in the underlying social structure (see section E below).

(b) *Relationship between mortality and fertility*

97. As discussed elsewhere in this chapter, high fertility has frequently been a response to high mortality. The decline in mortality in industrialized countries, particularly among infants and young children, was an important element in creating an atmosphere favourable to the development of family limitation.<sup>212</sup> As mortality declined, the pressures of an increased number of surviving children on limited familial resources made themselves felt. Instead of having extra births in order to assure the survival to adulthood of the desired number of offspring, a tendency was noted for parents to "replace" a child who had died.<sup>213</sup> Under the continued impact of greatly reduced mortality, women have become increasingly aware that "... in the present fundamentally new conditions of population replacement a woman may give birth to fewer children yet retain as many as survived in the not too distant past ...".<sup>214</sup>

98. The decline in mortality among adults has also been suggested as a factor promoting family limitation. Thus, the slower elimination of the aged from the labour force is said to have made the economic situation more difficult for those in the reproductive ages.<sup>215</sup> Further, the dependency burden may have increased because of the greater survival of the aged and thereby have encouraged smaller families.<sup>216</sup>

(c) *Rising levels of living and increasing costs of children's upbringing*

99. During the period of declining fertility, average real income was rising, and the rich generally had fewer children than the poor. With increasing income, the rational planning for one's future and that of one's children became possible, and increasing wealth might therefore logically lead to decreases in fertility. It has been pointed out that there is no simple relationship between income levels and fertility levels, and that, following the decline of fertility among the rich, the decline also spread to the poorer groups. This was particularly true in large cities, where marked decreases in fertility occurred among the relatively poor.<sup>217</sup>

<sup>212</sup> In France, however, the infant mortality reduction could not have been responsible for the initial spread of family limitation because the decline of the death and birth rates occurred at the same time. Landry, *La révolution démographique* ... (1934), p. 38.

<sup>213</sup> Geissler, "Über den Einfluss der Säuglingssterblichkeit ..." (1885), p. 23; Sanders, *The Declining Birthrate in Rotterdam* (1931), chap. 9; Verrijn-Stuart, "Natalité, mortinatalité et mortalité ..." (1902), p. 368.

<sup>214</sup> Davytan, "The influence of socio-economic factors ..." (1967), p. 77.

<sup>215</sup> Ungern-Sternberg and Schubnell, *Grundriss der Bevölkerungswissenschaft* (1950), pp. 282-283.

<sup>216</sup> Winkler, "Der Geburtenrückgang, seine Ursachen ..." (1938), p. 17.

<sup>217</sup> These arguments were used in the controversy in the German literature about the extent to which "wealth" should be regarded as the cause of declining fertility. The importance of wealth was stressed by Brentano, "Die Malthussche Lehre ..." (1909), pp. 603-606; and Mombert, *Studien zur Bevölkerungsbewegung* ... (1907), chap. 3. On the other side Oldenberg, ["Über den Rückgang ..."]

100. The increasing costs of rearing children have been widely stressed as a factor in fertility decline. By the second half of the nineteenth century, it became questionable whether children were economic assets.<sup>218</sup> With the abolition of child labour and the enactment of compulsory education laws, children ceased to be a source of income for their parents and instead required increasing expenditure for education, thus threatening a reduction of living standards.<sup>219</sup>

101. At the same time, the State has been assuming, in increasing measure, certain financial responsibilities previously borne by the family, e.g. the cost of medical care. This trend serves to mitigate the depressing effect on the family's standard of living resulting from additional offspring.<sup>220</sup>

102. In recent years several attempts have been made to develop economic or socio-economic theories to explain household decisions concerning family size. Becker proposed a model based on conventional economic theory of consumer behaviour, according to which children were considered as a kind of commodity, and household decisions concerning the number of children desired were determined by weighing preferences against the constraints of income and costs. According to this theory, parents compare the utility of children with that derived from other goods; if knowledge of birth control methods was universal, fertility would be positively associated with income.<sup>221</sup> Various comments and criticisms have been made of Becker's model.<sup>222</sup> Easterlin, for example, suggested modifications of the concepts of income, prices, taste preferences and fertility control to emphasize the influence of sociological factors acting as constraints on economic factors. He proposed a more complex treatment of the factor of birth control practice in the model to take account of differing attitudes among various socio-economic groups.<sup>223</sup>

(1911)], Wolf [*Die neue Sexualmoral* ... (1928), pp. 37-40], and others stressed the complexity of the relationship between income and fertility. In France the role of wealth has been stressed particularly by Bertillon, *La dépopulation de la France* (1911), pp. 110 ff., although he by no means regarded it as the exclusive cause of the decline.

<sup>218</sup> Glass, *Population Policies and Movements in Europe* (1940), p. 58.

<sup>219</sup> Billig, *O prawach rozwoju ludności* (1963). Recent surveys have mentioned financial costs as reasons for not having larger families. See, for example, Prokopec, "Vdana žena v rodine a zamestnani -1961" (1963); Sveton and Vávra, *Reprodukcia obyvateľstva Československa* ... (1965).

<sup>220</sup> For example, a study in Great Britain showed that, despite rising costs, the added financial burden imposed by a second child was less in 1948 than in 1938, owing to subsidies provided by the State. Henderson, "The cost of children" (1950), part 2, pp. 295-298. In the Soviet Union, it is anticipated that by 1980 as much as 75-80 per cent of the cost of maintenance of children will be provided from public funds. Uralis, "Dynamics of the birth rate ..." (1967), p. 235.

<sup>221</sup> Becker, "An economic analysis of fertility" (1960).

<sup>222</sup> For different views and comments see, for example, Blake, "Are babies consumer durables?" (1968); Spengler, "The economist and the population question" (1966).

<sup>223</sup> Easterlin, "Towards a socioeconomic theory ..." (1969). For other modifications see Mincer, "Market prices ..." (1963); Namboodiri, "Some observations ..." (1972). See also Espenshade, "The price of children ..." (1972) and Freedman, "The relation of economic status ..." (1963).

#### (d) Levels of education

103. A generally inverse relationship between fertility and educational level appears to have existed in the United States and various European countries since the late nineteenth century, although this relationship is now diminishing or even disappearing in some low-fertility countries (see section F below). Moreover, it has been pointed out above (para. 93) that an increase in literacy has always taken place simultaneously with a reduction in fertility. The increased education of women in particular has frequently been mentioned as an important contributing factor to the changing attitude among women to their traditional role as homemaker and bearer of children, and related to this changing attitude is the greater degree of participation of women in gainful employment, believed by some writers to be an alternative for women to the bearing and rearing of children. Some Russian writers stress that access of Soviet women "to education and to literature, art, science and political activity" has been the most important of the social factors contributing to the reduction of fertility in the USSR.<sup>224</sup>

#### (e) Social mobility

104. The desire to improve one's position in the social scale has been stressed as an important motive for family limitation. The argument is particularly associated with the name of Dumont, who in the latter half of the nineteenth century devoted an extensive series of studies to this phenomenon, which he termed "social capillarity" (*capillarité sociale*). (See also chapter III, section F.) Just as a column of liquid must be thin in order to rise under the force of capillarity, so also must a family be small to rise in the social scale.<sup>225</sup> He and many others have argued that during the period when family size declined, the mobility between social classes increased greatly, and new attitudes toward social mobility developed. Whereas formerly most men took their social position for granted, concern with improving one's own position or that of one's children became an ever-pressing preoccupation. The recognition that rearing children absorbs money, time and effort which could otherwise be used to rise in the social scale fostered motivation for smaller families.<sup>226</sup> When people are maintained at the subsistence level with little hope for improving their social status, such incentives are lacking.<sup>227</sup>

105. Using various measures of socio-economic status, such as occupation, income of head of household or of

family, and rental value of the dwelling unit, many writers have found a clear inverse relationship between socio-economic status and fertility. These cross-sectional studies, the findings of which are reported in section F below, lend weight to the accepted inference that changes in the class structure of Western societies have played an important part in the secular decline of fertility. For example, while there has been a tendency for fertility to decline among all occupational groups, the shifting occupational pattern away from primary industries characterized by high fertility, toward white-collar and skilled industrial occupations characterized by lower fertility, is in itself a factor tending to depress fertility.

106. Although quantitative data on the relation between social mobility and fertility are not available for the period of major fertility decline, contemporary studies which examine this relation may contribute to an understanding of past processes. Such studies examine fertility performance in relation to the changes in the individual's status throughout his working life, or to changes in status from one generation to the next. Berent examined both aspects in his analysis of data from a sample survey of England and Wales in 1949. He found that upward mobility (based on a comparison of father's and son's social class) was associated with lower fertility, while downward mobility was associated with higher fertility. Moreover, those who moved to a higher social class between the time of marriage and time of interview had on average smaller families than those who remained static.<sup>228</sup> Some French and Hungarian studies have also suggested that there is a relationship between social mobility and family size.<sup>229</sup>

107. The findings have been more problematic in recent studies in the United States directly concerned with the relation of social mobility and fertility. Analyses of data from the Indianapolis Study showed that couples who experienced intergenerational upward mobility tended to come from smaller families than non-mobile couples,<sup>230</sup> but the relationship between fertility and mobility after marriage was much less clear.<sup>231</sup> Goldberg,

<sup>224</sup> Berent, "Fertility and social mobility" (1952).

<sup>225</sup> In a 1948 sample survey in France, it was found that the proportion of persons who had advanced in social class was higher among small families than among large families. Bresard, "Mobilité sociale et dimension de la famille" (1950), p. 563. Analyses of the family background of students at boys' *lycées* and law schools showed that students from higher social strata came from larger families than those of more modest social class, the inference being that in the latter class only small-sized families were able to provide secondary or higher education for their children. Girard, "Mobilité sociale et dimension de la famille, 2ème partie . . ." (1951). In Hungary, a 1962 sample survey of Budapest found upward mobility to be associated with lower fertility. The average number of children of manual workers who had moved to intellectual occupations was even lower than that of intellectual workers who had not moved upward from lower strata. Szabady, "Socio-occupational stratification . . ." (1964), p. 163.

<sup>226</sup> Kantner and Kiser, "Social and psychological factors affecting fertility, xxii . . ." (1954); Riemer and Kiser, "Social and psychological factors affecting fertility, xxiii . . ." (1954).

<sup>227</sup> Riemer and Kiser, "Social and psychological factors affecting fertility, xxiii . . ." (1954). Although little support was given to the hypothesis that low fertility is closely related to increasing income during marriage, some association was found between upward occupational mobility of husband and lower fertility, as measured by the average number of living children.

<sup>224</sup> The words quoted are from Ulanis, "Dynamics of the birth rate . . ." (1967), p. 235. See also his *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963).

<sup>225</sup> Dumont, *Dépopulation et civilisation* (1890), pp. 106 ff.; and his *Natalité et démocratie* (1898), pp. 163-186, 190-191, 212-226.

<sup>226</sup> United Kingdom, Royal Commission on Population, *Report* (1949), pp. 38-44; George, *Introduction à l'étude géographique . . .* (1951), p. 217.

<sup>227</sup> See Mombert, *Studien zur Bevölkerungsbewegung . . .* (1907), pp. 168 ff.; and his *Bevölkerungslehre* (1929), pp. 314-316. It has been suggested that the early decline of the birth rate in France was related to the special conditions existing in that country in the eighteenth century. Thus, "social promotion was not so difficult that all ambition was stifled; it was not so easy that unlimited fertility did not constitute a serious handicap in the struggle to rise in the social scale". Blacker, "Social ambitions of the bourgeoisie . . ." (1957), p. 63.

on the other hand, found little relation between inter-generational occupational mobility and completed family size in his analysis of sample survey data for indigenous urban women in Detroit.<sup>232</sup> More recently, a study of a sample of women in metropolitan areas suggested that upward social mobility, as measured by changes in income, might be weakly associated with an orientation toward smaller families.<sup>233</sup> In the words of Freedman: "The American findings may indicate what happens in a society when mobility becomes so predictable and routine as to minimize its social and monetary costs and when the goal of the mobility is a life style which includes a moderate number of children. The fertility level of the whole society may be affected by a dominant high valuation of mobility, even if mobility differences within the society do not lead to internal fertility differentials. In a society with high mobility even the non-mobile may limit family size simply to maintain their place in the social order."<sup>234</sup>

#### (f) Urbanization

108. Students of urban development in the past have associated certain aspects of the urban environment with relatively low fertility. Park, Wirth and Redfield in turn maintained that secularization, secondary group association, increased segmentation of roles and poorly defined norms characterize urbanism as a way of life and make for lower fertility among the urban community.<sup>235</sup> More recently, other writers have suggested that such views stress unduly the secularization and disorganizational aspects of urban life.<sup>236</sup> Nevertheless it seems safe to conclude that the urban environment in the long run has been conducive to the reduction of human fertility, although in the early stages of urbanization, there is evidence of higher urban than rural fertility in certain areas.<sup>237</sup> In Western Europe and Northern America there was evidence of lower urban than rural fertility as early as the seventeenth and eighteenth centuries.<sup>238</sup> In some countries it seems that rural and urban fertility declined equally fast in the nineteenth century, while in others the

difference between town and country widened, because urban fertility at first declined more rapidly.

109. The idea that it is the "urban mentality" rather than mere residence in cities which is responsible for declining family size has been advanced by some writers as an explanation of the earlier decline in fertility in France as compared with England, although the proportion of population living in cities was much higher in England than in France. It has been suggested that, because France was more unified than England, the relationship between the people of the cities and the countryside was closer in France than in England. Thus, workers moving to English cities required more time to adjust to urban life. In England, also, a child was an economic advantage to its parents as a result of the "poor laws" and child labour. For these and other reasons, those aspects of an urban mentality which reduce fertility are believed to have spread less rapidly in England than in France. Similar reasons are given to explain why the German birth rate remained high for some time following the rapid movement of population to cities.<sup>239</sup>

#### (g) Industrialization

110. The fact that the industrialization of Western Europe and Northern America has been accompanied by a sequence of demographic changes has led many writers to conclude that industrialization has played a dominant role in past fertility declines and that populations with high fertility will experience similar declines as they come under the sway of industrialization.<sup>240</sup> Industrialization, by virtue of its comprehensiveness, in a sense encompasses all the economic and social factors reviewed above. The scientific and technological aspects of industrialization have been accompanied by substantial modifications of manpower requirements in terms of ever-rising levels of skill and this in turn has contributed to the higher levels of education and to the increased cost of raising children. Scientific and technological developments have also been largely responsible for the decline of mortality, which has often been a precondition for fertility decline in many of the industrialized countries, and the first link in the chain of demographic events known as the demographic transition.<sup>241</sup>

111. The relationship between industrialization and some of the economic and social factors associated with fertility decline has been summarized by Freedman as follows: "industrial urbanization was associated with a much more complex division of labor in all spheres of life; together with the associated high rate of social and physical mobility, this inevitably led to a growth of secularism and rationalism, the declining influence of such traditional forces as religious faith, the shattering

<sup>232</sup> Goldberg, "The fertility of two-generation urbanities" (1959), p. 219.

<sup>233</sup> Westoff *et al.*, *Family Growth in Metropolitan America* (1961), p. 247.

<sup>234</sup> Freedman, "The sociology of human fertility . . ." (1961/62), p. 60.

<sup>235</sup> Park, "The urban community as a spatial pattern . . ." (1926); Wirth, "Urbanism as a way of life" (1938), particularly pp. 20-21; Redfield, *The Folk Culture of Yucatan* (1941), pp. 187-228.

<sup>236</sup> Sjöberg, "Comparative urban sociology" (1959), pp. 341-344; Freedman, "The sociology of human fertility . . ." (1961/62), p. 57.

<sup>237</sup> Ariès, *Histoire des populations françaises . . .* (1948), pp. 368-369. Ariès argued that the sudden uprooting of the proletarian masses, who streamed into the cities, may even have arrested or reversed an established trend towards family limitation. The causes which brought about the reduction of fertility of the proletariat in large cities—a fertility originally higher than the countryside—are also discussed by Heberle, "Social factors in birth control" (1941).

<sup>238</sup> For example, in the ratio of children to women of child-bearing age the difference between agricultural and industrial states was already marked at the 1800 census of the United States. Whelpton, "Industrial development and population growth" (1928), p. 462. See also Jaffe, "Urbanization and fertility" (1942), pp. 55-57.

<sup>239</sup> Halbwachs, "Réflexions sur un équilibre démographique" (1946), pp. 299-300.

<sup>240</sup> Notestein, "The economics of population . . ." (1953), pp. 15-21; Davis, *Human Society* (1949), pp. 600-608, 615-616.

<sup>241</sup> According to demographic transition theory, the transition from high to low fertility is initiated by declining mortality followed by rapid population growth and the breakdown of traditional practices relating to fertility and to family size (see chapter III above for a fuller discussion).

of traditional family and other primary group associations, the growth of either economic individualism or the attachment of the individual to a large, impersonal, specialized organization".<sup>242</sup>

### E. Factors related to levels and trends of fertility in high-fertility areas

112. In studying the factors responsible for high fertility, demographers have found it fruitful to compare economic, social and cultural conditions between high-fertility countries and countries where fertility is now low.<sup>243</sup> In this way the relationship of fertility levels to specific economic, social and cultural variables can be investigated. As will be seen below, this approach has led to the hypothesis that for the most part the same factors which are thought to account for the decline of fertility in the low-fertility countries are, in a reverse sense, also responsible for the continued high levels of fertility in the high-fertility group. Fertility has failed to decline either because at least some of the variables have not yet changed sufficiently to produce a modification of reproductive behaviour or because they have evolved differently than in the low-fertility countries.

113. Although the factors studied in this section are essentially the same as in the previous one, it has seemed appropriate to structure the discussion differently. In conformity with some of the important research that has been done linking the cultural factors (i.e., norms, attitudes, motivations) with the structure and function of the family, these two sets of factors are reviewed simultaneously. For similar reasons, the economic, social and other factors, treated separately in the last section, have been grouped together as the complex of interrelated threshold factors which they are widely believed to be.

#### 1. CULTURAL FACTORS AND FACTORS RELATED TO FAMILY STRUCTURE AND FUNCTION

114. Two very general explanations are usually offered for high fertility in the less developed areas. "From either the individual or the social point of view, high fertility has been an adjustment both to high and variable mortality and to the central importance in community life of familial and kinship ties. In most pre-industrial societies a wide range of activities involve interdependence with kinsmen and especially with children. These include production, consumption, leisure activity, assistance in illness and old age and many other activities covered by non-familial institutions in modern societies. To simplify greatly: large numbers of children are desired if the values considered worthwhile are obtained through familial ties rather than through other social institutions. If kinship ties are very important in a society where mortality is high and variable, the number of births desired and produced will be especially high in order to insure the

survival to adulthood of the essential minimum number of children."<sup>244</sup>

115. In societies where the kinship group must fulfil a multiplicity of functions, the basis of social organization is often a corporate kinship system with emphasis on unilineal descent, whether patrilineal or matrilineal. Such kinship systems generally provide strong motivation for high fertility; numerous children are valued as contributing to the strength of the group, economically as well as militarily, and of ensuring its continued survival.<sup>245</sup> Where the nuclear family is subordinate to a wider kinship group, the burdens of parenthood are eased by the co-operation of other members of the household in caring for the young and sharing in the economic costs. Under such kinship systems, the compulsion to marry is strong. The unmarried female may be a liability for her family, while, from the standpoint of the male, marriage means at once a link with another strong family and a means of expanding his own agnatic line.<sup>246</sup>

116. Tambiah and Ryan, studying familial institutions in Ceylon, have identified certain family values which are "close to the ideological core within which this people's high fertility mores are enmeshed". One of the main values inherent in the peasant family system is kinship or the blood relationship forming a continuous link between persons. The lineal family stands above the individual; family members are expected to devote themselves to maintaining family honour and prosperity. The selection of the partner for a child is the responsibility of the parent. So far as childbearing is concerned, a large number of children contributes to the strength and prosperity of the family. Sons perpetuate the family name. Daughters, although of less importance, may also raise the family fortunes through hypergamic marriage. The limitation of family size is contrary to family mores; and fertility is an important attribute of the female. Although the female is in an inferior position to the male, as a mother she holds a commanding position and in this role is held in high esteem by her children.<sup>247</sup>

117. While it has often been argued that the extended family system is favourable to high fertility, there have been few empirical studies which attempt to assess the effects on fertility of various forms of familial organization in high-fertility societies. Several studies conducted in rural India, however, revealed that women living in nuclear families generally had somewhat higher fertility than those living in joint families, lower frequency of coitus among the latter group being possibly a contributory factor.<sup>248</sup> The Indian data were limited in scope, but even if the results prove to be more widely true among

<sup>244</sup> Freedman, "Norms for family size . . ." (1963), pp. 226-227.

<sup>245</sup> Lorimer, "The relation of kinship systems to fertility" (1954).

See also Freedman, "The sociology of human fertility . . ." (1961/62), pp. 50-51.

<sup>246</sup> Davis, "Institutional patterns favoring . . ." (1957), pp. 34-35.

<sup>247</sup> Tambiah and Ryan, "Secularization of family values in Ceylon" (1957), pp. 292-294. Similarly, among the Bantu of South Africa, high fertility is reinforced by the value placed upon daughters, who are a potential source of accumulation of wealth, and by the extended family system which provides little incentive for family limitation. [Sadie, "Opening discussion . . ." (1964), p. 146.]

<sup>248</sup> Nag, "Family type and fertility" (1967).

<sup>242</sup> Freedman, "The sociology of human fertility . . ." (1961/62), p. 56.

<sup>243</sup> Freedman, "Fertility; statement by the Moderator" (1966), p. 37.



populations in which birth control methods are little known, it is nevertheless quite possible that, once the modernization process began to take hold, the greater pressures on parents in nuclear families would lead them to a more rapid adoption of contraception.

118. In many pre-industrial societies there is considerable emphasis on the procreation of male children, in order to perpetuate the family line or to perform certain religious rites. Thus Hindu tradition demands that every family should have a son.<sup>249</sup> A recent survey of male attitudes towards family limitation in East Pakistan revealed that those males who wanted more children in fact, for the most part, really desired more sons for security in their old age, daughters being regarded by some as burdensome and costly.<sup>250</sup> The old Chinese proverb "one son is no son, two sons are an undependable son, and only three sons can be counted as a real son"<sup>251</sup> and the traditional wish addressed to an Indian bride, "Be the mother of eight sons!"<sup>252</sup> are symptomatic of the need for many extra births in order to maintain family size at an accepted level. In high-mortality societies generally, the felt need to ensure at least one surviving son is likely to imply a desired family size of at least four children and possibly more.<sup>253</sup>

119. It has been noted that large-family values tend to persist after the disappearance of the economic and social conditions responsible for them. According to Kozlov, "the complex of ideological factors which formed around the institution of the large family [became] relatively independent of the material factors which gave rise to it. As a result, the tradition of large families continues to exist even when the basic material factor underlying it—a high death rate—has ceased or is ceasing to be operative";<sup>254</sup> for Lorimer, "cultural inertia" which hampers "any rational adjustment of reproductive patterns to objective conditions . . . is the most powerful obstacle in the modern world to the rational ordering of personal behaviour influencing population trends".<sup>255</sup>

120. In many developing countries religion may have helped to sustain high fertility, although the absence of direct prohibitions against methods of family limitation other than abortion in religions such as Hinduism, Buddhism and Islam has been pointed out. In dealing with the attitudes of major religions to fertility, analysis must take into account "the beliefs and practices of the living community as well as the tenets advanced on the basis of sacred writings and traditions. It is often assumed that differences between the two mean a dilution of faith and the supervention of non-religious influences. Any such assumption should be tested, for in the application of religious principles to changing social conditions it is

quite normal to find a certain interaction, a kind of dialogue, between the community of believers and the religious heritage expounded by the teaching authorities".<sup>256</sup>

121. Some writers have taken the view that Roman Catholicism, with its strong condemnation of contraceptive devices, has tended to consolidate high fertility mores and has been a powerful factor upholding large family norms in Latin America and the Philippines. Day, however, suggests that Catholicism is not the key factor involved, but that populations currently experiencing high fertility will reduce their fertility when, and only when, their other conditions of life are conducive to it, and they will do so regardless of any church's opposition.<sup>257</sup> The Roman Catholic Church has in any case gradually modified its attitude to the procreative duty of married couples, and the concept of a prudent regulation of fertility, using approved methods, has offset to some extent the Church's pro-natalist position.<sup>258</sup>

122. Some writers believe that Moslem populations may offer a more prolonged resistance to fertility decline than other religious groups. Among the reasons they cite are the following: (a) while Moslem religious doctrine does not specifically prohibit voluntary birth limitation, the institutional pressures to have many children, especially sons, are strong; (b) the population of almost all Moslem countries consists largely of a culturally conservative peasantry, resistant to modern influences; and (c) although recent progress has been noted, the status of women is perhaps lower among Moslems than among other major religious communities.<sup>259</sup> Experience suggests that an improvement in the status of women may be one of the necessary conditions of fertility decline.

123. In studies of fertility differences among Moslem and non-Moslem groups within several developing countries it has been found that, among populations living in cities, Moslem fertility has been higher than that of non-Moslems. Such differences could not be explained solely by socio-economic factors, and it was suggested that religion appeared to play a role in influencing the speed of transition from high to low fertility. (These studies are cited in section F below.)

124. Neither Hinduism nor Buddhism contains doctrines bearing on family planning in the contemporary sense, and there is enough flexibility in both faiths for reformers to be able to put forward the case for scientific methods of family planning without offending the adherents. Nevertheless, classical Hindu teaching has a strongly pro-natalist orientation. The custom of early marriage and the high incidence of marriage among Hindus, mentioned above, have received support from the stress laid on the begetting of a son to continue the family line. In Buddhist teaching, on the other hand, procreation and family life are matters of secondary

<sup>249</sup> Kozlov, "Some causes of the high fertility . . ." (1967), p. 157.

<sup>250</sup> Ahmed, "Male attitudes . . ." (1965), p. 2.

<sup>251</sup> Quoted in Fan, "Fertility level . . ." (1965), p. 1.

<sup>252</sup> Quoted in Kozlov, "Some causes of the high fertility . . ." (1967), p. 157.

<sup>253</sup> Freedman, "The sociology of human fertility . . ." (1961/62), p. 51.

<sup>254</sup> Kozlov, "Some causes of the high fertility . . ." (1967), p. 158.

<sup>255</sup> Lorimer, *Culture and Human Fertility* . . . (1954), p. 251.

<sup>256</sup> Fagley, "Doctrines and attitudes . . ." (1967), p. 78.

<sup>257</sup> Day, "Catholic teaching and Catholic fertility" (1967), p. 250.

<sup>258</sup> Fagley, "Doctrines and attitudes . . ." (1967), p. 80.

<sup>259</sup> For a discussion of these factors, see Kirk, "Factors affecting Moslem natality" (1967). See also Seklani, "La fécondité dans les pays arabes . . ." (1960).



interest, and "... pro-natalist influences in Buddhist cultures appear to stem mainly from folk mores".<sup>260</sup>

125. Studies of attitudes to fertility and family size have been extended in recent years from low-fertility countries to a number of high-fertility countries. Such surveys are indeed an almost essential preliminary to any national plan designed to encourage family limitation. The fertility survey in Mysore undertaken jointly by the United Nations and the Government of India sought spontaneous statements designed to indicate preference regarding family size. Some respondents stressed the economic advantage of children to parents, who can count on the support of their sons and daughters in their old age. Others reported emotional satisfaction gained from large families. It was not only the personal satisfaction felt by parents that mattered, but also the prestige value of a large family in the eyes of friends and neighbours. The fear of losing children was also advanced as a reason for a large family. Some respondents gave what the study calls "irrational" reasons, such as that a person's horoscope decrees that he must have another child.<sup>261</sup>

126. Blake's study of Jamaica shows that, superimposed on the general realization of the pleasures and benefits of parenthood, is an equal awareness of the disadvantages of large families. Thus, on the one hand, children are valued in themselves and for the help they can give their parents with domestic chores, in addition to the family income and in caring for parents in old age. But, it is also recognized that frequent pregnancies constitute a great burden on the female, and that numerous children create difficulties in the way of education.<sup>262</sup>

127. The general findings about family preferences have led writers to conclude that in high-fertility societies, certain segments of the population are receptive to the ideal of small families. Hill, Stycos and Back found that the ideal family size in Puerto Rico was between two and three children, which is about the same average as that obtained earlier by Hatt; these figures are lower than the actual family size.<sup>263</sup> In Chile, women with four children or less expressed a preference for four children, while those with more than four children gave a somewhat higher level of preference, but lower than the actual size of their family.<sup>264</sup> Similar questions in the United Nations Mysore study elicited responses of ideal families averag-

ing between 3.6 and 3.8 among urban married women, and a higher level (4.7) among women in rural areas. These ideal sizes fall considerably short of the actual number of children these women had, and the survey suggests that in many cases the ideal size represents the number of surviving rather than live-born children.<sup>265</sup> Data from a 1962 survey of married women in Taichung City, Taiwan (China) showed a strong preference for a moderate number of children. About 60 per cent of the wives in their thirties wanted between three and four children, while only about 10 per cent wanted at least six. As family size increased, a higher proportion of respondents declared that they had more children than they wanted.<sup>266</sup>

128. The low state of technology and the general unfamiliarity of the population of high-fertility countries with all types of contraception undoubtedly militate against fertility reduction. Nevertheless the evidence now available does not support the view that high-fertility countries would already have adopted family limitation, were it not for the lack of the necessary information and supplies. On the contrary, there is some evidence that large-scale effective use of contraceptives does not by any means automatically follow when they are made available. Furthermore, many observers have expressed the opinion that there is considerable ambivalence about professed small- and moderate-sized family values,<sup>267</sup> and others have commented upon the apparent lack of strong motivation towards the achievement of expressed desires to limit family size.<sup>268</sup> Most scholars agree that some social and economic development is a necessary condition for the widespread adoption of family limitation in high-fertility countries.<sup>269</sup> The social and economic factors are discussed in the following subsection.

<sup>265</sup> United Nations, *The Mysore Population Study ...* (1961), p. 140.

<sup>266</sup> Freedman, Takeshita and Sun, "Fertility and family planning in Taiwan ..." (1964), pp. 18-19.

<sup>267</sup> For example, Hill, Stycos and Back, after an extensive analysis of the consistency of response in their Puerto Rican survey data, conclude that "the expressed preference of so many Puerto Ricans for a moderate sized family probably conceals a great deal of ambivalence ..." [Hill, Stycos and Back, *The Family and Population Control ...* (1959), p. 81]. See also Freedman, "The sociology of human fertility ..." (1961/62), p. 47.

<sup>268</sup> Sauvy and Coale among others have commented upon the high degree of motivation required for the successful use of the classical methods of birth control, and doubt that their use could be mastered by populations which have not yet crossed the critical economic and cultural threshold beyond which the wish to control fertility becomes strong enough to have a significant effect on reproductive behaviour. They point out that, because of the requirement of careful adherence to the calendar, the use-effectiveness of the pill, one of the new and less demanding methods, has sometimes been disappointing in less developed countries. The authors agree that the IUD, on the other hand, requires minimal motivation. [Sauvy, *Théorie générale de la population ...* (1966), vol. 2, pp. 213, 225, 230-231; and his *De Malibus à Mao Tsé-Toung* (1958), pp. 212-215; Coale, "The voluntary control ..." (1967), pp. 166-169.] In line with these views are the findings of Stycos and Back in Jamaica that family size attitudes, although generally favourable to the small family, are characterized by "lack of intensity". [Stycos and Back, *Prospects for Fertility Reduction ...* (1957), pp. 11, 14.]

<sup>269</sup> Freedman, "Fertility; statement by the Moderator" (1966), p. 45.

<sup>260</sup> Fagley, "Doctrines and attitudes ..." (1967), pp. 78-79.

<sup>261</sup> United Nations, *The Mysore Population Study ...* (1961), pp. 145-146. An example of how astrological beliefs may influence fertility behaviour even in a modernized society where fertility is already low is seen in the case of Japan, where the birth rate was temporarily depressed in 1966, "the year of the fiery horse" (which occurs only once in every sixty years), considered to be inauspicious for the birth of girl babies. The crude birth rate declined from 18.6 in 1965 to 13.7 in 1966 and then rose again to 19.3 in 1967. The low crude birth rate in 1966 has been attributed in part to early and late birth registrations, as well as to fewer births. See Biraben, "L'année 'Cheval et Feu'" (1968); and his "Quelques précisions sur l'année 'Cheval et Feu'" (1969).

<sup>262</sup> Blake, *Family Structure in Jamaica ...* (1961), pp. 184 ff.

<sup>263</sup> Hill, Stycos and Back, *The Family and Population Control ...* (1959), pp. 71-73; Hatt, *Backgrounds of Human Fertility in Puerto Rico* (1952), p. 53.

<sup>264</sup> Tabah and Samuel, "Preliminary findings of a survey ..." (1962), p. 290.

## 2. ECONOMIC, SOCIAL AND OTHER FACTORS

129. A chapter in a recent United Nations study of fertility is devoted to an examination of the relationships between levels of fertility, as measured by the gross reproduction rate in different countries of both high and low fertility, and the various indicators of the degree of their economic and social development. The twelve indicators chosen for the purpose were income *per capita* energy consumption *per capita*, degree of urbanization, proportion of economically active males employed in non-agricultural activities, hospital beds per 1,000 population, life expectancy, infant mortality rate, proportion of women married (legally or consensually) in the 15-19 age group, female literacy rate, newspaper circulation per 1,000 population, radio receivers per 1,000 population, and cinema attendance. For each of these twelve indicators, the average values of the high-fertility group of countries differ greatly from those of the low-fertility group. Moreover, there is for each indicator a wide gap between the average values for the highest fertility countries in the low-fertility group and the lowest fertility countries in the high-fertility group.<sup>270</sup>

130. Within the high-fertility group, as also within the low-fertility group, the differences in average values of each indicator according to particular levels of fertility are relatively small and of doubtful statistical significance. Nevertheless for the former group, but *not* within the low-fertility group, there does exist some association between fertility and the whole complex of indicators, as can be seen from table IV.9 where the consistency of the

patterns of variation of the indicator averages from one level of fertility to another within the high-fertility group is clear. With few exceptions, the higher the gross reproduction rate, the lower is the average degree of economic and social development as measured by the various indicators. The possible inferences from the data in this table are either that the countries of the very highest fertility are on that account at a disadvantage in development, or that a very low level of development is conducive to exceptionally high fertility.<sup>271</sup>

131. According to the "threshold" hypothesis, improving economic and social conditions are unlikely to have much effect on initially high fertility in a developing country until a certain economic and social level is attained; but once that level is achieved, fertility is likely to enter a decided decline and to be ultimately stabilized at a much lower level.<sup>272</sup> Statistical analysis of the values of the indicators for both high- and low-fertility countries, according to the United Nations report, "brought out some reasons for believing that the levels reached in indicators pertaining to means of communication, health and education may be more pertinent [to the fertility rate] than the levels of the other indicators in this respect. But for any of the indicators, there is obviously nothing immutable about the values that would correspond to such a threshold of declining fertility; these values could be greatly changed under the influence of changing conditions in the world".<sup>273</sup>

132. In this context it is useful to examine the levels of certain economic and social indicators in several countries where recent fertility declines have brought birth rates

<sup>270</sup> United Nations, *Population Bulletin* ... (1965), pp. 134-151. For the results of a multiple correlation analysis of age-specific birth rates, income per head, an index of education, and population density, see Adelman, "An econometric analysis ..." (1963).

<sup>271</sup> United Nations, *Population Bulletin* ... (1965), p. 142.

<sup>272</sup> *Ibid.*, p. 143.

<sup>273</sup> *Ibid.*, p. 150.

TABLE IV.9. UNWEIGHTED AVERAGE OF SOCIAL AND ECONOMIC INDICATORS IN HIGH-FERTILITY COUNTRIES ACCORDING TO LEVEL OF THE GROSS REPRODUCTION RATE

	Range of gross reproduction rate		
	2.00-2.49	2.50-3.09	3.10 and above
Number of countries .....	13	38	34
Economic indicators:			
Income per head (\$US) .....	223	166	154
Energy consumption per head (in equivalent kilograms of coal) .....	486	343	328
Percentage of population in localities of 20,000 or more inhabitants .....	33.0	16.9	12.8
Percentage of economically active males in non-agricultural employment .....	50	39	30
Social indicators:			
Hospital beds (per 1,000 population) .....	4.6	2.7	2.2
Life expectancy at birth (years) .....	46.5	50.8	47.1
Infant mortality (per 1,000 live births) .....	124	104	134
Percentage of women married in 15-19 age group .....	23.5	28.5	29.2
Percentage literate among females 15 years of age and over .....	40.8	31.6	29.5
Newspaper circulation (per 1,000 population per year) ....	56	33	26
Radio receivers (per 1,000 population) .....	42	34	23
Cinema attendance (per person per year) .....	6	4	4

SOURCE: United Nations, *Population Bulletin* ... (1965), tables 9.2, 9.3, and 9.4.

down to the low 30s or below. These countries include China (Taiwan), Singapore, Puerto Rico and Chile (see section A above). Each of these countries can claim some economic and social characteristics which are more common among the low-fertility group of countries than among those of high fertility. In Taiwan infant mortality is lower than in Southern Europe, and the indicators pertaining to education and means of communication are also comparable with those of a number of Southern European countries. Singapore is highly urbanized and a very small proportion of the country's population is employed in agriculture; the income, newspaper circulation, radio receiver and cinema attendance indicators are also relatively high and the infant mortality indicator relatively low. Puerto Rico shows a moderately high level of social and economic development in relation to all twelve indicators, and this is also true of Chile except for the life expectancy, infant mortality and cinema attendance indicators.<sup>274</sup> There is strong evidence which illustrates the widespread desire for family limitation in these four countries.<sup>275</sup>

133. The formulation of the threshold hypothesis reflects the widely shared belief that the same hypothetical economic and social factors reviewed in the previous section as responsible for past reductions of fertility in low-fertility countries have relevance also in explaining fertility levels in high-fertility countries. The combined effect of changes in these economic and social factors, which are overlapping aspects of what is variously referred to as economic and social development, modernization and industrialization, brings about changes in family size norms and in motivation for family limitation. In many of the high-fertility areas of the world this process has not advanced very far, with the consequence that the pre-industrial family structure remains essentially intact and changes in family size motivation are minimal. Children do not become less of an economic asset and more of an economic burden until changes such as the following occur: (a) declining mortality increases family size because a larger proportion of children born survive to adulthood; (b) improved education and new economic opportunities stimulate parental aspirations which conflict with large-family values; (c) extended family ties are weakened as a result of far-reaching social and economic change, thereby increasing the burdens of child-rearing for the nuclear family; and (d) ever-larger segments of the population are exposed to new ideas and influences—for example with respect to leisure-time activities, relations between spouses, parental responsibilities towards children, and birth control methods—which directly or indirectly tend to modify reproductive behaviour.

134. There is much less agreement as to the requisite mixture of the relevant social and economic factors and even as to whether the same combination of factors can be expected to be equally effective in all populations despite cultural variations. It is widely recognized, how-

ever, that many circumstances in the high-fertility countries today are different from what they were before the onset of falling fertility in the low-fertility countries, and the significance of these differences for fertility change is not known. On the one hand are the developments in birth control technology making available at low cost new, mostly female, methods of contraception which require less motivation for effective use than the older methods, and the very knowledge that family planning is a reality in the more advanced countries. On the other hand, rapid urbanization in many developing countries stems more from a rural exodus generated by agricultural overpopulation than from economic expansion and the transformation of industrial and occupational structure.<sup>276</sup> Furthermore, many aspects of economic and social development have an exogenous character in that they are based on modern techniques borrowed from the industrialized countries and superimposed on traditional institutions.<sup>277</sup> As a consequence of such differences, it cannot be taken for granted either that the economic and social factors will have precisely the same effect in modifying motivational patterns in today's situation, or that the same degree of motivational change will be required.

135. Some writers have noted a tendency for rapid economic development in developing countries to be associated in the short run with increasing fertility. In Latin America, for instance, it has been suggested that the *direct* effect of economic development on fertility is positive, because married couples become more optimistic about their future economic status, but that in the long run the forces depressing fertility tend to be stronger than the forces making for an increase in fertility unless the increase in *per capita* income continues at a high rate.<sup>278</sup> In a rather different context there also appears to be a positive association between economic development and fertility in the Sudan, in so far as the settled and relatively prosperous population of the Gezira Scheme area has a higher fertility than the predominantly nomadic and less prosperous populations of other provinces of the same country. It seems possible however that the low fertility of the Sudanese nomads may be due in part to relatively low marriage rates, high marital instability, high frequency of venereal disease and numerous miscarriages.<sup>279</sup>

#### F. Recent and current fertility differentials within countries

136. Extensive reference has been made in the preceding two sections to differential fertility as a method for investigating those social and economic factors which account for past fertility declines in countries of low fertility as well as those which explain current levels of fertility in high-fertility areas. Although some of the

<sup>274</sup> United Nations, *Population Bulletin* ... (1965), pp. 138-140.

<sup>275</sup> See Keeny, "Korea and Taiwan ..." (1966), p. 3; Lim, "Malaysia and Singapore" (1966), p. 90; Hill, Stycos and Back, *The Family and Population Control* ... (1959), p. 187; Tabah and Samuel, "Preliminary findings of a survey ..." (1962), pp. 303-304; Romero, "Chile" (1966), pp. 243-245.

<sup>276</sup> Freedman, "Fertility; statement by the Moderator" (1966), p. 41; United Nations, *Report on the World Social Situation, 1957* (1957), pp. 123 ff.

<sup>277</sup> Germani, *Política y sociedad en una época de transición* ... (1962), pp. 98-109.

<sup>278</sup> Heer and Turner, "Areal differences in Latin American fertility" (1965), p. 290.

<sup>279</sup> Henin, "Some aspects of the effects ..." (1965), p. 7.

factors examined above are identical with the differential characteristics of the present section, the previous discussion explored the causal mechanism of each factor, whereas the present section is concerned more with the statistical evidence for the association between each factor and levels, or changes of level, of fertility.

137. The study of differential fertility has found widespread use as a means of forecasting fertility trends in high-fertility countries, where emerging differences in fertility levels among population groups displaying certain economic and social characteristics (namely, those which have already been established as being related to lowered fertility levels in industrialized countries) may signal an imminent fertility decline. The study of fertility differences is also useful in assessing the factors and prospects of change in the composition of a population in respect to its ethnic, religious and linguistic sub-groups. Eugenists and some analysts of social problems, especially in Anglo-Saxon countries, have been concerned with the implications for population quality of the widening fertility differential according to socio-economic status during the course of decreasing fertility, and have followed trends for signs of a contraction and even a reversal of the customary inverse association between fertility and socio-economic status. According to this point of view, the inverse association signifies that those most qualified (either in genetic terms or in terms of financial and other resources) to raise children were having the fewest and those least qualified were having the most.<sup>280</sup>

138. Generalizations based on international comparisons—so often fraught with difficulties because of incomparabilities in the data—are more than usually subject to qualifications and reservations in the case of differential fertility because of the diversity of interests of scholars working in this area. Conclusions frequently have to be drawn on the basis of not completely comparable differentials, for example, differentials referring to women of completed fertility compared with those for women of still incomplete fertility, or differentials referring to all women in a given age group compared with differentials for married women only or for women of a specified marriage cohort. Although these various forms of expressing the differentials are all legitimate research tools adapted to the special interests of the individual investigator, it cannot be taken for granted that they can be used interchangeably without affecting the validity of the generalizations being made.

## 1. URBAN-RURAL DIFFERENCES

139. The difference between urban and rural fertility in Western European countries became progressively larger during the period of fertility decline, but narrowed during the period of recovery following the Second World War.<sup>281</sup> Opposing trends were observed in some

Eastern European countries and the USSR. In Poland and the USSR, for example, the differential appears to have widened during the 1950s, but in Hungary the long-standing differential between urban and rural areas appears to have been reduced in that decade.<sup>282</sup> In the United States the gap between urban and rural fertility, which showed little change between 1920 and 1940, decreased decidedly thereafter.<sup>283</sup> In Japan in 1960, rural fertility exceeded urban fertility by 20 per cent among ever-married women 35 years old and over. It has been suggested, however, that the differential may eventually disappear with the growing sophistication of both the rural and the urban populations in successful contraceptive practice.<sup>284</sup>

140. Not only is an urban-rural differential common in low-fertility countries, but there also tends to be an inverse relationship between fertility and size of community. Thus, in the United States in 1957, the number of children ever born per 1,000 ever-married women aged 15-44 (distribution standardized for age) ranged from 1,820 for urban areas containing over 3,000,000 inhabitants, to 2,128 for urban areas of under 250,000 inhabitants, and with higher figures for the smaller urban areas and for rural areas.<sup>285</sup> Similar differentials have also been found in other low-fertility countries. In Japan and the USSR, for example, it was found that the larger the size of the community, the lower the fertility.<sup>286</sup>

141. Census and other data permit a comparison of rural and urban fertility in only a few countries of high fertility. In Latin America, child-woman ratios<sup>287</sup> and figures of average numbers of children born per woman of completed fertility show that rural fertility is universally higher than urban fertility in the region. In India and Jordan, however, there is very little difference between urban and rural fertility, but in Ceylon, the Philippines, Thailand and China (Taiwan) there is a substantial differential, rural fertility being in all cases the higher.<sup>288</sup>

<sup>282</sup> *Ibid.*, p. 126; Kiser, "Social, economic and religious factors . . ." (1967), pp. 219-220; Good, "Some aspects of fertility change in Hungary" (1964), pp. 162-163. In Bulgaria, a pronounced urban-rural fertility differential was found as early as 1899-1902, when the crude birth rate in cities was 32 as compared with 42 in the villages, and 41 in the country as a whole. Danailov, *Izsledvaniya vurkhu demografiyata na Bulgaria* (1931), p. 274.

<sup>283</sup> Kiser, "Differential fertility in the United States" (1960), pp. 78-87.

<sup>284</sup> Kimura, "Current fertility patterns in Japan" (1967), p. 217.

<sup>285</sup> Kiser, "Fertility rates by residence and migration" (1959), p. 274; also Ruggles and Ruggles, "Differential fertility . . ." (1960), pp. 183-185.

<sup>286</sup> Japan, Bureau of Statistics, *Nihon no jinko, 1960 . . .* (1963), table 23; Kono, *Shusse ryoku ni oyobosu shakai . . .* (1967), table 2; Volkov, "Zadachi i metody . . ." (1967), p. 254.

<sup>287</sup> Here defined as the number of children aged 5-9 years per 1,000 women aged 20-49. The child-woman ratio is an imperfect tool for the study of fertility differentials, as it is affected by differential infant and child mortality as well as by differential completeness of enumeration of the child population. More particularly, when used to study differences between urban and rural fertility, the ratio may also distort the rural-urban fertility differential because of age-selective migration from rural to urban areas. Carleton found, however, in his analysis of data for Latin American countries, that the bias of the urban child-woman ratio due to age-selective migration proved to be small. [Carleton, "Fertility trends . . ." (1965), pp. 18-20.]

<sup>288</sup> United Nations, *Population Bulletin . . .* (1965), pp. 131-133.

<sup>280</sup> For a description of this "evaluative" approach to differential fertility, see Westoff, "The changing focus of differential fertility research . . ." (1953), pp. 25-26; also Moore, "Sociology and demography" (1959), p. 849. The eugenicist view is frequently expressed in the issues of *Eugenics Review* (London) or *Eugenics Quarterly* (New York).

<sup>281</sup> United Nations, *Population Bulletin . . .* (1965), p. 124.

Although data on rural-urban fertility levels are available for a number of African countries, the quality of the data is such that even the direction of the differential cannot in all cases be accepted with certainty. Sample survey data which permit a comparison of the fertility level in the capital cities with that in the rural areas show no consistent pattern in the differential. Urban fertility, which was lower in Mali, Guinea and Togo, was higher in Upper Volta, the People's Republic of the Congo and Gabon, while in Chad, Senegal and Madagascar, urban and rural fertility levels were about the same.<sup>289</sup> In the United Arab Republic, recent census and vital statistics data point to higher urban than rural fertility.<sup>290</sup>

142. The contrast between the consistently lower urban than rural fertility in Latin America and the absence of any differential pattern in either Asia or Africa has been noted by Carleton who relates it to some of the different aspects urbanization assumes in these regions. Internal migration is predominantly female in Latin America and the urban centres generally have a highly unbalanced sex ratio (with the consequence that urban women marry later on the average and a larger proportion never marry at all); in Africa and Asia, on the other hand, the pattern is usually just the reverse, with males predominating in the cities. Furthermore, in many of the cities of Africa and Asia, women's roles are structured in such a way that they are less exposed to many of the influences thought to be important in lowering fertility. For example, tradition often does not sanction the employment of women outside the home and certain kinds of work that are customarily undertaken by women in Latin America (e.g. domestic service) are performed by men.<sup>291</sup>

## 2. EDUCATIONAL STATUS

143. In low-fertility countries there is generally an inverse relationship between fertility and education of the parents, but the magnitude of the differential has diminished in recent decades, and a direct relationship has even been observed at the highest educational levels in a few countries.<sup>292</sup> In the United States, according to Kiser, "The differentials in fertility rates by education . . . were still strong in 1960 although they lessened somewhat over the previous decade. Although the relative increase in fertility of the ever-married college graduates tended to be larger than that of women of lower educational attainment, the college graduates still had the lowest fertility rates at all ages. The ever-married white women whose education was limited to elementary school were

of conspicuously high fertility".<sup>293</sup> Another writer, also basing his analysis on 1960 census data, has found support for the hypothesis that in the United States, education of the wife has a stronger inverse relationship to fertility than education of the husband.<sup>294</sup> In view of the close relationship between educational status and other socio-economic characteristics of population groups, the relationship between education and fertility was studied in isolation from the other characteristics in an analysis of 1940 census data for the United States. It was found that an inverse relationship between education and family size was not always present at the highest education levels.<sup>295</sup>

144. In Europe the relationship between fertility and education is not systematic. In Sweden, the Netherlands, and the United Kingdom (England and Wales), the fertility of the better-educated is above the average levels in their respective populations. This positive relationship at the highest educational levels, however, is of comparatively recent origin. In the Netherlands, for instance, according to data from the 1947 census, the ratio of university graduates' fertility to national fertility increased from 77 for marriages contracted in 1914-1918 to 102 for those originating in 1939-1943.<sup>296</sup> Again, in the Federal Republic of Germany, for married women aged 45 and over, the mean number of children ever born per married woman was inversely associated with educational status all the way through the educational scale, according to a survey undertaken in 1958, but, for younger married women, the relationship between educational background and both past fertility and expected fertility was "U"-shaped, the highest fertility levels relating to those with the most education and the least education.<sup>297</sup> Breznik found a strong inverse relation between level of education and fertility in Yugoslavia.<sup>298</sup> Another study in that country showed that of three socio-economic indicators examined (*per capita* income, degree of urbanization and level of education), fertility was most closely associated with level of education.<sup>299</sup>

145. At least three intermediate variables are involved in the relationship between educational attainment and fertility: age at marriage, frequency of marriage, and use of contraception. Examining American nuptiality,

<sup>289</sup> Kiser, "Social, economic and religious factors . . ." (1967), p. 222.

<sup>294</sup> Dinkel, "Education and fertility in the United States" (1965).

<sup>295</sup> Ruggles and Ruggles, "Differential fertility . . ." (1960), pp. 169 ff. In comparing the family size of women who had completed four years of high school with the family size of college women, a positive relation between education and family size was found among women whose husbands earned \$5,000 or more. When the husband's occupation was held constant, a similar direct relation between education and family size appeared in the comparison of four-year high school women with college women for all occupational groups except for women married to professional men. The traditional inverse relationship between education and family size was observed at lower educational levels.

<sup>296</sup> Johnson, "Differential fertility in European countries" (1960), pp. 50-55.

<sup>297</sup> Freedman, Baumert and Bolte, "Expected family size . . ." (1959), pp. 145, 148.

<sup>298</sup> Breznik, "Diferencijalni fertilitet stanovništva Jugoslavije . . ." (1959).

<sup>299</sup> Rašević, "Neki socio-ekonomski faktori kao determinante . . ." (1965).

<sup>289</sup> Cohen, *Fécondité: facteurs* (1967), pp. 21, 26. A study of fertility among an urban Bantu community found a distinct, although slight, inverse relation between length of urban residence and fertility. Badenhorst and Unterhalter, "A study of fertility in . . ." (1961), p. 81.

<sup>290</sup> Zikry, "Fertility differentials . . ." (1965). See also El-Badry, "Trends in the components of population growth . . ." (1965), p. 144.

<sup>291</sup> Carleton, *Crecimiento de la población . . .* (1966), p. 33; United Nations, *Report on the World Social Situation, 1957* (1957), pp. 118-120.

<sup>292</sup> United Nations, *Population Bulletin . . .* (1965), pp. 122-123, 127-128.

Tietze and Lauriat found that for 1940 and 1950 the highest ages at marriage occurred in the extremes of the range of education, that is, among persons with no schooling and among those with four or more years of university education.<sup>300</sup> Also in 1940 the proportion of women married between ages 20 and 49 generally decreased with educational attainment. But this pattern was much less noticeable in the data for 1950.<sup>301</sup> The relationship between education and receptivity to the use of contraception is illustrated by the case of Protestants in the United States. "Eighty-five per cent of college-educated Protestant wives approved [of family limitation] wholeheartedly, and none disapproved under all circumstances. On the other hand, only 50 per cent of the Protestant women with a grade school education approved completely, and 4 per cent were strongly opposed".<sup>302</sup>

146. In Japan, too, a partial explanation of fertility differentials, both with regard to urban-rural residence and educational attainment, appears to relate to the degree of practice of birth control. According to surveys conducted in that country, 54 per cent of couples practised contraception when the husband had more than 13 years of schooling, but only 38 per cent when the husband had been at school for nine years or less.<sup>303</sup>

147. Data for the study of differential fertility according to educational attainment of the husband or wife are available in only a small number of high-fertility countries. For the United Arab Republic, 1960 census data show an inverse relationship between educational attainment of women and their fertility, the lower fertility of the well-educated married women being due in part to a later age at marriage and in part, almost certainly, to a greater utilization of contraception.<sup>304</sup> In Bangalore City, India, women with high school or university education were found to have fewer children, on the average, than women of lesser educational attainment. The differential was much reduced, however, when the data were standardized by duration of marriage and age at marriage. The lower fertility of the more highly educated women thus appears to result partly from their later age at marriage, and partly from attempts to limit family size, with the former factor seemingly the more important.<sup>305</sup> In Taichung in China (Taiwan), however, the inverse relationship applied throughout the educational scale for married women aged 35-39 years. According to a survey conducted in 1962, wives with no education had an average of 5.7 live births and those of the highest educational status had only 3.6. Education was positively associated with use of family limitation methods.<sup>306</sup> Similar findings emerged from a

survey undertaken in Greater Santiago in Chile in 1959, where women in the 35-50 age group who had received no schooling at all, or only one year of primary education, had an average of 4.41 live births, while women with at least four years of higher education had an average of 2.36 live births.<sup>307</sup>

### 3. ECONOMIC STATUS GROUPS

148. Many studies have found an inverse relation between economic status, as measured by income or some other criterion, and fertility, but there is evidence that this traditional differential has been undergoing substantial change. In a study based on 1935 data for the United States, Kiser found that, except for the lowest income groups, there was no well-established inverse relation between level of income and fertility among urban native white women, though the inverse relationship did apply to foreign-born white women and was strongest among non-white women.<sup>308</sup> A 1952 survey found an inverse relationship between fertility and husband's income for non-farm women aged 45 years and over, but not for younger women.<sup>309</sup> In a study among women of completed fertility in Detroit, Goldberg found no significant relationship between income and fertility among the indigenous urban women, though an inverse relationship existed among the rural migrants.<sup>310</sup> Freedman and Slesinger's analysis of data for white non-farm women in the reproductive ages showed no negative relationship between income and fertility among the indigenous non-farm couples, while for farm migrants there was a substantial inverse association.<sup>311</sup>

149. Rental value of the dwelling unit has also been used as a measure of economic status for studying fertility differentials in the United States. The Indianapolis Study revealed a strong inverse relationship between this measure and fertility, except that at the upper rental values, a direct relationship appeared; that is, after a rent in excess of \$60 per month, an advance in rent was associated with a rise in fertility.<sup>312</sup> Such an obverse "J" curve has been observed for the United States as a whole.<sup>313</sup>

<sup>307</sup> Tabah and Samuel, "Preliminary findings of a survey . . ." (1962), p. 280.

<sup>308</sup> Kiser, "Birth rates and socio-economic attributes in 1935" (1939), pp. 146-151.

<sup>309</sup> Grabill, Kiser and Whelpton, *The Fertility of American Women* (1958), pp. 276-277.

<sup>310</sup> Goldberg, "The fertility of two-generation urbanites" (1959), pp. 217-218. The author suggested that it was the fertility behaviour of the rural migrant families and their disproportionate representation in the lower status groups that produced the negative association of income and fertility found in many studies of urban fertility differentials.

<sup>311</sup> Freedman and Slesinger, "Fertility differentials for the indigenous . . ." (1961). The authors indicate that, with increasing urbanization, the negative correlation between income and fertility may disappear, possibly to be replaced by a small positive correlation.

<sup>312</sup> Whelpton and Kiser, *Social and Psychological . . .* (1946), vol. 1, pp. 20 ff.

<sup>313</sup> Grabill, Kiser and Whelpton, *The Fertility of American Women* (1958), pp. 274-277.

<sup>300</sup> Tietze and Lauriat, "Age at marriage . . ." (1955), p. 164.

<sup>301</sup> Grabill, Kiser and Whelpton, *The Fertility of American Women* (1958), pp. 184-188.

<sup>302</sup> Freedman, Whelpton and Campbell, *Family Planning, Sterility and Population Growth* (1959), p. 165.

<sup>303</sup> Population Problems Research Council, *Fifth Public Opinion Survey . . .* (1959), p. 19. For earlier data on this subject, see Honda, *A Survey of Spread of Birth Control* (1953); and Okasaki, *A Fertility Survey in Japan of 1952* (1953).

<sup>304</sup> Zikry, "Fertility differentials . . ." (1965), pp. 3-4.

<sup>305</sup> United Nations, *The Mysore Population Study . . .* (1961), pp. 121-123.

<sup>306</sup> Freedman, Takeshita and Sun, "Fertility and family planning in Taiwan . . ." (1964), pp. 22-25.



150. In Europe, several studies in the 1930s also revealed the inverse relationship between income and fertility. For example, in a family budget survey carried out in the Soviet Union in 1934, Strumilin found a clear inverse association between monthly income and the number of births.<sup>314</sup> Several studies reported a narrowing of the differences between the fertility of the population in different economic quarters of big cities.<sup>315</sup> Other inquiries, however, showed no diminution of differentials.<sup>316</sup> In certain of these studies it was found that fertility did not show a continuous decline with rising economic status. Thus, though the birth rate in very poor districts was usually higher than in other districts, there was no decrease in fertility after a given level of prosperity was reached. Some studies showed that the wealthiest districts had more children than those districts next below them in the economic scale. From a study conducted in twenty villages in southern Poland in 1948 linking the size of peasant holdings with the number of children in the family, Stys concluded that rich peasants had much larger families than poorer ones.<sup>317</sup> Among those who had matriculated in Sweden, fertility was generally found to vary positively with level of income, though fertility rates were lower in the very highest income class than the class immediately belows.<sup>318</sup> Data for the non-agricultural population in the Federal Republic of Germany, based on a 1962 sample survey, revealed a positive correlation between income of husband and family size. This correlation, which was most evident in the cities, diminished in strength with decreasing size of community. In view of this observed relation between income and size of family, Schwarz has suggested that increased income may lead to larger families in the future, since modern man is able, through contraception, to adapt his family size ideal to his material situation.<sup>319</sup>

<sup>314</sup> Strumilin, *Problemy ekonomiki truda* (1957), chap. 5. This study, which distinguished between recent migrants from rural areas and long-term urban residents, found that income appeared to be the decisive factor, since low-income long-term urban residents had higher fertility than high-income newcomers from villages.

<sup>315</sup> Wolf, *Die neue Sexualmoral* ... (1928), pp. 40-60; Hersch, "Situation sociale et natalité ..." (1932); Innes, *Class Fertility Trends* ... (1938), chap. 2; Spengler, *France Faces Depopulation* (1938), pp. 98-100; Glass, *Population Policies and Movements in Europe* (1940), pp. 72 ff.; Stevenson, "Some aspects of fertility ..." (1942).

<sup>316</sup> Zanten and van den Brink, "Population phenomena in Amsterdam" (1938), pp. 43-45; Martin, "Studies in the declining birth rate ..." (1937).

<sup>317</sup> Stys, "The influence of economic conditions ..." (1957), p. 136. Other authors, however, have found size of holding to be an unsatisfactory indicator of economic level. For example, a study which examined the relation between size of holding, income and family size of Polish peasants found only a small positive correlation between the first two variables, but a clear inverse correlation between the latter two. See Chojnacka, *Konsumpcja żywności w rodzinach rolniczych* ... (1963), pp. 20-27.

<sup>318</sup> Moberg, "Marital status and family size ..." (1950), pp. 124-125.

<sup>319</sup> Schwarz, "Nombre d'enfants suivant le milieu ..." (1965), pp. 87-88, 91. See also Witt, "Differential fertility" (1966), p. 4. In commenting on the 1962 survey data, Witt argues that the relevant factor that ought to be used is not the absolute amount of income, but "the deviation of personal income from profession specific norms ...".

151. Occupation, especially of the husband, has been probably the most widely utilized index of socio-economic status in the study of fertility differentials. Changes in occupational distribution of the population of industrially advanced countries have accompanied the general declines in fertility. Relatively high fertility has been associated with the primary industries, particularly agriculture and mining, while lower rates of fertility have been associated with the professional classes, white-collar workers, and urban industrial workers.

152. During periods of declining fertility, the extent to which different occupational groups participate in the decline often varies within a country, and from one country to another.<sup>320</sup> Data from the 1911 census of England and Wales and the 1946 family census permit a systematic analysis of the relationship between occupation and fertility for cohorts married in the last decades of the nineteenth century up to the 1920-1924 marriage cohort. These data clearly show the inverse relationship between fertility and social status categories based on occupation, although there are some important exceptions to the pattern in the 1946 family census data. As fertility declined steadily among wives of both non-manual and manual workers, the gap between these two broad groups increased in the latter part of the nineteenth century, but became stabilized some time around the turn of the century, with the excess fertility of the manual group remaining relatively constant at about 40 per cent.<sup>321</sup> In Japan, the decline in fertility which has taken place since 1920, and particularly since the end of the Second World War, has affected all occupational categories. While data on completed fertility suggest that there may have been some widening of the gap between occupational groups in the early period of the decline, the differential has since narrowed, and recent fertility surveys indicate a trend towards convergence.<sup>322</sup>

153. In the United States, available evidence suggests that there was a widening of the fertility differential by occupation in the early years of this century, followed by a narrowing, as a result of greater decline among the lower socio-economic classes. After the Second World War, the gap narrowed further owing to the relatively greater increases in fertility among the upper socio-economic classes.<sup>323</sup> In Hungary, the historically higher fertility of the agricultural, as compared to the non-agricultural, population has actually been reversed. The fertility of farm women was 30 to 40 per cent higher than that of non-farm women before the First World War, and

<sup>320</sup> For a discussion of changes in fertility according to occupational status in selected European countries, see Johnson, "Differential fertility in European countries" (1960), pp. 55-60.

<sup>321</sup> United Kingdom, General Register Office, *Fertility of Marriage* (1923); Glass and Grebenik, *The Trend and Pattern* ... (1954), part I, pp. 106-111.

<sup>322</sup> Aoki and Nakano, *Dai 1-4-ji shussanryoku chosa kekka no yoyaku* (1967), p. 10; Kimura, "Current fertility patterns in Japan" (1967).

<sup>323</sup> Kiser, "Social, economic and religious factors ..." (1967), p. 221; Grabill, Kiser and Whelpton, *The Fertility of American Women* (1958), pp. 181-182.



as much as one-half to two-thirds higher in the interwar period. By the late 1940s this difference had disappeared, and by 1962-1963 the fertility of non-farm women was more than 25 per cent higher than that of farm women. The latter trend, however, was believed to be temporary.<sup>324</sup>

154. Direct information on the relationship between fertility and either economic or occupational status is very limited for high-fertility countries, and can usually be found only in special demographic surveys covering portions of a country which may not be typical of the whole. Census data for the United Arab Republic on family size by duration of marriage and husband's occupation indicate an inverse relationship between socio-economic status and family size in urban areas and a positive relationship in rural areas. It has been suggested that deferment of marriage among agricultural labourers in rural areas may be a factor contributing to the latter pattern;<sup>325</sup> however, the data were not standardized by age at marriage to test this hypothesis. For India, National Sample Survey data show no clear differentials in fertility among the four broad caste groups of Hindus at selected years after marriage.<sup>326</sup> However, in studies of Uttar Pradesh, Sinha found a distinct negative association between income and fertility, and Rele also found that among women married for more than fifteen years there was a negative relationship between social class and level of fertility, but considered that this differential might be associated with differential rates of widow remarriage.<sup>327</sup> From the Mysore Study it appears that, in rural areas, the higher the economic status (measured in terms of type of house) the larger the size of the family, but this is not conclusive since no such relationship characterizes the fertility pattern of Bangalore City.<sup>328</sup> Analysis of a demographic survey taken in Morocco in 1962 showed that the wives of professional men had the smallest completed family size with an average of 5.0 children, and the wives of merchants and retailers the largest with an average of 6.2 children, the corresponding figures for the population in agricultural and artisanal occupations being 5.5 and 5.4, respectively. Here the spread is not great and there does not appear to be a definitive inverse relationship between economic status and fertility.<sup>329</sup>

## 5. EMPLOYMENT OF WOMEN

155. Numerous studies have shown an inverse relationship between family size and the extent of female participation in the labour force; i.e., married women who are gainfully employed generally have fewer children than

other married women.<sup>330</sup> This relationship has been found to be more marked in the industrialized than in the non-industrialized countries, and in urban more than in rural areas. Moreover, it is the women who work for wages, rather than the self-employed or unpaid family workers, who have significantly lower fertility than non-working women.<sup>331</sup>

156. The interpretation of these observed differentials remains in some doubt, however, since a causal relationship has yet to be established. Some authors have emphasized the possibility that women who work may on that account abstain from childbearing to a greater extent than non-working women<sup>332</sup> in order to realize their goals of achieving or maintaining a higher standard of living. Those who believe that female employment outside the home is an important factor tending to lower fertility have advocated increasing opportunities for such employment in high-fertility areas as a means of reducing birth rates.<sup>333</sup> Other writers have been less optimistic about the possibility that increased entry of women into the labour force would bring a reduction in high birth rates. They have rather stressed the selection aspect, whereby women with no children or very few children find it easier to accept employment away from the home.<sup>334</sup>

157. Efforts to assess the possible effects of female labour force participation on fertility are complicated by the intervention of other variables such as socio-

<sup>330</sup> In addition to the works cited in chapter IX, section A, see, for example, Vostrikova, "Female fertility and methods of studying ..." (1967), p. 243; Henripin, *Tendances et facteurs ...* (1968), p. 307; Collver, "Women's work participation and fertility ..." (1968); Jaffe, *People, Jobs and Economic Development ...* (1959), pp. 186-194.

<sup>331</sup> Jaffe and Azumi, "The birth rate and cottage industries ..." (1960), pp. 59-61. Federici, examining data for Italy, found the usual negative correlation between female employment and fertility, except for women at the higher ages, who worked predominantly in agriculture, and often as unpaid family workers. Federici, "A női munka hatása a termékenységre" (1967).

<sup>332</sup> The results of a survey in Czechoslovakia which indicated that the prolongation of maternity leave was a factor influencing positively the birth of the third child would seem to suggest that a certain proportion of employed women had restricted or postponed childbearing prior to the liberalization of maternity benefits. Kučera, "Vyzkum třetích a čtvrtých dětí narozených ..." (1965).

<sup>333</sup> Thus, Jaffe and Azumi, in their study of the relationship between different types of female employment and fertility levels in Japan found that women who worked away from the home averaged about one-half child fewer than women working in cottage industries or remaining outside the labour force. The authors concluded that, from the point of view of reducing the birth rate, the most desirable industries to introduce would be those using large quantities of female labour away from the home. Jaffe and Azumi, "The birth rate and cottage industries ..." (1960), p. 62.

<sup>334</sup> In a study of female employment in Lima, Peru, Stycos found that the largest fertility differential between working and non-working women occurred in the lowest socio-economic class, the class least likely to practise contraception. He concluded that it seems likely that "... employment status is more often a consequence of marital fertility than a cause". Stycos, "Female employment and fertility in Lima, Peru" (1965), pp. 49, 53-54. Another writer has theorized that in societies where the roles of mother and worker are relatively incompatible, the origin of the negative association between female employment and fertility is related to the presence or absence of birth control technology. Where know-

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<sup>324</sup> Klinger, "Trends of differential fertility ..." (1961), pp. 87-88; and his "A diferenciális termékenység újabb alakulása" (1964).

<sup>325</sup> Zikry, "Fertility differentials ..." (1965), p. 5.

<sup>326</sup> Das Gupta *et al.*, *Couple Fertility* (1955), p. 41.

<sup>327</sup> Sinha, "Differential fertility and family limitation ..." (1957); Rele, "Fertility differentials in India" (1963), p. 198.

<sup>328</sup> United Nations, *The Mysore Population Study ...* (1961), p. 124.

<sup>329</sup> Berrada, "Fertility in relation to ..." (1967).

economic status, education and the like, all of which are interrelated.<sup>335</sup> Thus the likelihood of a woman's entering the labour force may be influenced by her education, which in turn depends on other socio-economic factors. Recognizing the possible importance of other factors, some analysts have examined the relationships between activity status and fertility separately for different educational and income groups. The findings show that the fertility differentials between active and inactive women persist even when other factors are controlled. Such detailed analyses are not numerous, however, and do not permit conclusions concerning the relative force of the various factors.<sup>336</sup>

## 6. RELIGIOUS AND ETHNIC DIFFERENCES

158. In many societies fertility differences have been observed among population groups differentiated on the basis of common national heritage, language or religion, and sharing common attitudes and cultural patterns. The question immediately arises whether the observed differences result mainly from the group's social and economic characteristics (educational attainment, occupational structure, urban-rural residence, income level and the like), which differ from those of the rest of the population, or whether they reflect cultural factors peculiar to the group. Even where economic and social conditions have been equalized among different population groups, cultural patterns formed under previous conditions may tend to persist, and it has frequently proved difficult to determine the relative weight of these various influences in accounting for intergroup fertility differences.

159. So far as religion is concerned, a number of studies in various European countries, and in the United States and Canada, have found fertility to be higher among Catholics than among Protestants and Jews, but while the differential appears to be narrowing in most of these countries, in the United States recent evidence has indicated a widening of the gap. The trend towards a diminution of the differential in a number of countries has been attributed to several factors: (a) a modification of traditional attitudes on the part of certain religious bodies towards ideals and practices which affect family size; (b) a weakening of the influence of religious doctrine

and tradition; (c) a lessening in the non-religious differences which appear in part to have contributed to the religious differential in fertility. Regarding the second of these factors, several studies on the relation between religion and fertility have not been content merely to study religious affiliation; rather, they have concerned themselves with the effects of "religiousness", as measured by the intensity of religious beliefs and practices. As to the third factor, in any study of fertility differentials based on religion, it is important to consider to what extent the observed fertility differences between religious groups may be due to differences in income, occupation, education, urban-rural residence or some other non-religious factors. These studies have found, generally, that while socio-economic and residential factors often account for a substantial part of the religious fertility differential, they do not account for all of it.

160. In the United States, where information on religion is not collected in the census, the demographic characteristics of religious groups have been investigated by means of sample surveys.<sup>337</sup> These have generally found that among the three major religious groups, Catholics have the highest fertility. While fertility differences based on the traditional measures of socio-economic status have been decreasing, religious differences have emerged in recent years as perhaps the strongest of the socio-economic determinants of fertility.

161. Data from the Growth of American Families (GAF) studies of 1955 and 1960, and from some 1962 studies conducted by the Population Studies Center of the University of Michigan, suggest a growing differential in fertility between Catholics and non-Catholics. In the 1955 study, the average number of children borne by Catholics was only slightly higher than for Protestants when the duration of marriage was controlled. By 1962, however, as a result of an increase in Catholic fertility, Catholics had borne 0.6 more children than non-Catholics, despite the shorter average duration of their marriages at time of survey.<sup>338</sup> Regarding the Protestant-Jewish differential, a special analysis of the 1955 GAF data attributed the lower fertility of the Jews in large measure

(Footnote 334 continued)

ledge of birth control methods is present, women who work may voluntarily restrict the size of their families, while at the same time there is a self-selection of sterile and subfecund women into the labour force, because their lighter household duties permit them to work. In the absence of birth control technology, however, only the self-selection factor is of importance. Weller, "The employment of wives ..." (1968), p. 513.

<sup>335</sup> For example, Morsa found in his study of working-class women in a suburb of Brussels that the same motive—that of economic necessity—was often responsible for women working and for their abstention from child-bearing. Morsa, "Travail des femmes et natalité" (1959), p. 260.

<sup>336</sup> Jaffe, analysing data for Puerto Rico, found a widening of fertility differences between working and non-working women at higher educational levels, whereas Henripin found the opposite trend for Canada. The latter author's data, however, showed that the fertility differential for working and non-working women widened with increasing income. Jaffe, *People, Jobs and Economic Development* ... (1959), p. 187; Henripin, *Tendances et facteurs* ... (1968), pp. 306-314.

<sup>337</sup> Some of the major studies have been the Indianapolis Study [Whelpton and Kiser, eds., *Social and Psychological* ... 5 vols., (1946-1958)]; the Growth of American Families Studies [Freedman, Whelpton and Campbell, *Family Planning, Sterility and Population Growth* (1959), and Whelpton, Campbell and Patterson, *Fertility and Family Planning* ... (1966)]; and the Princeton Study [Westoff et al., *Family Growth in Metropolitan America* (1961), and Westoff, Potter and Sagi, *The Third Child* ... (1963)]. While the Indianapolis Study was restricted to Protestant couples only, a preliminary household survey yielded data permitting a comparison of fertility for the three major religious groups.

<sup>338</sup> Freedman, Whelpton and Campbell, *Family Planning, Sterility and Population Growth* (1959), pp. 275-279; Whelpton, Campbell and Patterson, *Fertility and Family Planning* ... (1966), pp. 75-77, 123-124; Freedman, Goldberg and Slesinger, "Current fertility expectations ..." (1963), pp. 376-379. Whereas the analyses of data from these three studies pertain to the white population only, a 1957 survey by the United States Bureau of the Census, which included the non-white population, showed virtually no fertility differential between Protestant and Catholic women 15 to 44 years old. United States, Bureau of the Census, *Statistical Abstract of the United States 1958* (1958), p. 41. Differences reflecting religion, however, might be obscured by the higher proportions of Negroes and rural residents in the Protestant group.

to their greater concentration in urban areas and their higher socio-economic status.<sup>339</sup> On the other hand, Goldscheider, in his review of the existing literature on Jewish fertility, concludes that the consistently lower fertility of the Jews cannot be adequately explained in terms of their distinct social and economic characteristics, but that the influences arising from their minority-group status must be taken into account.<sup>340</sup> Studies which have investigated the effects of "religiousness" (as defined in terms of frequency of church attendance, the amount of education received in church-related schools, the importance of religion in daily life etc.) on fertility, have generally found a strong association between these measures and fertility among Catholics, but little relationship among Protestants or Jews.<sup>341</sup>

162. Several studies in the United States have shown a direct relationship between the number of children expected or desired by Catholic women and the amount of their education received in church-related schools. Below the college level, the religious educational experience appears to have had a significant influence on fertility expectations,<sup>342</sup> but the higher number of children desired by women attending Catholic colleges reflects the tendency of women already oriented towards large families to select such institutions, as family-size desires of first- and fourth-year women were found to be quite similar.<sup>343</sup>

163. An analysis of 1961 census data for Canada seems to indicate a narrowing of the fertility differential between Catholic and Protestant women who were over forty-five years old at the census date. An apparent convergence is also found among the younger age groups, but because of the differences in marital patterns between Catholics and Protestants (the Catholics tend to marry later than the Protestants and therefore bear their children at a later age), it is not possible to draw firm conclusions regarding trends in the differential for women who were still in their childbearing years. An important factor in the narrowing of the fertility differential has been the rapidly falling fertility of the French Catholics of Quebec. However, the complex cross-currents of ethnic group membership, urban-rural residence and geography make it difficult to sort out the influence of the religious factor which, the authors feel, furnishes a relatively weak explanation for the observed differentials.<sup>344</sup>

<sup>339</sup> Freedman, Whelpton and Smit, "Socio-economic factors in religious differences in fertility" (1961).

<sup>340</sup> Goldscheider, "Fertility of the Jews" (1967).

<sup>341</sup> See Westoff, "Religion and fertility ..." (1959); Freedman, Goldberg and Slesinger, "Current fertility expectations ..." (1963), p. 379; Whelpton, Campbell and Patterson, *Fertility and Family Planning* ... (1966), pp. 81-89, 123; Westoff, Potter and Sagi, *The Third Child* ... (1963), pp. 92-107; Goldscheider, "Fertility of the Jews" (1967), p. 206.

<sup>342</sup> Whelpton, Campbell and Patterson, *Fertility and Family Planning* ... (1966), pp. 84-87, 123.

<sup>343</sup> Westoff and Potvin, *College Women and Fertility Values* (1967), chap. 5.

<sup>344</sup> Krotki and Lapierre, "La fécondité au Canada selon la religion ..." (1968). The findings of this study confirm, for the most part, the conclusions of an earlier study by Burch. See Burch, "The fertility of North American Catholics ..." (1966). Henripin found a marked persistence of the Catholic-Protestant differential when comparing fertility of English-speaking groups only. See

164. In the Federal Republic of Germany, a comparison of fertility data for Catholic and Protestant marriage cohorts, based on the 1950 census, showed a progressive contraction of the differential for successive marriage cohorts. For the most recent cohort studied, that of 1937-1940, the differential had entirely disappeared in localities of 100,000 or more inhabitants, although in smaller localities Catholics had somewhat higher fertility. Comparable data are not available for later dates, but a 1962 sample survey which permits the comparison of fertility for a predominantly Protestant region (Lower Saxony) with a predominantly Catholic one (Bavaria) confirmed that excess Catholic fertility is found almost exclusively in the less populous localities.<sup>345</sup>

165. In the Netherlands, the marked differential in fertility between Catholics and Protestants which already existed among late nineteenth-century marriage cohorts, was maintained well into the twentieth century; by the early 1960s, however, there was evidence that a narrowing of the differential was under way.<sup>346</sup> While geographic and economic differences between the religious groups have been offered as explanation for the persistence of the differential, the importance of the religious factor has been particularly stressed by some writers.<sup>347</sup>

166. Fertility differences between Catholics and Protestants in Switzerland widened in the early decades of this century as fertility declined much more rapidly among Protestants than among Catholics. Although some narrowing of the differential appears to have occurred since 1930, post-war trends have been difficult to assess because of the heavy and predominantly Catholic immigration in the 1950s and 1960s.<sup>348</sup>

Henripin, *Tendances et facteurs* ... (1968), pp. 198-216, 344-345. For an analysis of data from the 1941 census of Canada, see Charles, *The Changing Size* ... (1948), chap. 4.

<sup>345</sup> Schwarz, "Nombre d'enfants suivant le milieu ..." (1965), pp. 88-91. For other discussions of fertility differentials by religion in Germany, see Ungern-Sternberg and Schubnell, *Grundriss der Bevölkerungswissenschaft* (1950), pp. 276-278; Burger, *Religionszugehörigkeit* ... (1964), pp. 105 ff.

<sup>346</sup> Van den Brink, "Leveling of differential fertility ..." (1955); De Wolff and Meerdink, "La fécondité des mariages à Amsterdam ..." (1957); Van Heek, "Het Nederlandse geboortepatroon en de godsdienstfactor ..." (1963); Witt, "Differential fertility" (1966); Netherlands, Central Bureau of Statistics, *Maandstatistiek van bevolking* ... (Mei 1967), table 7.

<sup>347</sup> Van Heek found the fertility differential to be as high as 40 to 80 per cent in Catholic and Protestant districts with similar socio-economic structure. Not only was the fertility of Dutch Catholics higher than that of other Dutch religious groups; it was also found to be considerably higher than that of Catholics in border areas of Belgium and Germany. According to Van Heek, the Catholic-Protestant differential resulted from the strong indirect social control exercised by the Dutch Catholic Church, with its pro-natalist orientation, and the position of Dutch Catholics as a strong minority in competition with a dominant majority. Van Heek, "Roman-Catholicism and fertility in the Netherlands ..." (1956).

<sup>348</sup> See Mayer, "Recent demographic developments in Switzerland" (1957), p. 349; and his "The impact of postwar immigration ..." (1966), pp. 83-85; also Switzerland, Bureau fédéral de statistique, *Annuaire statistique de la Suisse, 1966* (1966), pp. 33, 71. As the Swiss Protestants are mainly town-dwellers while the Catholics inhabit the rural areas, several writers have examined fertility within a particular occupational group or among regions with similar economic characteristics, in an attempt to isolate the in-

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167. In Yugoslavia marked differences in birth rates have been established among the different ethnic nationalities. In 1961, crude birth rates ranged from about 46 for the Albanians to around 20 for the Serbs, Croats, Slovenes and some other groups. The fact that differences in fertility between various ethnic groups in the same region are sometimes smaller than differences between the same ethnic groups in different regions is evidence of the strong influence of social and economic factors on fertility levels.<sup>349</sup>

168. Although data on fertility levels by ethnic nationality are limited for the USSR, the birth rate for each Union Republic may be considered to reflect, to a large degree, the rate for the major nationality of that Republic. These rates vary widely from one Republic to another. In 1962, the Azerbaijan and Turkmen Republics had birth rates over 40 per 1,000 population, a figure that was 2.5 times greater than that of the Estonian and Latvian Republics, with a rate of 16. Uralanis has attributed such variations to distinctive traditions and customs which have evolved in the course of many generations.<sup>350</sup>

169. Wide differences in fertility levels in Canada between the French-speaking and English-speaking population have been well-documented, but recent evidence suggests the gradual disappearance of this differential over time. A 1961 census monograph, which attempted to isolate the strictly linguistic-cultural factor by eliminating the influence of religion, urban-rural residence, education and income, found that there was no systematic superiority in fertility among 35-39-year-old French-speaking Catholic women over their English-speaking counterparts in the same educational and income groups. Indeed, for certain categories the fertility of the French-speaking group was lower. Among women aged 45-49 years, however, the French-speaking women did have higher fertility in most categories, and a still wider

differential was observed among women aged 65-74 years.<sup>351</sup>

170. In Israel, fertility levels among Jewish immigrant groups of different cultural backgrounds reflect the levels prevalent in their country of origin. Thus, the fertility of "Oriental" immigrants (those from Africa and Asia) greatly exceeds that of women from Europe and America. When the comparisons are made for women of similar educational attainment, the fertility differentials are reduced but still remain substantial, underlining the importance of cultural factors in reproductive behaviour.<sup>352</sup>

171. Differences in fertility levels have also been observed among different racial groups in multiracial societies. Thus, crude birth rates of the white and non-white population in the United States differ considerably, non-white fertility being consistently higher.<sup>353</sup> These differences can be explained by socio-economic factors, as it has been shown that, for groups with similar educational achievement, the fertility of non-whites who have had no southern farm background does not differ greatly from that of whites.<sup>354</sup>

172. Fertility differences among population groups differentiated on the basis of religion, race, language or tribe have also been noted in high-fertility societies. In Brazil, where fertility is high for all population groups, the somewhat lower fertility of Negroes as compared with the white and mestizo groups is due mainly to the larger proportion of childless women among the Negro women, who appear to be at a certain disadvantage in sexual and marital selection.<sup>355</sup> In South Africa, large differences in fertility levels among the major racial groups can be explained mainly in terms of the vast differences in socio-economic level.<sup>356</sup> Analyses of census data for Bolivia, Ecuador and Peru have suggested that fertility is higher in the predominantly Spanish-speaking regions, as compared with the Indian-speaking regions, despite the fact that the latter areas have a lower level of economic

(Footnote 348 continued)

fluence of the strictly religious factor. Mayer and Brüscheiler concluded, in their separate studies, that the religious factor was less important than the economic-occupational factor as a determinant of fertility, but that in an economically homogeneous population, the religious factor still retained considerable importance. Brüscheiler, "Konfession und Geburtenrückgang" (1938), p. 49; Mayer, *The Population of Switzerland* (1952), pp. 104-111. An analysis of 1941 census data showed that fertility of farmers' wives was higher among Catholics than among Protestants. Nixon, "Some demographic characteristics ..." (1963), p. 47.

<sup>349</sup> For example, the 1961 birth rates for the Albanians and the Serbs in the region of Kosovo and Metohija were 46.3 and 31.3, respectively, while the Serbs of Vojvodina had a birth rate of only 17.6. Thus, the difference in birth rates between these two ethnic groups in the same region was smaller, relatively, than that between the Serbs in the two different regions. Breznik and Sentić, "Les études démographiques et la nationalité ..." (1966), pp. 416-417. See also Yugoslavia, Centar za Demografska Istraživanja, "Demografski razvitiak narodnosti u Srbiji" (1967), p. 122.

<sup>350</sup> Uralanis, "Dynamics of the birth rate ..." (1967); and his *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 38, 50. One of the factors contributing to such variations in fertility is age at marriage. In the Baltic Republics, only 4 to 5 per cent of women aged 16-19 years were married in 1959, in the Turkmen Republic the figure was 32 per cent, while in the Kirghiz Republic it was over 44 per cent. Studies by Sifman, and Karakhanov and Aliakberova, of fertility in the Central Asian Republics, indicate the influence of a variety of factors, including ethnic ones, on fertility levels. See Sifman, "Dinamika rozhdaemosti ..." (1970); and Karakhanov and Aliakberova, "Nekotorye rezultaty ..." (1970).

<sup>351</sup> Henripin, *Tendances et facteurs ...* (1968), pp. 189-197. For an analysis of data from the 1941 census, see Charles, *The Changing Size ...* (1948), chap. 4.

<sup>352</sup> Israel, Central Bureau of Statistics, *Marriage and Fertility, part 2 ...* (1967), table 15. See also Matras, *Social Change in Israel* (1965), pp. 180 ff.

<sup>353</sup> In the period 1951-1961, for example, the birth rate of non-whites ranged between 32 and 34 per 1,000 population, while that for whites was some 10 points lower. Whelpton, Campbell and Patterson, *Fertility and Family Planning ...* (1966), p. 334. In 1964, the fertility rate (births per 1,000 women aged 15-44 years) for non-whites exceeded that for whites by 42 per cent. United States, National Center for Health Statistics, *Natality Statistics Analysis, United States—1964* (1967), p. 11.

<sup>354</sup> Whelpton, Campbell and Patterson, *Fertility and Family Planning ...* (1966), pp. 334-370.

<sup>355</sup> Carvalho, "Quelques aspects de la natalité au Brésil" (1955); Mortara, "Quelques données sur la fécondité ..." (1959).

<sup>356</sup> For discussions of differences among the Bantu, Coloured, Asian and European populations with respect to demographic, occupational and income characteristics, see Sadie, "Opening discussion ..." (1964), p. 144; Horwood, "The social framework of economic development ..." (1964), p. 176; Lombard, "The determination of racial ..." (1964).

development.<sup>357</sup> Demographic sample surveys in a number of African countries have recorded wide variations in fertility, as well as sterility, from one ethnic group to another (see section B.4 above), but it has not been possible to determine the relative influence of the various factors involved.<sup>358</sup>

173. A few surveys which have examined fertility differences among Moslem and non-Moslem groups in the same country suggest that while such differences are slight in the more backward sectors, Moslem fertility is higher than that of non-Moslems in the more developed sectors. Thus, there appeared to be no significant differences in fertility between Moslems and non-Moslems in rural areas of Lebanon and the United Arab Republic, nor among illiterates in Ghana.<sup>359</sup> On the other hand, among urban residents in Lebanon, educated Christians were found to have lower fertility than educated Moslems, and uneducated Christians had lower fertility than uneducated Moslems.<sup>360</sup> Similarly, in the United Arab Republic, Rizk found higher fertility among Moslems than among non-Moslems in the cities which did not appear to be related to differences in socio-economic status.<sup>361</sup>

### G. Prospects for future trends of fertility

174. As demographic research developed in the third and fourth decades of this century, it was fertility, among the components of population growth, that was thought to be most amenable to projection in both developed and developing countries. It was considered that in developed countries fertility would continue its downward movement, perhaps achieving stability at levels sufficient for the maintenance of the population, but more likely resulting ultimately in population decline. In countries then agricultural in economic base, fertility was assumed to be high and very resistant to change until some future period when industrialization and urbanization would initiate and sustain declines in mortality and

later declines in fertility. In industrialized countries fertility trends in the post-war period have not borne out these earlier predictions, and new research has brought to light complexities in the historic changes in fertility in these countries. Moreover, fertility levels in developing countries are now known to be more diverse than was formerly presumed, and the reasons for this diversity are as yet not well understood. Advances in methodology and analytical technique now permit the measurement of fertility levels over wider areas and with greater precision, but they do not provide a sufficient basis in fact or in theory for the evaluation of future fertility trends. The major determinants of future developments lie in the responses of people and governments in situations that are new, not merely in the developing countries of currently high fertility, but in the world as a whole.

#### 1. PROSPECTS IN AREAS WHERE FERTILITY IS NOW HIGH

175. There now exist a number of conditions in the less developed countries that are favourable to a reduction in birth rates. The increasing pressures that population growth places on families, villages, and the larger society, are stimulants both to governmental actions and to family decisions. Recognition of the hazards to national development and family welfare inherent in the continuation of high rates of population growth has led an increasing number of Governments to adopt programmes aimed at moderating fertility. The effectiveness of these programmes in transforming the attitudes, decisions, and actions of the people has major relevance for the future trend of fertility.

176. While there is agreement that fertility levels in the developing countries will decline with modernization, the time of onset and the tempo of the decline remain problematic. Research is needed in order to determine what factors in the development process constitute critical turning points that are accompanied by substantial shifts in attitudes and behaviour. There is evidence, for example, that at the lower levels of educational attainment, groups of individuals differing with respect to years of schooling completed show virtually no significant differences in average fertility, though at the higher levels, marked fertility differences are associated with differing levels of educational attainment.<sup>362</sup> It is essential to learn more about the kind and amount of education and about the nature of other forces of modernization that are required in order for new behaviour patterns to begin to assert themselves.

177. The inability to forecast future changes accurately, or perhaps the inherent unpredictability of such changes, has often led demographers to prepare several alternative series of fertility projections for a particular population. The common procedure is a series of three projections to delimit the range within which future changes would be most likely to lie, with the central projection being regarded as most likely. Based on observations of the course of past fertility in low-fertility countries, the United

<sup>357</sup> Stycos, "Culture and differential fertility in Peru" (1963); Heer, "Fertility differences between Indian ..." (1964). The two authors assessed somewhat differently the probable reasons for these differentials; Stycos attached importance to differential mating patterns, while Heer suggested that the differences might possibly be due to the existence of indigenous birth control practices in the Indian-speaking regions.

<sup>358</sup> See, for example, Congo (Brazzaville), Service de statistique, and France, Service de Coopération, *Enquête démographique 1960-1961* ... (1965), pp. 46-47; Central African Republic, Service de la statistique générale, and France, Service de Coopération, *Enquête démographique en République centrafricaine, 1959-1960* ... (1964), pp. 98, 104; Chad, Service de statistique, and France, Service de Coopération, *Enquête démographique au Tchad 1964* ... (1966), vol. 1, pp. 127-128; Gabon, Service de statistique, and France, Service de Coopération, *Recensement et enquête démographiques, 1960-1961* ... (1965), pp. 88-90.

<sup>359</sup> Yaukey, *Fertility Differences in a Modernizing Country* ... (1961), p. 31; Rizk, "Population growth and its effect ..." (1964), p. 172; Busia, "Some aspects of the relation ..." (1954), p. 346.

<sup>360</sup> Yaukey, *Fertility Differences in a Modernizing Country* ... (1961), p. 79.

<sup>361</sup> Discussed in *ibid.*, p. 42, based on Rizk's doctoral dissertation, *Fertility Patterns in Selected Areas in Egypt*, Princeton University, 1959.

<sup>362</sup> See, for example, United Nations, *Report of the Ad Hoc Committee of Experts* ... (1969), p. 26.

Nations assumed that fertility in developing countries would decline to half its initial level over a thirty-year period following the onset of a decisive decline. The three sets of United Nations projections are distinguished by different dates at which such a downward movement in fertility is assumed to begin (see chapter XV).

## 2. PROSPECTS IN AREAS WHERE FERTILITY IS NOW LOW

178. While the broad outlines of fertility movements within low-fertility countries are well known, attempts to pinpoint and assess the relative influence of specific economic and social factors on fertility have not yielded conclusive results. It is the general realization that fertility is ultimately an aspect of human behaviour and that, as such, economic and social factors conditioning it will be expressed in motivations of some sort, that has led modern investigators to more subtle approaches. The study of expected family size appears as one means of assessing the family's intentions in respect of childbearing. In view of the ease of obtaining and applying efficient contraceptive techniques in the advanced societies, such an approach has been thought to have merit for short-term projections, though in actual practice it has been found to have many limitations.<sup>363</sup>

179. Post-war movements suggest that uniformity of future fertility trends cannot be expected. According to

<sup>363</sup> See, for example, Ryder and Westoff, "The trend of expected parity . . ." (1967).

Biraben, moderately high fertility rates are a possibility in Western Europe.<sup>364</sup> On the other hand, in certain countries of Eastern Europe, experts have recently expressed concern regarding the low level of current and projected fertility.<sup>365</sup> Even where prevailing levels of fertility continue, short-term fluctuations may occur. The hypothesis has been advanced that, in the later stages of the spread of fertility control, the level obtaining in a country will temporarily tend to fall below any tenable long-term level. One basis for this hypothesis is that for a short time fertility will be depressed below its long-term level because birth restriction by different cohorts will be bunched in the same period. In addition, the members of certain cohorts would reduce fertility to an unusual degree.<sup>366</sup> According to Ryder, the fertility of industrialized countries is not expected to change much in the long run, but "improved ability to determine fertility will lead to greater sensitivity of response to instability in the environment, and therefore to the risk of fertility fluctuations of even greater amplitude . . . than we have seen in the recent past".<sup>367</sup>

<sup>364</sup> Biraben, "Evolution récente de la fécondité . . ." (1961).

<sup>365</sup> Regarding Hungary, see, for example, Szabady, "Születésszámunk nemzetközi és történeti megvilágításban" (1964); and his "Magyarország jövőbeli népességi perspektívái" (1964).

<sup>366</sup> Coale, "Introduction" (1960), p. 7.

<sup>367</sup> Ryder, "The character of modern fertility" (1967), p. 36.

## MORTALITY

1. Among the components of population change, mortality has historically played an important role in determining the growth of population. Following the Industrial Revolution, the death rate began a slow descent in the now developed countries of Europe, and later in areas of European overseas settlement, contributing to a gradually rising rate of population growth as fertility decline lagged behind. Recently in the world's developing countries mortality has fallen rapidly, accounting for the very rapid increase in population experienced by these countries, while their fertility levels remained relatively stable. Now that mortality has been reduced to moderate levels in most developing regions of the world, fertility will increasingly become the decisive factor in population growth. In addition to its role in determining numbers of population, mortality also exerts an influence on the age structure of the population, though its effect in this respect is much smaller than that of fertility (see chapter VIII, section B).

2. The health status of a population has an obvious bearing on mortality, and hence on population growth; moreover, its importance as a variable affecting the quality of the population is also recognized. Analyses of the health status of the population have generally been neglected in demographic research, however, largely because of the poor development of the data and techniques used in measuring health.<sup>1</sup> Far more is known about levels of mortality than about conditions of health and morbidity within the various countries. In the first place, the concept of health as a measurable variable is rather vague. Because of the difficulties involved in measuring the positive characteristics of health, the opposite concept of ill-health, or morbidity, is usually adopted as the object of study. Even this concept, however, does not lend itself to precise definition and measurement, since the delimitation between health and illness in a particular individual is frequently uncertain. In contrast, death is a clearly defined event, and Governments have generally adopted legal provisions for the registration of such events, even though in many countries such registration is incomplete in practice. No established procedure exists, on the other hand, for the reporting of illness. Generally, illnesses are reported only when they lead to admission to a hospital, or at least to a visit to a physician.

3. While mortality data are often used as indicators of health status, they may sometimes give an erroneous or distorted picture. In the developed countries which have achieved low mortality levels and where death

has become relatively uncommon after the first month of life and until old age, mortality and cause-of-death statistics have lost much of their value as indicators of morbidity. Thus, the need for morbidity statistics has become more apparent.<sup>2</sup> Because of the severe limitations of the more readily available types of data, such as hospital statistics, or industrial records of causes of absences from work, the trend has been increasingly towards the use of national sample surveys to collect data on the incidence of illness in the population.

4. The concept of societal responsibility for the health of the population, little dreamed of a century ago, has won gradual acceptance over time so that today nearly everywhere the reduction of disease and lowering of death rates are considered important tasks of government. Moreover, in a setting of growing interdependence among countries and with the gradual extension of international contacts and travel, Governments have sought collaboration in health matters. Such collaboration has gathered momentum since the establishment of the World Health Organization in 1946. The broad view of health stated in that organization's Constitution as "... a state of complete physical, mental and social well-being"<sup>3</sup> serves as a goal for eventual national attainment. In fact, the Constitution specifically states that "Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures".<sup>4</sup>

5. The continued effort to control disease and reduce mortality is a universally accepted government policy even in those developing countries where rapid population growth presents many serious problems. Aside from the important, and obvious, humanitarian considerations, the contribution that better health makes to economic development, for example, through increased labour productivity, should not be overlooked.<sup>5</sup>

6. Government policies relevant to health cover a wide variety of matters involving measures which directly or indirectly promote better health. Formal statements of health policies are not always easily accessible, although some are set forth in the development plans of certain countries.

<sup>2</sup> On the needs for morbidity data in developing countries, see Swaroop, "Study of morbidity in underdeveloped areas" (1959).

<sup>3</sup> World Health Organization, *Basic Documents* ... (1969), p. 1.

<sup>4</sup> *Ibid.*

<sup>5</sup> See Taylor, "Health and population" (1965), p. 477; Taylor and Hall, "Health, population and economic development" (1967), p. 3.

<sup>1</sup> Linder, "Health as a demographic variable" (1959), pp. 489-490.



7. Faced with many challenging health problems, Governments must select priority areas for action, bearing in mind limitations on their resources.<sup>6</sup> That these priorities differ greatly in developed and developing countries, owing to the very different nature of their pressing health problems, is evident from a few examples. Thus, in the Netherlands, where adequate curative health care has been provided for many years through compulsory insurance, government policy has placed increasing emphasis on preventive health measures and on rehabilitation of disabled persons which can result in important savings in social expenditures.<sup>7</sup> In the health service of the Soviet Union the stress is also on preventive medicine, and the development of an extensive network of dispensaries and clinics throughout the country has permitted the observation of healthy persons as well as the sick.<sup>8</sup> In contrast, certain developing countries such as India give high priority to the extension of health services to the rural villages to improve the balance of medical care between urban and rural areas.<sup>9</sup> Senegal's plan, adopted in 1961, emphasized health education in the rural areas and the expansion of rural health centres and mobile units, rather than new hospital construction.<sup>10</sup> In tropical Africa it has been suggested that sound health policy should be based on a balanced approach which might couple measures to improve the health of such high-risk groups as pregnant women and children with efforts to reduce morbidity and thus increase productivity among the working population. Progress in the latter area could be expected to lessen the strain produced by increased population growth.<sup>11</sup>

8. The complicated interplay of various biological, economic, social and cultural factors has an impact on the health of individuals and hence on the mortality levels of populations. Among these influences, a broad distinction is often made between those which are biological in nature, and not subject to change in the short run, and those which are environmental. This chapter is concerned mainly with the latter, and gives little attention to such factors as the genetic composition of the population, natural selection, and the susceptibility or resistance of population to endemic or epidemic diseases. Despite their obvious importance as factors affecting health and mortality, advances in medical knowledge and in the application of medical science in the prevention, diagnosis and treatment of disease are likewise not treated in detail, although a brief summary is included of outstanding medical discoveries which have contributed to the control of disease.

<sup>6</sup> See Biraud, "Implications of population trends for planning health programmes" (1964), p. 118.

<sup>7</sup> United Nations, *Planning for Balanced Social and Economic Development* ... (1964), p. 71.

<sup>8</sup> Freidlin, "State measures in the field of public health ..." (1967), pp. 322-323.

<sup>9</sup> United Nations, *Planning for Balanced Social and Economic Development* ... (1964), pp. 23-24.

<sup>10</sup> *Ibid.*, pp. 212-213.

<sup>11</sup> Lucas, "Public health priorities and population pressure in developing countries" (1968).

9. The emphasis in the present chapter is rather on the demographic, economic, social and cultural factors which affect mortality. Sex and age structure are the main demographic factors considered, since the crude death rate is influenced by the proportion of aged persons in the population, and by the ratio between the sexes, males generally having higher mortality than females in modern times. The economic and social factors which influence the level of mortality are numerous and of considerable complexity; they include, for example, occupation, educational level, nutritional standards, housing conditions, sanitation, public health services, medical services and the general level of living. Statistics on the levels and trends of mortality rates in different geographical areas and among different population groups, analysed in relation to known facts about the economic and social conditions of the various areas and population groups, make it possible to draw inferences regarding the factors which determine the rates. Because these factors are mutually interdependent, however, a satisfactory quantitative estimate of the influence of any one factor is very difficult to obtain. Thus, for example, the health of an individual is greatly influenced by his level of living, which is in turn partly determined by his education, and by such conditions as the state of the labour market and of the economy in general. Habits concerning personal hygiene which affect health are partly conditioned by an individual's level of living and education, but may also be influenced by the individual's cultural heritage and the prevailing social environment.

10. The known facts concerning levels, patterns and trends of mortality in different regions of the world are summarized in the following sections. Section A is concerned with general mortality levels and trends, section B with sex and age patterns, section C with foetal and infant mortality, section D with causes of death, and section E with mortality differentials among different regions and population groups. The next three sections of the chapter deal respectively with factors related to high mortality in the past, factors in mortality decline in developed countries, and factors related to mortality levels and trends in developing countries. A final section discusses prospects for future mortality change.

## A. Levels and trends of mortality

### 1. RECENT MORTALITY LEVELS

11. The crude death rate<sup>12</sup> is the most widely available index of mortality. It provides a measure of gross deletions from the population through death, and is also useful for giving a general idea of mortality trends within one area and for roughly classifying countries according to mortality levels. However, care must be exercised in its use for international comparisons, as it is greatly affected by the age structure of populations.<sup>13</sup> Age-

<sup>12</sup> The crude death rate is generally computed as the number of deaths in a year per thousand of the mid-year population.

<sup>13</sup> The anomalous situation may arise, for example, of a country with a high proportion of young people having a lower crude death rate than a country with an older population, although the age-

specific death rates,<sup>14</sup> standardized death rates,<sup>15</sup> and computations of expectation of life at birth<sup>16</sup> (or at another specified age) are measures which do not suffer from this deficiency and are often used to compare mortality levels between different countries or changes in mortality over time.<sup>17</sup>

12. Although satisfactory death registration data were available for only a little more than one third of the world's population around 1960,<sup>18</sup> sample surveys and other sources have provided a means of estimating approximate mortality levels for the different regions of the world. Table V.1 shows estimated crude death rates and expectation of life at birth for the period 1965-1970. Figures for the developing regions are subject to a considerable margin of error, since they depend in part on extrapolations of previous trends. For the world as a whole, the crude death rate was estimated at about 14 per 1,000 population for this period, but the rate was by no means uniform for the major regions. In the less developed regions of Africa, Asia and Latin America combined, the death rate was about 16, as compared with 9 for the developed regions as a whole. Among the developing regions, the crude death rate was highest in Africa (21 per 1,000 population) and lowest in Latin America (10); it was estimated at about 14 for East Asia and 17 for South Asia. Differences between developed regions in the

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specific rates for most age groups may be greater in the former than in the latter. For a discussion of the limitations of the crude death rate, see United Nations, *Demographic Yearbook, 1966* ... (1967), pp. 1, 32.

<sup>14</sup> Number of deaths in a particular sex-age group per 1,000 mid-year population in the same sex-age group.

<sup>15</sup> Methods of standardization are discussed in the following works, among others. Woolsey, "Adjusted death rates ..." (1947); Karpinos and Chassan, "A note on standardized rates" (1949); Wolfenden, "On the theoretical and practical considerations ..." (1962); Kitagawa, "Standardized comparisons in population research" (1964).

<sup>16</sup> This measure of mortality, which is derived from the life table, represents the average number of years of life to which a group of newborn infants could look forward if they were subject to the same risks of death at each age as those prevailing in the population at the time period to which the life table refers. Methods of life table construction are contained in a number of works, including the following: Spiegelman, *Introduction to Demography* (1955), pp. 72-93; Stolnitz, *Life Tables from Limited Data* (1956); Barclay, *Techniques of Population Analysis* (1959), pp. 93-122; Mizushima, *Seimeihyo no kenkyu* (1963); Pressat, *Principes d'analyse* (1966). Calculation of a life table requires accurate statistics of deaths classified by age groups, as well as data on the numbers of population in each age group. Methods of life table construction have also been developed for use where vital statistics are lacking or unreliable. See Mortara, *Methods of Using Census Statistics* ... (1949), pp. 1-10; Arriaga, *New Life Tables for Latin American Populations* ... (1968), pp. 8-15. Systems of model life tables have also been developed for use where the basic data required for life table construction are unavailable. See United Nations, *Age and Sex Patterns of Mortality* ... (1955); ———, *Methods for Population Projections by Sex and Age* (1956); Coale and Demeny, *Regional Model Life Tables and Stable Populations* (1966); Ledermann, *Nouvelles tables-types de mortalité* (1969).

<sup>17</sup> The advantages of different measures of mortality for the purpose of measuring progress in public health are discussed by Dolejši, "K problému komplexního ukazatele ..." (1964), pp. 346-351.

<sup>18</sup> Even in some countries where birth registration is considered to be satisfactory, death registration data are inadequate, infant deaths in particular being frequently under-reported.

level of the crude death rate were much less pronounced than in the developing regions.

13. Within each of the developing regions there is also considerable variation in the level of crude death rates for individual countries. In Africa the number of deaths per 1,000 population during the early to mid-1960s ranged from about 9 in the small, atypical island of Mauritius to 30 or over according to surveys carried out in some countries of Western and Middle Africa. In the Latin American region, the crude death rate was as low as 7 per 1,000 in Puerto Rico, but rates above 20 have been estimated for Haiti and Bolivia. In Asia, very low crude death rates of 5-7 per 1,000 are found not only in the more highly developed countries in this region, such as Israel, Japan and the Ryukyu Islands, but also in several of the lesser developed countries. In contrast, crude death rates above 20 have been estimated for Indonesia, Iran, Laos and Nepal.<sup>19</sup>

14. It is noteworthy that some developing countries have attained death rates lower than those now prevailing in industrialized countries. However, if age structure of the population is taken into account, the mortality rates of the industrialized countries are, in general, lower. This paradox is explained by the higher proportion of older persons in the populations of the industrialized countries.<sup>20</sup>

15. The effect of differences in age structure on regional death rates has been demonstrated by comparing unadjusted crude rates for 1965 with rates standardized for age structure. Thus, the average crude death rate for the developing regions would be raised by three points—from 18 to 21 per 1,000—if the age structure of the population were the same as that of the developed regions. While the crude death rate for Latin America was only slightly higher than that of Europe in 1965, the less favourable mortality situation in the former region is apparent from the standardized rates, which were 14 and 19 for the two regions respectively.<sup>21</sup>

16. Another satisfactory measure of differences between the mortality levels of different populations is expectation of life at birth, since it is not affected by age structure of the populations. The regional estimates presented in table V.1 show that the peoples of the world who are economically deprived are also those with the shortest life expectancy. According to prevailing mortality conditions in the late 1960s, a person born in Northern Europe could expect to live nearly thirty years longer on average than a person born in Africa.<sup>22</sup> The gap in average life expectancy between Northern Europe and Asia was

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<sup>19</sup> United Nations, *Demographic Yearbook, 1968* ... (1969), tables 3 and 18.

<sup>20</sup> For a fuller discussion of the effect of age structure on the crude death rate, see United Nations, *Population Bulletin of the United Nations, No. 6* ... (1963), p. 14.

<sup>21</sup> Macura and El-Badry, "Diversity or uniformity of demographic problems? ..." (1968), p. 204.

<sup>22</sup> The estimated average life expectancy in Africa of about 43 years suggests conditions of mortality not very different from those prevailing in the United States in the middle of the nineteenth century. Expectation of life at birth for white males around 1850 has been estimated at about 40 years, while for females it was lower. Jacobson, "An estimate of the expectation ..." (1957), p. 198.

TABLE V.1. ESTIMATED CRUDE DEATH RATES AND EXPECTATION OF LIFE AT BIRTH FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-1970<sup>a</sup>

Major areas and regions	Crude death rate (Deaths per 1,000 population)	Expectation of life at birth (years)
World total .....	14	53
Developing regions .....	16	50
More developed regions .....	9	70
Africa .....	21	43
Western Africa .....	24	39
Eastern Africa .....	22	42
Middle Africa .....	24	39
Northern Africa .....	17	50
Southern Africa .....	17	48
Asia (excluding the USSR) .....		
East Asia .....	14	52
Mainland region .....	15	50
Japan .....	7	71
Other East Asia .....	10	60
South Asia .....	17	49
Middle South Asia .....	17	48
South-East Asia .....	16	50
South-West Asia .....	16	51
Europe (excluding the USSR) .....	10	71
Western Europe .....	11	72
Southern Europe .....	9	70
Eastern Europe .....	9	71
Northern Europe .....	11	72
Latin America .....	10	60
Tropical South America .....	10	60
Middle America (mainland) .....	10	60
Temperate South America .....	9	65
Caribbean .....	11	58
Northern America .....	9	70
Oceania .....	10	65
Australia and New Zealand .....	9	72
Melanesia .....	18	47
Polynesia and Micronesia .....	9	61
USSR .....	8	70

SOURCE: United Nations, *The World Population Situation in 1970* (1971), p. 32.

<sup>a</sup> For the developing regions the figures are estimates of the order of magnitude and are subject to a substantial margin of error.

more than twenty years and between Northern Europe and Latin America about twelve years. The range of expectation of life among the more developed regions is shown to be very narrow—from 65 years in Temperate South America to 72 years in Northern and Western Europe and in Australia and New Zealand. In addition to these regions, the remaining regions of Europe, Northern America, Japan and the USSR had achieved life expectancies of at least 70 years by the late 1960s.

17. Very significant inequalities in expectation of life at birth have been observed between populations within the developing regions. For example, during the period 1955-1960 average life expectancy among Central American countries is estimated to have ranged from 36-45 years in Haiti to 56-62 years in Costa Rica and Cuba, and

within South America it varied from 40-45 in Bolivia to 65-68 years in Uruguay.<sup>23</sup> Available information suggests a range of similar magnitude among Asian countries. The more meagre and less reliable statistics for Africa suggest somewhat greater uniformity in that continent, though expectation of life in Southern and Northern Africa is unquestionably above the average for the continent.

## 2. PAST TRENDS

18. Knowledge of the mortality conditions that prevailed in the now developed regions in the distant past is very incomplete, but it is clear that the life span was very short (see chapter II, section A). A life table for ancient Greece, prepared from burial inscriptions, indicates an average length of life of about 30 years around 400 B.C.<sup>24</sup> Estimates of life expectancy in various European countries from the thirteenth to the seventeenth century, based on fragmentary data, range from 20 to 40 years.<sup>25</sup> Mortality rates were very irregular at the time, for certain years being double or treble the long-range average. Such large variations in mortality rates were due to frequent outbreaks of epidemics (for example, plague and smallpox) and to great famines. Steady, if slow, improvements in conditions affecting mortality are indicated by the life tables for a number of European population groups during the eighteenth century, most of which show expectation of life at birth ranging from about 35 to 40 years.<sup>26</sup>

<sup>23</sup> Sauvy, "La population des pays ..." (1963), pp. 63-65. See also Somoza's studies of mortality in Latin American countries at varying dates around 1950-1960. Somoza, "Trends of mortality ..." (1965), pp. 222-226; and his "Levels and trends of mortality in Latin America ..." (1967).

<sup>24</sup> Valaoras, "The expectation of life in ancient Greece" (1936), pp. 403-407.

<sup>25</sup> The expectation of life in Geneva was estimated at about 21 years in the period 1561-1600 and about 26 years in the period 1601-1700. Bickel, "Early Swiss mortality tables" (1949), p. 359. A generation life table of males born 1426-1450 in England, constructed from the manuscript inquisitions *post mortem* in the Public Record Office, shows an expectation of life at birth of 33 years. Russell, "Demographic pattern in history" (1948), p. 404. In the first life table ever constructed, the expectation of life in the city of Breslau during 1687-1691 was found to be 33.5 years. Halley, "An estimate of the degree of mortality of mankind" (1693). Genealogical records for men in the ruling classes of Europe born during the period 1480-1579 indicate an expectation of life for the group of about 30 years. Peller, "Studies on mortality since the Renaissance" (1947), p. 79. The expectation of life at birth in the Normandy parish of Crulai in the period 1690-1750 was estimated at 32-33 years. Gautier and Henry, "La population de Crulai ..." (1958).

<sup>26</sup> The Swedish tables for 1755-1776 show an expectation of life at birth of 33.2 years for males and 35.7 years for females. French tables by Deparcieux, published in 1746, gave an expectation of life at birth of 37.5 for both sexes. The corresponding figure from the Carlisle tables, based on the experience of two parishes in Carlisle, England, during 1779-1787, is 38.7 years. Dublin, Lotka and Spiegelman, *Length of Life* ... (1949), pp. 35-36, 346-351. Dublin and his associates surmised from what evidence they could gather that in the United States at the end of the eighteenth century the life expectancy at birth was between 35 and 40 years. *Ibid.*, p. 41. Henry estimated life expectancy of the rural population of France to have been about 30-35 years during the eighteenth century and that of the urban population even somewhat lower. Henry, "The population of France in the eighteenth century" (1965), pp. 434-456.

19. Stolnitz has suggested that the average expectation of life at birth of some 40 years in "the West" (including Northern and Western Europe, Northern America and Oceania) in 1850 represents the maximum attained by that date in any major region.<sup>27</sup> Some privileged groups could claim a better record before 1850; for example, it has been estimated that the expectation of life at birth of members of the British peerage, after oscillating with a maximum of just over 38 years during the period 1550 to 1750, gradually increased between 1750 and 1850 until in the last quarter of this period the expectation of life was 52.1 years for males and 58.4 years for females.<sup>28</sup> Also, according to estimates by Henry, the citizens of Geneva enjoyed an expectation of life of just over 40 years as far back as the first half of the eighteenth century.<sup>29</sup> For national populations, however, the Scandinavian countries probably had the most favourable mortality experience at given points in time. For the latter two-thirds of the eighteenth century, the crude death rate averaged 26-29 per 1,000 in Denmark, Finland, Iceland, Norway and Sweden, which is low compared to the rates in other European countries at that time.<sup>30</sup> Expectation of life at birth exceeded 40 years for the first time in Sweden in the 1820s and rose to 55.7 years by the first decade of the 1900s.<sup>31</sup>

20. The period since the beginning of the nineteenth century, especially since 1850, has been an era of outstanding progress in the prolongation of human life. An idea of the extent of this progress in several developed countries is given by the data in table V.2, which shows average values of expectation of life at birth for the combined populations of six European countries and a state of the United States, beginning in 1840. The rate of improvement was slower during the nineteenth than during the twentieth century, and decennial increases in life expectancy were most remarkable during the two decades following the turn of the present century and in the years immediately after the Second World War.

21. In contrast with the trends in Northern Europe, Oceania and the United States, the decline of mortality had a comparatively late start in some other parts of Europe and the Soviet Union. For example, in Italy as late as 1871-1880 life expectancy at birth did not exceed

TABLE V.2. AVERAGE EXPECTATION OF LIFE AT BIRTH FOR SIX EUROPEAN COUNTRIES AND ONE STATE IN THE UNITED STATES, BOTH SEXES, 1840-1965<sup>a</sup>

Year	Expectation of life at birth (years) <sup>b</sup>	Decennial increase in life expectancy between two successive dates (years)
1840 .....	41.0	
1850 .....	41.5	0.5
1860 .....	42.2	0.7
1870 .....	43.5	1.3
1880 .....	45.2	1.7
1890 .....	47.1	2.0
1900 .....	50.5	3.4
1910 .....	54.3	3.8
1920 .....	58.3	4.0
1930 .....	61.7	3.4
1940 .....	64.6 <sup>c</sup>	2.9
1950 .....	69.8 <sup>c</sup>	5.2
1960 .....	72.0 <sup>c</sup>	2.2
1965 .....	72.3 <sup>c</sup>	0.3 <sup>d</sup>

SOURCES: For 1840-1930 data are adapted from Hart and Hertz, "Expectation of life as an index of social progress" (1944); and Valaoras, *Stichia viometrias ke statistikis* (1943), p. 190. Data for later years have been compiled from United Nations, *Demographic Yearbook 1967* ... (1968), table 29.

<sup>a</sup> The countries are: Denmark, England and Wales, France, Netherlands, Norway and Sweden; the state in the United States is Massachusetts.

<sup>b</sup> Arithmetic average of expectation of life at birth for each sex.

<sup>c</sup> Includes the entire United States.

<sup>d</sup> Five-year increase.

35 years, and a steady fall of mortality did not start before 1875.<sup>32</sup> The decline in mortality was faster in those European countries where it began later. For example, according to Stolnitz's data, the rise in expectation of life at birth in Austria in the first three decades of the twentieth century matched the rise in the so-called "Western" countries during a period roughly twice as long, beginning around 1860.<sup>33</sup> In European Russia, average life expectancy around 1896-1897 was only about 32 years—below the level for Sweden in 1760, and as late as 1926-1927, it was only 44 years in the Soviet Union as a whole. But over the next three and a half decades the USSR realized a gain of twenty-six years in life expectancy for males and females combined, so that the value for 1960-1961 was 70 years.<sup>34</sup> In Italy it took fifty-five years for the crude death rate to decrease from about 30 (around 1875) to about 15 (around 1930), whereas such a fall had taken about 150 years in France and Sweden and about 125 years in England.<sup>35</sup> Expectation of life in

<sup>27</sup> Stolnitz, "A century of international mortality trends ..." (1955), p. 27.

<sup>28</sup> Hollingsworth, *The Demography of the British Peerage* (1964), pp. 56-57. "The levels of mortality experienced by the aristocracy during the three and a half centuries from the Elizabethans to the present day were presumably always lower than obtained amongst the general population, except for the special effects of the two world wars in the twentieth century. ... While progress was enjoyed first by the few, and only later by the many it spread throughout the population comparatively fast once it had been initiated. The expectation of life of the general population born around 1846 in England and Wales was 41.6 years, and for those born around 1876 it was 48.5; the same expectations of life were applicable to the nobility in about 1752 and 1793, respectively, showing time lags of ninety-four and eighty-three years between the highest social class and the general population." *Ibid.*, pp. 67-68.

<sup>29</sup> Henry, *Anciennes familles genevoises* (1956), pp. 157-158.

<sup>30</sup> Gille, "The demographic history of the Northern European countries ..." (1949), p. 33.

<sup>31</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 23, 50.

<sup>32</sup> Cipolla, "Four centuries of Italian demographic development" (1965), p. 578. For trends in Czechoslovakia, see Musil, "Rozbor dynamiky ..." (1959).

<sup>33</sup> Stolnitz, "A century of international mortality trends ..." (1955), p. 42.

<sup>34</sup> Ulanis, *Rozhdaemost i prodolzhitel'nost zhizni* ... (1963), p. 104; Ovcharov, "Morbidity factors and trends ..." (1967), p. 420; Brushlinskaya, "The importance of morbidity statistics ..." (1967), p. 395. Data for Sweden are given in United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), p. 50. See also Rodina and Dmitrieva, "Postroenie tablits smertnosti ..." (1965).

<sup>35</sup> Cipolla, "Four centuries of Italian demographic development" (1965), pp. 579-580.

Greece, which is estimated to have been about 36 years in the 1860s, increased only gradually in the latter part of the nineteenth and early twentieth centuries; after 1920, however, improvement was much more rapid, and life expectancy increased from about 45 years in 1920-1924 to 65 years in 1955-1959.<sup>36</sup>

22. Trends in crude death rates in thirty developed countries from 1906 to 1969, and in ten developing countries from 1920 to 1969, are shown in tables V.3 and V.4 respectively. It is seen that during this period the most rapid improvements in mortality were registered in Eastern and Southern Europe, in the USSR, and in

countries of Asia and Latin America, rather than in those regions where mortality decline began relatively early. In nearly all countries in the former regions, mortality rates decreased by at least one-half since the early part of the century, and, in some cases, by as much as four-fifths. Some of the largest declines were registered by developing countries; for example, in Singapore, the crude death rate dropped from about 30 to 5 per 1,000 between 1920 and 1969, in China (Taiwan), from 26 to 5, and in Mauritius from 32 to 8. Changing age structure, as well as changing mortality conditions, contributed to these rapid declines, since, with fertility remaining relatively stable, the age pattern of mortality decline experienced by the developing countries has tended to increase the proportion of population in the younger age groups.

<sup>36</sup> Valaoras, "A reconstruction of the demographic history of modern Greece" (1960), p. 132.

TABLE V.3. CRUDE DEATH RATES FOR MORE DEVELOPED COUNTRIES, 1906-1969  
(Deaths per 1,000 population)

Period	Northern Europe						Western Europe					
	Denmark	Finland	Ireland	Norway	Sweden	United Kingdom (England and Wales)	Austria*	Belgium	Federal Republic of Germany <sup>b</sup>	France	Netherlands	Switzerland
1906-1909	13.9	17.5	16.8	13.8	14.4	15.0	22.9	16.1	17.9	19.5	14.5	16.2
1910-1914	12.9	16.1	16.4	13.2	13.9	13.9	17.9	15.0	16.6	19.8	13.0	14.6
1915-1919	13.1	19.5	17.3	14.2	14.8	15.5	21.6	15.7	20.3	24.0	13.9	14.7
1920-1924	11.4 <sup>c</sup>	15.6	14.6	11.8	12.4	12.3	16.7	13.7	13.9	17.3	11.0	12.9
1925-1929	11.1	14.9	14.5	11.1	12.1	12.2	14.7	13.8	11.9	17.3	10.0	12.2
1930-1934	10.8	13.6	14.1	10.4	11.7	12.0	13.5	13.2	11.0	16.0	9.0	11.7
1935-1939	10.7	13.3	14.3	10.2	11.7	12.0	13.9	13.2	11.9	15.7	8.7	11.6
1940-1944	10.0	17.3	14.6	10.7	10.8	12.3	14.4	15.1	12.2 <sup>c</sup>	17.8	10.3	11.4
1945-1949	9.6	11.8	13.7	9.3	10.4	11.5	15.3	13.4	11.3 <sup>c</sup>	13.9	9.4	11.1
1950-1954	9.0	9.7	12.6	8.6	9.7	11.6	12.3	12.2	10.7	12.7	7.5	10.1
1955-1959	9.1	9.1	12.0	8.8	9.6	11.6	12.5	11.9	11.0	11.8	7.6	9.9
1960-1964	9.7	9.2	11.8	9.5	10.0	11.8	12.5	12.1	11.1	11.2	7.8	9.5
1965	10.1	9.6	11.5	9.5	10.1	11.5	13.0	12.2	11.2	11.2	8.0	9.3
1966	10.3	9.4	12.2	9.6	10.0	11.7	12.5	12.1	11.3	10.8	8.1	9.3
1967	9.9	9.4	10.8	9.6	10.1	11.3	13.0	12.0	11.2	11.0	7.9	9.1
1968	9.7	9.6	11.4	9.9	10.4	11.9	13.1	12.7	11.9	11.1	8.3	9.3
1969	9.8	9.8	11.5	9.9	10.4	11.9	13.4	12.4	12.0	11.3	8.4	9.3

Period	Eastern Europe						Southern Europe				
	Bulgaria	Czechoslovakia <sup>d</sup>	German Democratic Republic <sup>b</sup>	Hungary <sup>a</sup>	Poland <sup>a</sup>	Romania <sup>a</sup>	Greece <sup>a</sup>	Italy	Portugal	Spain	Yugoslavia
1906-1909	24.0	21.8	17.9	24.0 <sup>f</sup>	22.9	26.3	20.3	21.5	20.2	24.3	24.9 <sup>g</sup>
1910-1914	23.0	20.0	16.6	22.9 <sup>f</sup>	22.0 <sup>h</sup>	24.5	...	19.1	20.2	22.3	21.7 <sup>g,i</sup>
1915-1919	22.9	19.9	20.3	21.7 <sup>f</sup>	26.9 <sup>j</sup>	34.8 <sup>i</sup>	...	25.0	25.9	24.3	...
1920-1924	21.3	16.5	13.9	20.9	20.6	24.0	21.2	17.5 <sup>c</sup>	21.5	21.0	20.5 <sup>c</sup>
1925-1929	18.5	15.2	11.9	17.3	17.0	21.6	17.4	16.6	18.7	18.4	20.0
1930-1934	15.8	13.7	11.0	15.8	15.0	19.8	16.8	14.1	16.9	16.4 <sup>i</sup>	18.4
1935-1939	13.9	13.2	11.9	14.3	14.0 <sup>c</sup>	19.1	14.6	13.9	15.9	17.9	15.9
1940-1944	13.1	14.3	12.2 <sup>c</sup>	13.9 <sup>c</sup>	...	18.9 <sup>j</sup>	26.0	14.5	15.9	15.3	...
1945-1949	13.3	13.6	17.4 <sup>c</sup>	14.5	11.4 <sup>i</sup>	17.5 <sup>c</sup>	20.9	11.2 <sup>c</sup>	14.0	12.0	13.2 <sup>i</sup>
1950-1954	10.2	10.9	11.7	11.4	11.1	12.0	7.2	9.9	11.8	10.2	12.4
1955-1959	8.9	9.7	12.4	10.3	9.0	9.7	7.3	9.6	11.5	9.4	10.5
1960-1964	8.2	9.5	13.1	10.1	7.6	8.6	7.8	9.8	10.8	8.8	9.4
1965	8.2	10.0	13.3	10.7	7.4	8.6	7.9	10.0	10.3	8.6	8.7
1966	8.3	10.0	13.0	10.0	7.3	8.2	7.9	9.6	10.8	8.6	8.1
1967	9.0	10.1	13.1	10.7	7.8	9.3	8.3	9.7	10.2	8.7	8.7
1968	8.6	10.7	14.0	11.2	7.6	9.6	8.3	10.1	10.0	8.7	8.7
1969	9.5	11.2	14.3 <sup>k</sup>	11.3	8.1	10.1	8.1	10.1	10.6	9.2	9.2

TABLE V.3. CRUDE DEATH RATES FOR MORE DEVELOPED COUNTRIES, 1906-1969 (continued)  
(Deaths per 1,000 population)

Period	Northern America		South America (Argentina)	Oceania		Asia (Japan)	Soviet Union (USSR) <sup>a</sup>
	Canada	United States <sup>1</sup>		Australia	New Zealand <sup>m</sup>		
1906-1909	...	15.1	...	10.8	9.8	20.8	29.5
1910-1914	...	13.9	17.1	10.7	9.3	20.2	27.1
1915-1919	...	14.4	17.1	10.8	10.5	22.5	34.4
1920-1924	11.9	12.0	14.0	9.8	9.0	23.0	30.0
1925-1929	11.2	11.8	13.0	9.4	8.6	19.8	20.4
1930-1934	10.0	11.0	11.6	8.8	8.3	18.1	20.4 <sup>j</sup>
1935-1939	9.9	11.0	11.5	9.6	9.0	17.4	17.9
1940-1944	9.9	10.6	10.4	10.8	9.9	16.3	18.0 <sup>j</sup>
1945-1949	9.4	10.0	9.6	9.9	9.5	16.8	...
1950-1954	8.7	9.5	8.8	9.4	9.2	9.4	9.4
1955-1959	8.1	9.4	8.6	8.8	9.0	7.8	7.7
1960-1964	7.7	9.5	8.5	8.7	9.0	7.3	7.2
1965	7.6	9.4	8.5	8.8	8.9	7.2	7.3
1966	7.5	9.5	8.5	9.0	9.1	6.8	7.3
1967	7.4	9.4	8.7	8.7	8.6	6.8	7.6
1968	7.4	9.7	...	9.1	9.1	6.8	7.7
1969	7.3	9.5	...	...	8.9	6.7	8.1

SOURCES: For 1906-1919, data are mainly from Bunle, *Le mouvement naturel de la population* ... (1954); for 1920-1969, data are mainly from United Nations, *Demographic Yearbook, 1966* ... (1967), table 17; —, 1967 ... (1968), table 17; and —, 1969 ... (1970), table 43. Where applicable, additional sources are indicated in foot-notes.

<sup>a</sup> Two-year average.

<sup>1</sup> Three-year average.

<sup>j</sup> For one year only.

<sup>m</sup> Including East Berlin.

<sup>1</sup> Prior to 1945, data are for expanding area. For details, see original sources. Data for 1906-1919 from Linder and Grove, *Vital Statistics Rates in the United States, 1900-1940* (1947), pp. 122-124.

<sup>m</sup> Excluding Maoris. Data compiled from New Zealand, Department of Statistics, *Report on the Vital Statistics of New Zealand for the Year 1961* (1962), p. 11; —, *Monthly Abstract of Statistics, January 1968* (1968), pp. 5, 8; and —, *December 1970* (1970), pp. 13, 16.

<sup>a</sup> Prior to 1935, estimates based on Uralis, *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 80-90; beginning 1935, official rates from USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Narodnoe khoziaistvo SSSR v 1968 g.* (1969), p. 36. Prior to 1930, for European part of country only. Time period of rates differs from that indicated in stub for 1906-1919 and 1930-1944; see source. A series of rates which differ from those shown here for some periods has been estimated by Biraben in his "Essai sur l'évolution démographique de l'URSS" (1958).

... Not available.

<sup>a</sup> Major territorial changes may effect the comparability of the series. For details, see original sources.

<sup>1</sup> Prior to 1945, data pertain to territory of pre-war Germany.

<sup>j</sup> Four-year average.

<sup>m</sup> Prior to 1920, data from Czechoslovakia, Ústřední správa geodézie a kartografie, *Atlas obyvatelstva ČSSR* (1962), p. 38.

<sup>1</sup> Prior to 1950, estimates from Valaoras, "Mortality and fertility control in Greece" (1968), p. 354; see also his "A reconstruction of the demographic ..." (1960).

<sup>a</sup> For 1906-1910, 1911-1915 and 1916-1920, respectively. Rates are from Acsádi, Klinger and Szabady, *A világ népessége* (1959), p. 120.

<sup>a</sup> For Serbia only.

TABLE V.4. CRUDE DEATH RATES FOR SELECTED DEVELOPING COUNTRIES, 1920-1969  
(Deaths per 1,000 population)

Period	Ceylon	Chile	China (Taiwan)	Jamaica	Malaysia, West (formerly Malaya) <sup>a</sup>	Mauritius	Mexico	Puerto Rico	Singapore	Trinidad and Tobago
1920-1924	29	30	26	24	...	32	25 <sup>b</sup>	...	31	22
1925-1929	25	26	23	20	...	27	26	...	29	20
1930-1934	22	24	21	18	22 <sup>b</sup>	32	26	21 <sup>b</sup>	24	19
1935-1939	25	23	20	16	21	27	23	19	22	17
1940-1944	20	20	18 <sup>c</sup>	14	20 <sup>a</sup>	26	22 <sup>j</sup>	16	21 <sup>a</sup>	16
1945-1949	16	17	15 <sup>b</sup>	14	17 <sup>b</sup>	25	18	12	13 <sup>b</sup>	13
1950-1954	12	14	10	12	14	15	15	9	10	11
1955-1959	10	13	8	10	11	12	12	7	7	10
1960-1964	9	12	6	9	9	10	10	7	6	7
1965	8	11	6	8	8	9	10	7	6	7
1966	8	10	5	8	8	9	10	6	6	7
1967	8	10	6	7	8	9	9	6	5	7
1968	8	9	6	8	8	9	10	6	6	7
1969	...	...	5	7	7	8	9	6	5	...

SOURCES: United Nations, *Demographic Yearbook, 1966* ... (1967), table 17; —, 1967 ... (1968), table 17; —, 1969 ... (1970), table 43.

... Not available.

<sup>a</sup> Prior to 1941, including Singapore.

<sup>b</sup> Three-year average.

<sup>c</sup> Four-year average.

<sup>j</sup> Two-year average.

23. Statistics for most of the developing countries in table V.4 show that, while some improvements in mortality conditions were taking place in the 1920s and 1930s, the most rapid fall in mortality levels has unquestionably occurred after the Second World War. In Mexico, for example, the crude death rate was still as high as 22 per 1,000 in the early 1940s, but by the mid-1960s it had fallen to about 10. Fairly similar trends are observed in Ceylon, Chile and Malaysia. On the other hand, mortality decline seems to have begun earlier in the Caribbean islands of Jamaica, Puerto Rico, and Trinidad and Tobago than in most of the developing countries of Asia and Latin American for which trend data are available.

24. Life tables of satisfactory quality available for several developing countries also illustrate the fact that mortality has been declining at a faster pace in these countries in recent decades than was the case when the now developed countries had similar levels of mortality. In Trinidad and Tobago, average life expectancy rose from 38.8 to 61.4 during the thirty-four years from 1920-1922 to 1954-1956, whereas Sweden required 110 years, from 1810 to 1920, to accomplish the same feat.<sup>37</sup> Stolnitz provides evidence that survival trends in Guyana, Jamaica and Trinidad between the 1920s and the 1940s were equal to achievements for which the western developed countries required over half a century.<sup>38</sup> Ceylon gained twenty-eight years in life expectancy during the thirty-three years following 1921; more than one-quarter of this gain occurred during the seven years between 1947 and 1954.<sup>39</sup> Taiwan gained about twenty years in life expectancy from 1936-1941 to 1959-1960.<sup>40</sup>

25. Average life expectancy at birth in Puerto Rico, which was estimated at about 38 years in 1910, had risen to only 40.6 years by 1930, and to 46.0 years by 1940, at which time it was seventeen years less than in the United States. The average increase of 1.5 years annually during the next decade is one of the fastest rates of increase ever recorded. Progress continued during the 1950s, though at a less rapid pace, and average expectation of life by 1960 reached 69.4 years, a figure only negligibly below that for the United States in the same year.<sup>41</sup>

26. Comparisons of Chilean mortality experience with that for selected European countries also illustrates how mortality differences between developed and developing countries have been contracting. From 1920 to 1960 average life expectancy for males and females combined increased from 31 to 57 years, or a total of twenty-six years.<sup>42</sup> Subtraction of these values from the estimated average life expectancy of developed countries in table V.2 shows that the advantage held by the latter countries over Chile was reduced from twenty-seven to fifteen years.

Miró examined values of average life expectancy for twenty Latin American Republics at two recent dates in the 1940s and the 1950s and found that life expectancy had been extended greatly in all countries, but that the improvements had been most noteworthy in places where expectation of life at birth had previously been lowest.<sup>43</sup>

27. The developing countries which have satisfactory data for studying mortality trends are not representative of the populations of these regions as a whole, and there remain wide gaps in knowledge of mortality levels and trends. It is reasonably certain that high mortality and low expectation of life were the rule in these areas well into the twentieth century.<sup>44</sup> In Asia, data are almost totally lacking for several countries with very large populations, and for other large populations trend data are very uncertain. In a span of approximately forty years, from 1891-1901 to 1931-1941, it has been estimated that British India realized a gain of only about eight years in average life expectancy, from 24 to 32 years.<sup>45</sup> However, official Indian life tables for 1951-1960 showed an acceleration in improvements in mortality conditions, with life expectancy for both sexes combined increasing to 41 years.<sup>46</sup> Although Pakistan experienced a gain of about six years in life expectancy between 1951 and 1960-1965,<sup>47</sup> its estimated level of only 40 years places it, along with India, at about the level that developed western countries had achieved in 1840 (table V.2).

28. Except for the island of Mauritius in the Indian Ocean, no adequate data exist to study mortality trends for countries in the African region. There is some evidence of a relatively slow, though continuous rise in average life expectancy in Egypt; by 1959-1961 the level is estimated to have reached 51.6 years for males and 53.8 years for females. This represents a gain of sixteen years for males and twelve years for females over the levels estimated for 1936-1938.<sup>48</sup> Among the Coloured population of South Africa a gain in life expectancy of about seven years—from 40 to 47—is estimated to have been achieved between 1936 and 1951.<sup>49</sup>

29. In summary, mortality differences between developed and developing regions appear to be getting smaller, as a result of the recent important declines in the latter

<sup>37</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 . . . (1963), p. 51.

<sup>38</sup> Stolnitz, "A century of international mortality trends . . ." (1955), p. 52.

<sup>39</sup> Meegama, "Malaria eradication and its effect on mortality levels" (1967), pp. 207-238.

<sup>40</sup> Stolnitz, "Recent mortality trends . . ." (1965), p. 128.

<sup>41</sup> Vazquez, Morales and Janer, *Tablas de vida abreviadas para Puerto Rico* . . . (1963), pp. 23-27.

<sup>42</sup> Somoza and Tacla, "La mortalidad . . ." (1966), p. 39.

<sup>43</sup> Miró, "The population of Latin America" (1964), pp. 38-39. See also Sauvy, "La population des pays d'Amérique latine" (1963), pp. 49-64; Pan American Health Organization, *Health Conditions in the Americas, 1961-1964* (1966), pp. 9-10.

<sup>44</sup> It has been estimated, for example, that the average length of life of slaves in Guyana between 1820 and 1832 was under 23 years, implying a crude death rate of about 40 per 1,000 population, and that there was little improvement in the mortality experience of that country in the years between manumission and the end of the nineteenth century. Roberts, "A life table . . ." (1952), p. 243.

<sup>45</sup> Davis, *The Population of India and Pakistan* (1951), p. 36.

<sup>46</sup> United Nations, *Demographic Yearbook, 1964* . . . (1965), p. 620. According to a study by Visaria, infant and child mortality were underestimated in the official life tables. His estimates show life expectancy at birth rising from about 33 years in 1941-1951 to 37.4 years in 1951-1961. Visaria, "Mortality and fertility in India . . ." (1969), pp. 111-112.

<sup>47</sup> Khan, "Public health programmes . . ." (1966), p. 11.

<sup>48</sup> El-Badry, "Trends in the components of population growth . . ." (1965), p. 157.

<sup>49</sup> Stolnitz, "Recent mortality trends . . ." (1965), p. 128.



regions. Thus, world mortality conditions appear to be approaching the completion of the circle; prior to the historical decline of mortality in the now developed countries, the level had probably not varied very much between regions. Mortality trends that accompanied the development of the West then gave rise to inequities in average length of life. With the improvements in the techniques of controlling disease in developing countries since the Second World War, these differences have substantially decreased, though in some regions, particularly in Africa, the gap between prevailing death rates and those in developed regions is still very wide.

## B. Sex and age patterns of mortality

30. In nearly all countries having reliable statistics there are notable inequities in mortality between males and females subjected to the same general environmental conditions. Though there are a few exceptions, females now usually have an over-all advantage, as is seen in recent data on average life expectancy at birth for each sex. Improvements in health conditions which have brought life expectancy to high levels in most of the world's developed regions appear to have benefited females more than males, with a consequent widening of the mortality gap between the sexes.

31. The incidence of death, of course, varies greatly with age, and long-term improvements in mortality have been found to affect different age groups to a different extent. Without statistics of deaths classified by sex and age groups, it would not be possible to disengage the effects of social and economic factors affecting mortality from those of the sex and age composition of the population in which the deaths occur. Reasonably reliable statistics of this type are available for less than half of the world's population, however, their coverage being particularly sparse in the economically less developed regions.

### 1. SEX DIFFERENCES IN MORTALITY

32. Expectation of life at birth is almost universally higher for females than for males, both in developed countries with low mortality and in developing countries with higher mortality levels. Ceylon, India and Pakistan appear to be the exceptions in recent years to the predominant pattern of higher female life expectancy. According to life tables for these countries, expectation of life at birth for males exceeded that for females by 0.5 years in Ceylon (1962), 1.3 years in India (1951-1960) and 2.7 years in Pakistan (1962-1964).<sup>50</sup> Available data suggest that higher female than male mortality may also be found among several other populations in Asia and Africa, but the evidence is less clear than in the case of the three

countries mentioned above.<sup>51</sup> Moreover, other instances of higher female than male mortality may occur in those parts of the world for which no reliable documentation is available.

33. In countries of low mortality, not only is the expectation of life at birth higher for females than for males, but death rates at each age are usually higher for males than for females.<sup>52</sup> The same pattern does not hold true, however, for the developing countries, where mortality levels are generally higher. Numerous instances are found of higher female than male mortality at particular ages, despite the higher overall male mortality which characterizes most of these countries. While infant mortality for females is almost invariably less than that for males,<sup>53</sup> at ages 1-4 years recorded death rates are higher for girls than for boys in such countries as Mauritius, Réunion, the United Arab Republic, Costa Rica, Guatemala, Mexico, Puerto Rico, and China (Taiwan), as well as in Ceylon, India and Pakistan.<sup>54</sup> Excessive female mortality in the reproductive ages, as well as some younger ages, was a common occurrence among the populations of Northern and Western Europe before 1920, and even later in Eastern and Southern Europe.<sup>55</sup> As late as 1930 in Japan mortality was higher for females than for males in the age span from five to forty years.<sup>56</sup> In recent years, however, such a differential appears only among some populations in the world's developing regions. For example, statistics for the 1960s show higher female than male mortality still persisting at the ages of

<sup>51</sup> A life table for the Asian population of South Africa (1950-1952) showed a higher life expectancy for males than for females, as did life tables based on sample survey data for Cambodia (1958-1959) and Upper Volta (1960-1961). United Nations, *Demographic Yearbook*, 1967 ... (1968), table 29. See also Soda, "Trends of mortality in Asia and the Far East" (1967), p. 362. It has been suggested that the high sex ratio of the population enumerated in the 1966 census of Iran (107 males per 100 females) may be indicative of higher female than male mortality. El-Badry, "Higher female than male mortality in some countries of South Asia ..." (1969), p. 1239.

<sup>52</sup> An exception is Yugoslavia, where higher female than male mortality at ages 1-4 years has persisted in the period following the Second World War. Plavec, *Smrtnost stanovništva u Jugoslaviji* ... (1967), pp. 13-14.

<sup>53</sup> Albania and the United Arab Republic were among the very few countries recently reporting higher infant mortality for females than for males. United Nations, *Demographic Yearbook*, 1967 ... (1968), table 16. In some areas of Yugoslavia, post-neonatal infant mortality was found to be lower among males than among females. Tasić et al., *Smrtnost odojčadi u Jugoslaviji* (1966), pp. 48-49.

<sup>54</sup> United Nations, *Demographic Yearbook*, 1967 ... (1968), table 21. Excess female mortality at the ages of early childhood has sometimes been attributed to parental preferences for male children and consequent neglect of females. Jain, "Actuarial report—1951" (1954), p. 26. See also Robinson, ed., *Studies in the Demography of Pakistan* (1967), p. 11. It has been noted, however, that unless reported infant mortality rates, which show an excess of male mortality, are so erroneous as to reverse the truth, they pose a challenge to the argument that in certain societies female infants are given less attention than males on cultural grounds. El-Badry, "Higher female than male mortality in some countries of south Asia ..." (1969), p. 1242.

<sup>55</sup> Stolnitz, "A century of international mortality trends, II" (1956), pp. 23-24; Pascua, "Recent mortality-trends in areas of lower death-rates" (1955), p. 261.

<sup>56</sup> Pascua, "Recent mortality-trends in areas of lower death-rates" (1955), pp. 262, 280.

<sup>50</sup> For Pakistan, see Yusuf, "Abridged life tables for Pakistan ..." (1967), p. 541; for Ceylon and India, see United Nations, *Demographic Yearbook*, 1967 ... (1968), table 29. Sarkar's life tables, computed from death rates based on census data adjusted for under-enumeration, give a higher life expectancy for females than for males. See his *The Demography of Ceylon* (1957), pp. 120-121. On sex differentials in mortality in the Punjab, see Gordon, Singh and Wyon, "Causes of death at different ages ..." (1965), pp. 6, 11.

TABLE V.5. SEX DIFFERENTIALS IN AVERAGE EXPECTATION OF LIFE AT BIRTH  
FOR SELECTED DEVELOPED COUNTRIES, 1900 AND 1965

Country	Around 1900 <sup>a</sup>			Around 1965 <sup>a</sup>		
	e <sub>0</sub> (years)		Excess of female over male (years)	e <sub>0</sub> (years)		Excess of female over male (years)
	Male	Female		Male	Female	
Australia .....	55.2	58.8	3.6	67.9	74.2	6.3
Austria .....	39.1	41.1	2.0	66.8	73.5	6.7
Belgium .....	45.4	48.8	3.4	67.7	73.5	5.8
Bulgaria .....	40.0	40.3	0.3	67.8	71.4	3.6
Czechoslovakia .....	38.9	41.7	2.8	67.8	73.6	5.8
Denmark .....	52.9	56.2	3.3	70.2	74.7	4.5
England and Wales .....	48.5	52.4	3.9	68.3	74.4	6.1
Finland .....	45.3	48.1	2.8	65.5 <sup>b</sup>	72.7 <sup>b</sup>	7.2
France .....	45.3	48.7	3.4	67.8	75.0	7.2
Germany .....	44.8	48.3	3.5	67.6 <sup>c</sup>	73.4 <sup>c</sup>	5.8
Hungary .....	37.1	37.9	0.8	67.0	71.8	4.8
Italy .....	44.2	44.8	0.6	67.2	72.3	5.1
Netherlands .....	51.0	53.4	2.4	71.1	75.9	4.8
New Zealand .....	58.1	60.6	2.5	68.4	73.8	5.4
Norway .....	54.8	57.7	2.9	71.0	76.0	5.0
Spain .....	33.8	35.7	1.9	67.3	71.9	4.6
Sweden .....	54.3	57.0	2.7	71.6	75.7	4.1
Switzerland .....	49.2	52.2	3.0	68.7	74.1	5.4

SOURCE: Compiled mainly from United Nations, *Demographic Yearbook, 1967 ...* (1968), table 29.

<sup>a</sup> Specific dates for each country are: Australia (1891-1900 and 1960-1962), Austria (1901-1905 and 1966), Belgium (1899-1900 and 1959-1963), Bulgaria (1899-1902 and 1960-1962), Czechoslovakia (1899-1902 and 1964), Denmark (1901-1905 and 1964-1965), England and Wales (1901-1910 and 1963-1965), Finland (1901-1905 and 1961-1965), France (1898-1903 and 1965), Germany (1901-1910 and 1964-1965), Hungary (1900-1901 and 1964), Italy (1901-1911 and 1960-1962), Netherlands (1900-1909 and 1961-1965), New Zealand (1901-1905 and 1960-1962), Norway (1901/02 - 1910/11 and 1961-1965), Spain (1900 and 1960), Sweden (1901-1910 and 1961-1965), and Switzerland (1901-1910 and 1958-1963).

<sup>b</sup> Data from Strömmer, *Väestöllinen muuntuminen Suomessa* (1969), p. 106.

<sup>c</sup> For Federal Republic of Germany.

peak fertility in such countries as Mauritius and West Malaysia. Moreover, in Ceylon, India and Pakistan, particularly large differentials between the sexes occur in the reproductive ages owing to higher maternal mortality.<sup>57</sup>

34. Recent life tables show that in the more developed countries, the advantage that females have over males in average life expectancy at birth is generally greater than in countries of the developing regions. In Northern America, Australia, the Soviet Union and many European countries, the life expectancy at birth is 6-8 years greater for females than for males, whereas in countries of the developing regions, the female advantage is usually less than five years.<sup>58</sup> Moreover, long-term mortality declines have generally increased the female advantage in expecta-

tion of life at birth.<sup>59</sup> Such a trend is seen in table V.5 which compares life expectancy values at the beginning of the century and at the mid-1960s for eighteen developed countries. Females are shown to have increased their longevity advantage over males in each of these countries, though if percentage differences, rather than absolute differences in life expectancy values for the two sexes are compared, a widening of the sex differential is barely discernible in Denmark and Sweden. In a study of recent mortality trends in Eastern Europe it was found that in six of nine countries both the percentage and absolute differences between the life expectancy values for the

<sup>57</sup> For India, see India, The Cabinet Secretariat, National Sample Survey, *Tables with Notes on Differential fertility ...* (1968), p. 15. For Pakistan, see Seltzer, *Benchmark Demographic Data for Pakistan ...* (1968), pp. 21-22, 39. For Ceylon, Mauritius, and West Malaysia, see United Nations, *Demographic Yearbook, 1967 ...* (1968), table 21.

<sup>58</sup> United Nations, *Demographic Yearbook, 1967 ...* (1968), table 29. See also Stolnitz, "Recent mortality trends ..." (1965), pp. 136-137.

<sup>59</sup> Studying data for fourteen European countries, Chasteland observed that, with only one exception, male excess mortality had increased during the first half of the twentieth century. See his "Evolution générale de la mortalité en Europe occidentale ..." (1960), pp. 82-83. Using age-adjusted death rates computed for nineteen low-mortality populations, Spiegelman showed that the average male-to-female ratio rose from 1.2 in 1930 to 1.3 in 1950 and 1.5 in 1960. Spiegelman, "Recent mortality in countries of traditionally low mortality" (1967). See also Federici, "Osservazioni sull'evoluzione temporale di alcune caratteristiche della mortalità ..." (1954); Naddeo, "Caratteristiche strutturali della mortalità ..." (1965); George, "Mortality trends in Canada, 1926-1965" (1967), p. 987.

two sexes were greater in the 1960s than they had been earlier in the period following the Second World War.<sup>60</sup>

35. Age-specific death rates for European countries for recent dates show that the largest percentage differences between the sexes generally occur in the twenties, owing to the greater risk of accidental death to which young men are exposed. The excess mortality of men then falls and reaches a low level between thirty and fifty years, after which there is a rise to a second peak usually between fifty and sixty-four years.<sup>61</sup> Various studies have examined male excess mortality either in terms of broad age groups only or in terms of absolute rather than percentage differences between male and female rates, and in such cases the greatest differences have usually been observed in the late middle ages. Thus, Spiegelman, studying 1960 death rates for broad age groups, found that in fourteen of nineteen countries the female advantage in mortality was greatest at ages 45-64 years.<sup>62</sup> In some studies sex differences in mortality have been analysed in terms of expectation of life at various ages—a measure which reflects differences in male and female survival rates at all older ages. For developed countries, these figures have generally shown the greatest differential at birth, with decreasing differences at advancing ages. By age sixty the remaining sex differential in life expectancy is generally quite small; for example, it averaged 2.0 years in countries of Northern and Western Europe in the 1940s.<sup>63</sup> Somewhat greater sex differences in life expectancy at this age are shown for European countries in later years.<sup>64</sup>

36. Long-term trend data for European countries show that females have increased their mortality advantage over males in all age groups since the early part of the century, with the greatest relative increases occurring at adult ages. Thus, in the European countries studied by Chasteland, male mortality at ages 15-40 on average exceeded that for females by about three per cent around 1900, but by about 50 per cent at mid-century. A large increase in male excess mortality was also reported at

ages 40-60 years.<sup>65</sup> In recent decades a particularly marked widening of the sex differential has been observed at ages 15-24 years, both in England and Wales<sup>66</sup> and in the United States. The rising incidence of motor vehicle deaths which affect males disproportionately has been an important factor in this trend. Widening sex differentials were also pronounced at ages 45-64 years in the United States, because of a rising death rate from heart disease and malignancies among males, at the same time that the female death rate resulting from these diseases was declining.<sup>67</sup>

37. What few reliable data there are on long-term changes in life expectancy in developing countries suggest that the trend toward a widening sex differential is less uniform than in the developed countries. Data for six countries in Latin America and three in Asia covering four decades preceding 1960 are shown in table V.6. In Chile and Puerto Rico the gap between male and female average life expectancy at birth has widened over the period from 1920 to 1960 both in absolute and percentage terms, while in Guyana, Jamaica, Mexico and Trinidad and Tobago, the sex differential in years of life expectancy was greater in 1960 than in earlier years, but the percentage gains were nearly equal for the two sexes.<sup>68</sup> In China (Taiwan) between the late 1920s and 1960, average life expectancy for females has exceeded that for males by a nearly constant amount of over four years.<sup>69</sup>

38. In Ceylon, where the official life tables show an excess female mortality, the gap between life expectancy for males and females has narrowed from 2.0 years in 1920-1922 to 0.5 years in 1962. During this forty-year period life expectancy nearly doubled, rising from 32.7 to 61.9 years for males and from 30.7 to 61.4 years for females. In India, where sex differences in mortality are also at variance with the normal pattern, life tables for 1941-1950 and 1951-1960 show a relatively greater gain for males, and hence a widening of the sex differential.

39. The available information may be summarized in Stolnitz's conclusion that mortality differentials tend to be less favourable to females in non-industrial and developing regions of the world than in the industrially advanced countries, and that in the developed countries the

<sup>60</sup> Szabady, "A kelet-Európai szocialista országok halandósági trendjei ..." (1968), p. 960. For recent trends in Romania and Czechoslovakia, respectively, see Sandu and Mureşan, "Structural changes in mortality ..." (1967); U.S. National Center for Health Statistics, *Mortality Trends in Czechoslovakia* (1969), pp. 5-8.

<sup>61</sup> Koller, "Trends of mortality in adult and old age" (1967). A similar pattern was found in Canada. See George, "Mortality trends in Canada, 1926-1965" (1967), pp. 987, 992.

<sup>62</sup> Spiegelman, "Recent mortality in countries of traditionally low mortality" (1967). In about half of the European countries studied by Chasteland, the greatest sex differences in mortality for periods around 1950 occurred between ages forty and sixty years. Chasteland, "Evolution générale de la mortalité ..." (1960), p. 78. In Yugoslavia, male mortality exceeds female mortality by a substantial margin at ages fifty to seventy-five years, while at most ages up to forty years the differential is quite small. Plavec, *Smrtnost stanovništva u Jugoslaviji* ... (1967), pp. 14-15.

<sup>63</sup> Stolnitz, "A century of international mortality trends, II" (1956), p. 27.

<sup>64</sup> Chasteland, "Evolution générale de la mortalité ..." (1960), p. 81; Szabady, "A kelet-Európai szocialista országok halandósági trendjei ..." (1968), p. 963.

<sup>65</sup> Chasteland, "Evolution générale de la mortalité ..." (1960), p. 78. Spiegelman's data for nineteen countries show that in the age groups between twenty-five and sixty-four years, death rates declined much more for women than for men between 1950 and 1960, while there was little difference in the percentage declines for the two sexes at younger ages. Spiegelman, "Recent mortality in countries of traditionally low mortality" (1967). See also Koller, "The development of the excess male mortality" (1963); Stolnitz, "A century of international mortality trends, II" (1956), p. 26.

<sup>66</sup> Thomas, "Mortality in England and Wales" (1963).

<sup>67</sup> Enterline, "Causes of death ..." (1961). For trends in Norway and Czechoslovakia, respectively, see Norway, Statistisk Sentralbyrå, *Dødeligheten og dens årsaker i Norge* ... (1961), pp. 49-52; Sveton, "Vývoj nadělnosti mužů v Československu" (1963).

<sup>68</sup> For trends in Chile, see also United States, National Center for Health Statistics, *Recent Mortality Trends in Chile* (1964), p. 7. Life tables computed for Venezuela show a gain in average life expectancy of 17.6 years for males and 19.6 years for females between 1941 and 1960. Michalup, "The mortality trend in Venezuela ..." (1967).

<sup>69</sup> United Nations, *Demographic Yearbook, 1967* ... (1968), table 29.

TABLE V.6. SEX DIFFERENTIALS IN AVERAGE EXPECTATION OF LIFE AT BIRTH  
FOR SELECTED DEVELOPING COUNTRIES, 1920 AND 1960

Country	Around 1920 <sup>a</sup>			Around 1960 <sup>a</sup>		
	°e <sub>0</sub> (years)		Excess of female over male (years)	°e <sub>0</sub> (years)		Excess of female over male (years)
	Male	Female		Male	Female	
<i>Latin America</i>						
Chile <sup>b</sup> .....	30.9	32.2	1.3	54.4	59.9	5.5
Guyana .....	33.5	35.8	2.3	59.0	63.0	4.0
Jamaica .....	35.6	38.2	2.6	62.6	66.6	4.0
Mexico <sup>b</sup> .....	32.4	34.1	1.7	57.6	60.3	2.7
Puerto Rico .....	38.2	38.8	0.6	67.1	71.9	4.8
Trinidad and Tobago .....	37.6	40.1	2.5	62.2	66.3	4.1
<i>Asia</i>						
Ceylon .....	32.7	30.7	-2.0	61.9	61.4	-0.5
China (Taiwan) .....	38.8	43.1	4.3	61.3	65.6	4.3
India .....	26.9	26.6	-0.3	41.9	40.6	-1.3

SOURCE: Compiled mainly from United Nations, *Demographic Yearbook, 1967 ...* (1968), table 29.

<sup>a</sup> Specific dates for each country are: Chile (1919-1922 and 1960-1961), Guyana (1920-1922 and 1959-1961), Jamaica (1920-1922 and 1959-1961), Mexico (1930 and 1959-1961), Puerto Rico (1919-1921 and 1959-1961), Trinidad and Tobago (1920-1922 and 1959-1961), Ceylon (1920-1922 and 1962), China (Taiwan) (1926-1930 and 1959-1960), and India (1921-1931 and 1951-1960).

<sup>b</sup> Data are from Somoza, "Levels and trends of mortality in Latin America ..." (1967), pp. 373-374.

relative survival chances of males are becoming increasingly prejudiced under conditions of industrialization.<sup>70</sup> A belief prevailing some three or four decades ago that the growing participation of women in economic activities would lead towards equalization of mortality between the two sexes has not become a reality.<sup>71</sup>

## 2. AGE DIFFERENCES IN MORTALITY

40. The typical age-specific mortality curve in countries of high mortality is roughly U-shaped, the left-hand value of the U representing the high mortality of infancy and the right-hand value corresponding to the mortality of old age. As expectation of life increases, infant mortality falls much faster than mortality at old age, and the curve therefore assumes more of a J-shape. In addition, its base becomes broader, indicating that low mortality rates extend over a larger number of age groups. Some typical modifications of these patterns are discussed below. Age-specific death rates for a few selected countries are shown in table V.7.

41. An especially wide range of death rates throughout the world is found at ages 1-4 years. In fact, even among developing countries, rates vary widely at these ages. Thus, in China (Taiwan), the death rate at ages one to four was only about 4 per 1,000 and in Mauritius only about 7 per 1,000 in the mid-1960s, while in Guatemala it was about 28, and according to sample survey results, 45 in India (1958-1959), and around the same level in Dahomey and Togo in 1961.<sup>72</sup> In certain populations there appears

to be a very high level of mortality at the ages of young childhood in relation to the general level of mortality. A striking example is provided by the Cocos-Keeling Islands, where the chance of dying between ages one and four was as great as the chance of dying in infancy for boys, and considerably greater for girls.<sup>73</sup> For countries with high childhood mortality rates the left side of the U does not fall so steeply as in countries where early childhood mortality is largely concentrated in infancy. Despite impressive reductions in childhood mortality in some developing countries, in many of them half or nearly half of all deaths still occur among children of pre-school age.<sup>74</sup>

42. Some developing countries are characterized by relatively light mortality at the younger ages and comparatively heavy mortality at the older ages. Such a pattern has been observed, for example, in Mauritius, especially among the male population,<sup>75</sup> and may reflect impaired health of persons in the older age groups who had survived arduous health conditions when they were young.

43. Improvements in health conditions in modern times have brought important mortality declines at all ages, but the per cent reduction has been most spectacular in the case of children and young adults, having been progressively less with increasing age. In the words of a United Nations study, "... more has been accomplished

<sup>70</sup> Stolnitz, "A century of international mortality trends, II" (1956), p. 31.

<sup>71</sup> Hansluwka, "Some considerations about statistics of mortality" (1968), p. 147.

<sup>72</sup> United Nations, *Demographic Yearbook, 1967 ...* (1968), table 21.

<sup>73</sup> Smith, "The Cocos-Keeling Islands ..." (1960), p. 122.

<sup>74</sup> Moriama, "Discussion" (1965), p. 258. Deaths of pre-school children constituted over 50 per cent of all deaths in five countries of Latin America in 1961 and 1962, and from 40 to 50 per cent in eight other countries.

<sup>75</sup> Adams, "Population estimates and projections ..." (1961), pp. 263-270.

TABLE V.7. AGE-SPECIFIC DEATH RATES FOR MALES AND FEMALES IN SELECTED COUNTRIES  
(Deaths per 1,000 population in each age group)

Sex and age (in years)	China (Taiwan) (1966)	France (1965)	Guatemala (1964)	Mauritius (1966)	Netherlands (1966)	Norway (1965)	United Kingdom (England and Wales) (1966)
<i>Males</i>							
Under 1 .....	23.2	20.5	120.0	72.8	16.8	19.0	21.7
1-4 .....	4.2	1.0	26.6	7.2	1.1	1.0	0.9
5-9 .....	0.9	0.5	6.7	1.9	0.6	0.6	0.4
10-14 .....	0.7	0.4	3.4	1.1	0.4	0.5	0.4
15-19 .....	1.3	1.0	4.8	1.4	0.9	0.9	1.1
20-24 .....	3.1	1.5	5.5	1.3	1.0	1.1	1.0
25-29 .....	2.4	1.5	6.8	1.6	0.9	1.2	1.0
30-34 .....	2.6	2.0	7.9	2.1	1.1	1.5	1.2
35-39 .....	3.5	2.9	9.1	4.3	1.6	1.9	1.8
40-44 .....	4.9	4.3	10.9	5.3	2.6	3.1	3.0
45-49 .....	7.4	6.4	14.4	8.2	4.3	4.3	5.2
50-54 .....	10.7	10.6	18.0	15.4	7.7	7.6	9.3
55-59 .....	17.6	16.7	22.3	24.3	13.1	11.7	16.2
60-64 .....	28.8	25.7	36.5	38.3	21.4	19.3	27.5
65-69 .....	46.2	38.2	47.0	55.0	32.4	31.0	44.1
70-74 .....	70.4	57.2	67.3	82.4	50.2	47.4	67.6
75-79 .....	106.9	88.6	81.2	119.3	78.2	75.2	102.7
80-84 .....	199.8	140.1	122.1	135.0	124.4	122.5	155.2
85 and over ..		236.6	163.3	520.0	218.8	213.1	258.2
<i>Females</i>							
Under 1 .....	20.9	15.9	100.0	60.8	12.5	15.2	16.6
1-4 .....	4.4	0.8	28.4	7.4	0.8	0.7	0.8
5-9 .....	0.7	0.3	6.9	1.6	0.3	0.4	0.3
10-14 .....	0.5	0.3	3.1	0.7	0.3	0.3	0.3
15-19 .....	0.9	0.4	3.8	1.4	0.4	0.3	0.4
20-24 .....	1.3	0.7	5.7	2.8	0.4	0.3	0.5
25-29 .....	1.4	0.7	6.5	3.0	0.5	0.4	0.6
30-34 .....	1.9	1.0	7.3	3.5	0.7	0.5	0.8
35-39 .....	2.4	1.5	8.0	4.1	1.0	1.0	1.3
40-44 .....	3.5	2.2	9.1	3.8	1.8	1.5	2.1
45-49 .....	4.4	3.4	10.5	6.0	2.6	2.5	3.4
50-54 .....	6.8	4.9	14.2	7.7	4.2	3.4	5.4
55-59 .....	10.3	7.2	20.0	13.4	6.4	6.0	8.0
60-64 .....	18.1	11.1	33.4	19.6	10.2	10.4	12.8
65-69 .....	29.2	18.2	45.2	32.0	18.3	16.6	21.7
70-74 .....	48.5	31.7	64.9	46.0	33.2	32.6	37.0
75-79 .....	77.8	56.1	87.8	76.0	59.9	57.3	64.0
80-84 .....	167.2	100.6	141.3	125.0	104.5	106.3	109.4
85 and over ..		193.3	209.4	491.4	203.7	199.8	204.0

SOURCE: United Nations, *Demographic Yearbook, 1967* ... (1968), table 21.

TABLE V.8. PERCENTAGE DECLINE OF MORTALITY RATES BY AGE GROUP IN SELECTED EUROPEAN COUNTRIES, 1876-1885 TO 1946-1955

Sex and age (in years)	France	Netherlands	Norway	United Kingdom (England and Wales)
<b>Males</b>				
1-4 ....	90	94	92	95
5-14 ...	85	85	85	85
15-24 ...	79	80	79	76
25-34 ...	74	82	77	80
35-44 ...	64	77	68	78
45-54 ...	42	64	55	56
55-64 ...	25	51	42	34
65-74 ...	26	43	18	24
<b>Females</b>				
1-4 ....	91	94	94	96
5-14 ...	89	91	91	89
15-24 ...	84	88	86	81
25-34 ...	81	83	84	82
35-44 ...	73	82	78	79
45-54 ...	59	65	64	65
55-64 ...	52	53	50	56
65-74 ...	44	43	27	43

SOURCE: Computed from data in Norway, Statistisk Sentralbyrå, *Dødeligheten og dens årsaker* ... (1961), pp. 219-223.

in eliminating premature death than in lengthening the life-span of persons who survive beyond middle age." <sup>76</sup>

44. From table V.8 it is seen that death rates at ages 1-4 and 5-14 in each of several countries of Northern and Western Europe declined by 85 per cent or more during the seventy-year period extending from the last quarter of the nineteenth century to the middle of the twentieth. Reductions in infant mortality, not depicted in the table, were only slightly less impressive. <sup>77</sup> It has been estimated

<sup>76</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), p. 53. It has been shown that different statistical measures lead to different conclusions concerning the relative mortality improvements achieved by the various age groups. Stolnitz found that while mortality changes at older ages are comparatively limited if trends in age-specific mortality rates are examined, this is not the case when per cent increases in survival ratios or life expectancy are used as the basis for analysis. Stolnitz, "A century of international mortality trends ..." (1956), pp. 36-40. Several other writers who have analysed age patterns of mortality change in terms of survival ratios have also demonstrated that the long-term per cent gains have been greatest at the youngest and oldest ages and relatively small in between. Hermalin, "The effect of changes in mortality rates ..." (1966); Keyfitz, "Changing vital rates ..." (1968); Coale, "The effect of decline in mortality ..." (1956). The latter authors were mainly interested in the effect of mortality decline on age structure, a subject discussed in chapter VIII.

<sup>77</sup> See Norway, Statistisk Sentralbyrå, *Dødeligheten og dens årsaker* ... (1961), pp. 216-223. Long-term trends in age-specific death rates in various other countries have displayed some of the same features. In the Soviet Union and the United States mortality fell at all ages during the twentieth century, though the proportionately greatest decreases were in early childhood and the proportionately smallest at the oldest ages. United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 53-54. In Poland it is estimated that the death rate at ages 1-4 fell by 95 per cent during the first sixty years of the present century, while the infant mortality rate fell by two-thirds. Padowicz, "Evolution de la mortalité d'après les tables polonaises de mortalité" (1963), p. 726. For Germany, see Freudenberg, "Grundzüge der Sterblichkeitsentwicklung nach dem Alter ..." (1955). For Hungary, see Peter, "Changes in the age structure of mortality in Hungary" (1963). For Spain, see Villar-Salinas, "Tendencia de la mortalidad en España" (1955).

that the largest reductions in mortality during childhood occurred at about age three in most European countries, and the minimum mortality rate, which formerly occurred at about the fifteenth year of life, gradually moved towards a younger age. <sup>78</sup> Past forty-five years of age, the long-term declines fell off sharply for each sex with increasing age. At ages over seventy-five years, the per cent decreases in death rates were slight compared with those for younger age groups. <sup>79</sup>

45. For countries having a long series of reliable data, some time lags are apparent in the onset of mortality decline at different ages. Thus, in Sweden death rates for infants, children and young adults showed some improvement as early as the first half of the nineteenth century, whereas mortality at ages beyond forty-five years was not lowered until the latter half of the nineteenth century. <sup>80</sup> In England, mortality at ages between five and twenty-five years started declining before 1870, and substantial decreases had occurred at ages twenty-five to forty-five years by the end of the century. On the other hand, decisive improvements in infant mortality and mortality at the older ages did not take place before the beginning of the twentieth century. <sup>81</sup> In France there was apparently no improvement in death rates for males aged fifty years and over until as recently as 1936. <sup>82</sup>

46. Since the Second World War, trends in age-specific death rates in various European countries and in Northern America, Australia and New Zealand have followed patterns generally in line with previous long-term trends. <sup>83</sup> A significant feature in a number of these

<sup>78</sup> France, *Statistique générale, Evolution de la mortalité* ... (1941), p. 64.

<sup>79</sup> See Pascua, "Evolution of mortality in Europe during the twentieth century" (1950), pp. 59-60. On mortality changes at the older ages see Vincent, "La mortalité ..." (1951); Spiegelman, "Recent trends in mortality at the older ages in countries of low mortality" (1963); ———, "An international comparison of mortality rates at the older ages" (1955).

<sup>80</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 53-54. Anderson's analysis stresses the substantial mortality decline experienced at middle and older ages in Sweden between 1841-1850 and 1891-1900. See his "Age-specific mortality in selected Western European countries ..." (1955), pp. 242-243.

<sup>81</sup> Logan, "Mortality in England and Wales ..." (1950), pp. 134-135. See also Peller, "Mortality, past and future" (1948), pp. 424-425; Greenwood, "English death rates ..." (1936), p. 678.

<sup>82</sup> France, *Statistique générale, Evolution de la mortalité* ... (1941), p. 68.

<sup>83</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 53-54. See also Krohn and Weber, "Some characteristics of mortality ..." (1967); Pascua, "Recent mortality trends in areas of lower death rates" (1955); George, "Mortality trends in Canada, 1926-1965" (1967), pp. 985-986. Analysis of mortality trends in Belgium showed that between 1946-1949 and 1958-1961 the extent of mortality declines among males was in almost inverse relation to age, varying from 60 per cent among infants to 2.5 per cent at ages sixty to seventy and 5.0 per cent for ages seventy to eighty. Morsa, "Tendances récentes ..." (1964), pp. 35-37. In Czechoslovakia, also, recent trends have shown a steeper gradient of decline among children, and diminishing reductions with increasing age. U.S. National Center for Health Statistics, *Mortality Trends in Czechoslovakia* (1969), pp. 5-7. For post-war trends in Yugoslavia see Plavec, *Smrtnost stanovništva u Jugoslaviji* ... (1967), p. 13; for Austria see Czermak and Hansluka, "Zum Gesundheitszustand der Kinder ..." (1968); Hansluka, "Zur Sterblichkeit der 20- bis unter 25 jährigen ..." (1967); ———, "Die Sterblichkeit der 25- bis 29 jährigen ..." (1967).

TABLE V.9. PERCENTAGE DECLINE OF MORTALITY RATES BY AGE GROUP IN SELECTED DEVELOPING COUNTRIES, BOTH SEXES, 1940 TO 1965

Age (in years)	Ceylon (1946-1963)	Chile (1940-1960)	China (Taiwan) (1940-1965)	Jamaica (1943-1960)	Mauritius (1944-1962)	Puerto Rico (1940-1960)	Trinidad and Tobago (1946-1960)
Under 1 .....	70	38	84	49	68	78	47
1-4 .....	69	69	86	47	73	84	68
5-14 .....	72	52	82	72	76	81	73
15-24 .....	72	71	73	70	83	82	64
25-34 .....	66	56	75	67	84	73	56
35-44 .....	58	45	73	59	78	62	45
45-54 .....	48	36	64	45	67	55	36
55-64 .....	22	27	50	30	54	38	12
65 and over .....	22	24	27	25	39		

SOURCE: Computed from data in various issues of the United Nations, *Demographic Yearbook*.

countries, however, has been the increase in mortality rates for males in age groups over fifty or fifty-five years. The most pronounced reversals of previous downward trends have occurred in the Federal Republic of Germany, the Netherlands and Norway, where increases of 20 per cent, 15 per cent and 11 per cent, respectively, were recorded between 1950 and 1960 in the death rate for males aged sixty to sixty-four years. Some rise in death rates among males in late middle age or older has also been recorded in Austria, England and Wales, Northern Ireland, Scotland and the United States. These trends in part reflect an increase in deaths from cardio-vascular diseases, which could not be offset by further declines in mortality from infectious diseases, in view of the low levels of the latter which had already been reached. In some countries, recent upward trends may also be linked to impaired health of the cohorts most affected by hardships suffered during the Second World War.<sup>84</sup> In Japan there has been a recent retardation of the decline of mortality from infectious diseases among middle-aged males and relative stability in the rates from cancer and cardio-vascular illnesses.<sup>85</sup>

47. Representative data which would permit a similar assessment of changing age patterns of mortality in the developing regions are not available. For the few developing countries with relatively good statistics on age-specific mortality, it appears that the large declines since the Second World War have benefited adults up to about age thirty-five as much or more than they have benefited young children. Thus, of the seven countries for which trend data are shown in table V.9, only China (Taiwan)

shows a pattern more nearly like that of developed countries, wherein the percentage declines in mortality rates for children aged 1-4 years and 5-14 years exceed those of the next higher age groups by considerable amounts. In the other countries, declines of about two-thirds or more in death rates at ages 15-34 compare favourably with the improvements recorded at younger ages.<sup>86</sup> In Mauritius, an exceptional rate of progress has been noted at ages 15-34 years between 1944 and 1957,<sup>87</sup> and in Jamaica between 1943 and 1960, improvements were substantially greater at ages 5-34 years than among younger children, though during the first stages of mortality decline in Jamaica (beginning after 1921), the biggest percentage declines had occurred among children 2-4 years of age.<sup>88</sup> According to Sarkar's analysis of long-term trends in Ceylon, the greatest mortality declines in the first four and one-half decades of the century occurred among young adolescents,<sup>89</sup> while the spectacular post-war decline was shared in nearly equally by age groups up to forty-five years. In Chile, between 1940 and 1960, the drop in the infant death rate lagged behind that in all other age groups up to forty-five years.<sup>90</sup> Relatively little improvement was realized in the infant death rate in Western Malaysia between 1947 and 1957, while a two-thirds decline—the largest for any age group—occurred for children 5-9 years.<sup>91</sup>

### C. Foetal and infant mortality

48. Owing to the heavy wastage of life that occurs during pregnancy and in the first year after birth, special importance is given to the study of foetal and infant mortality, apart from analyses of general mortality levels and trends. The period between conception and the end of the first month of life is a particularly hazardous one,

<sup>84</sup> Biraben *et al.*, "La situation démographique ..." (1964), pp. 464-466; United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 54-57; Koller, "Trends of mortality in adult and old age" (1966); Légaré, "Mortality at age forty-five and over ..." (1967). The impact of war conditions on the health of the population in Czechoslovakia was studied by Blaha *et al.*, *Následky války na lidském zdraví* (1966). Higher mortality rates were found among population groups which had been subjected to conditions of stress during the war as compared with population groups not so affected. Caffin observed that the rise in mortality rates for men above sixty years of age between 1933 and 1947 might have resulted from a deferment of deaths, if the numbers deferred decreased in successive ages. Caffin, "Increases in recent ..." (1957), pp. 295-297.

<sup>85</sup> United States, National Center for Health Statistics, *Recent Retardation of Mortality Trends in Japan* (1968).

<sup>86</sup> See United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), p. 57.

<sup>87</sup> Adams, "Population estimates and projections ..." (1961), pp. 270-272.

<sup>88</sup> Roberts, "A note on mortality in Jamaica" (1950), p. 72.

<sup>89</sup> Sarkar, *The Demography of Ceylon* (1957), p. 118.

<sup>90</sup> See table V.9 and United States, National Center for Health Statistics, *Recent Mortality Trends in Chile* (1964), pp. 4-5.

<sup>91</sup> Saw, "Postwar mortality trends in Malaya" (1967), p. 576.



as the foetus and young infant are subject to heavy mortality arising from genetic factors or from damage occurring during gestation or birth. After the first month of life, non-biological factors, including diseases arising from inadequacies in care and feeding, as well as those related to more general environmental conditions, predominate as causes of death.

49. For purposes of analysis, the pre-natal and post-natal periods have been further sub-divided, taking into consideration the availability of statistical data as well as the nature of the factors exercising the main influences on mortality. The pre-natal phase has generally been divided to distinguish between early, intermediate, and late foetal deaths—the dividing points being set at twenty and twenty-eight weeks gestation, respectively. Little is known of the extent of foetal deaths in the early periods of pregnancy, since the collection of adequate data on such events is a difficult, if not insoluble, task, even in countries with well developed statistical systems.<sup>92</sup> That early losses are thought to be considerable is indicated by Valaoras's estimate that between one-fourth and one-third of all gestations are terminated prematurely prior to the twentieth week of pregnancy.<sup>93</sup> Data on late foetal deaths (stillbirths), which occur after the twenty-eighth week of pregnancy, are widely available, at least in the developed regions, but international comparison is seriously hampered both by under-registration of events and by the use of differing definitions and methods of reporting.<sup>94</sup>

50. Mortality during the first year of life is frequently divided into neonatal mortality, namely that occurring in the first month of life<sup>95</sup> and post-neonatal mortality, that occurring during the remainder of the first year. The importance of identifying separately early neonatal mortality, or that occurring in the first week of life, has also been recognized.<sup>96</sup> The distinction between neonatal and post-neonatal mortality serves roughly to separate the endogenous and exogenous components of infant mortality which reflect the influence of biological and environmental factors, respectively, and require different

kinds of efforts to bring them under control.<sup>97</sup> In order to obtain a more refined measure of endogenous and exogenous mortality, formulae have been devised to be applied to the conventional data on age at death.<sup>98</sup>

51. As a result of the marked progress made by industrialized countries in controlling mortality due to environmental factors, attention has been increasingly focused on neonatal mortality, which has proved more difficult to reduce. Also within the past few decades there has been a trend towards broadening the study of mortality occurring soon after birth to include as well that occurring in the latter part of the pre-natal period. The idea of combining stillbirths and early neonatal deaths into a single statistical unit, the so-called "perinatal" mortality, was introduced in the 1940s,<sup>99</sup> the justification being that the factors underlying both of these types of mortality are very similar, and differ from the factors responsible for mortality later in infancy. Data on perinatal mortality, moreover, have the advantage of eliminating some of the problems of comparability in the statistics for either stillbirths or neonatal deaths caused by different definitions and registration procedures.<sup>100</sup>

## 1. STILLBIRTHS AND PERINATAL MORTALITY

52. In 1960-1964 reported stillbirth ratios in the developed regions ranged from a low of near 10 per 1,000 live births in Czechoslovakia to near 30 in Portugal, the average being 13-14.<sup>101</sup> The incidence of stillbirths is believed to be much higher in the developing regions, though few countries have adequate data on the subject. Two countries with relatively satisfactory data—Trinidad and Tobago and Mauritius—reported stillbirth ratios of 27 and 66, respectively, in 1960-1964.<sup>102</sup> The stillbirth

<sup>92</sup> See, for example, Peller, "Mortality, past and future" (1948), pp. 410-411; Lessof, "Mortality in New Zealand ..." (1949); Maruyama, *Nyuji Shibo (II)* ... (1957).

<sup>93</sup> See Bourgeois-Pichat, "Evolution récente de la mortalité infantile" (1964), p. 422. See also his "An analysis of infant mortality" (1952). In principle, it should be possible to distinguish between endogenous and exogenous mortality directly on the basis of cause-of-death statistics, but in practice this is difficult because of the unsatisfactory quality of the latter.

<sup>94</sup> Peller, "Mortality, past and future" (1948), pp. 410-412. See also Bourgeois, "De la mesure de la mortalité infantile" (1946). Peller recommended that perinatal mortality should include stillbirths and deaths during the first week of life. Peller, *Quantitative Research in Human Biology and Medicine* (1967), p. 146. The International Conference for the Eighth Revision of the International Classification of Diseases in 1965 endorsed a proposal to define the perinatal period as extending from the twenty-eighth week of gestation to the seventh day of life. World Health Organization, *Manual of the International Statistical Classification of Diseases* ... (1967), p. xxvii.

<sup>100</sup> For example, in several countries infants dying before registration of birth are classified as stillbirths and are excluded from the count of infant deaths and live births. Perinatal mortality is independent of such statistical variations. See Bourgeois-Pichat, "An analysis of infant mortality" (1952), pp. 12-14; Peller, *Quantitative Research in Human Biology and Medicine* (1967), p. 145; Valaoras, "Refined rates ..." (1950), p. 253.

<sup>101</sup> United Nations, *Demographic Yearbook, 1966* ... (1967), table 10. For an analysis of data available around 1950, see Valaoras, "Foetal, peri-natal and infant mortality" (1955).

<sup>102</sup> United Nations, *Demographic Yearbook, 1966* ... (1967), table 10.

<sup>92</sup> Hansluwka, "Some considerations about statistics of mortality" (1968), p. 146. See also Tietze, "Introduction to the statistics of abortion" (1953), pp. 136-137.

<sup>93</sup> The author estimated that another 10 per cent are terminated later in the pregnancy, so that only about 65 out of 100 pregnancies normally result in a live birth. See Valaoras, "Discussion" (1953), p. 143; Valaoras, "Foetal, peri-natal and infant mortality" (1955), p. 330. A slightly lower figure was found by Tietze and Martin. See their "Foetal deaths, spontaneous and induced ..." (1957), p. 175. A United Nations study cited the range of estimates of the loss during the entire pre-natal period as extending between 20 and 70 per cent. United Nations, *Foetal, Infant and Early Childhood Mortality*, vol. I ... (1954), p. 1.

<sup>94</sup> For a discussion of these problems, see United Nations, *Handbook of Vital Statistics Methods* (1955), pp. 46-60.

<sup>95</sup> According to international recommendations for infant mortality statistics, "early infancy" is defined as the first 28 days of life. In actual practice, however, some countries tabulate and report deaths in the first calendar, rather than lunar, month of life. See United Nations, *Principles for a Vital Statistics System* ... (1953), p. 21; ———, *Handbook of Vital Statistics Methods* (1955), p. 191; ———, *Demographic Yearbook, 1961* ... (1962), p. 32.

<sup>96</sup> Peller, *Quantitative Research in Human Biology and Medicine* (1967), p. 146.

ratio is higher among males than among females, the excess of the male ratio having a modal value of about 20 per cent, according to a study of twenty-six countries.<sup>103</sup>

53. Long-term trends in four European countries and Canada, all having reputedly good statistics, show stillbirth ratios generally fluctuating in the 20s from 1915 until after 1940, when a downward trend became more noticeable. Japan, on the other hand, showed a continuous and pronounced drop in its stillbirth ratio from its original high level during the same period.<sup>104</sup>

54. When stillbirths and deaths in the first week of life are combined, it is found that the resulting perinatal mortality constitutes by far the largest component of mortality up to the end of the first year of life in most countries of Central and Northern Europe. In fact, where infant mortality is now at a very low level, perinatal deaths exceed the total number of deaths from the first week up to thirty or thirty-five years of age.<sup>105</sup> The mean perinatal ratio in twenty developed countries, most of which had reliable statistics, was about 28 per 1,000 live births in 1960-1964. The range was from about 20 in Czechoslovakia to above 40 in Portugal. Substantial progress in controlling perinatal mortality is indicated by the fact that the ratio was reduced by more than one-fifth in the same twenty countries in a period of less than a decade. In 1952-1954 the average ratio was 35-36 per 1,000 live births.<sup>106</sup>

55. Examining ratios of perinatal mortality for England and Wales over a longer time period, Peller found that the ratio dropped from 61 per 1,000 live births in 1936-1939 to 32 in 1960-1962, or by nearly one-half. During the same period, however, the mortality rate for the second week to the end of the first year of life declined by three-fourths.<sup>107</sup> According to the available data for Austria, the perinatal mortality ratio declined from 62 in 1927 to 35 in 1960, representing a fall of 43 per cent. During the same period, neonatal mortality dropped by 52 per cent and post-neonatal mortality by 83 per cent.<sup>108</sup>

56. The contribution of pre-natal and post-natal care in reducing perinatal mortality is suggested by the fact that countries with low ratios are those with well-developed medical care programmes. In Portugal, which has one of the highest perinatal mortality rates reported in Europe, only about half of all confinements in 1959 were

attended by a physician or qualified midwife, whereas the corresponding proportion was over 90 per cent in countries with low perinatal mortality such as Czechoslovakia, Finland, Hungary, the Netherlands, Norway, Sweden and the United Kingdom.<sup>109</sup>

57. Various studies have examined the relationship between rates of stillbirths, perinatal or neonatal mortality on the one hand, and such factors as age of mother and birth order on the other. In general, the mortality ratios studied have been found to rise with the increasing age of the mother and with higher birth orders, although some exceptions have been noted.<sup>110</sup>

## 2. LEVELS AND TRENDS OF INFANT MORTALITY

58. Infant mortality rates<sup>111</sup> are much more widely available than any of the other measures of pre-natal and post-natal mortality discussed above. In fact, estimates of the infant mortality rate exist for nearly all countries for which the crude death rate is known. While the former are on the whole less reliable than the latter—since infant deaths are more likely to go unregistered than adult deaths—they have long been of interest to social scientists and persons concerned with public health problems. This is because the incidence of mortality during the first year of life has been considered one of the most sensitive indicators of the general level of living, being particularly responsive to changes in environmental and social conditions,<sup>112</sup> although, as discussed below, recent trends in developing countries seem to be diminishing its usefulness in this respect.

59. The range of infant mortality rates in the world's more developed regions in the mid-1960s was considerably wider than that of the crude death rates. On the one hand, the infant mortality rate had fallen below 20 per 1,000 live births in the Scandinavian countries, as well as in Australia, England and Wales, Japan, the Netherlands, New Zealand, and Switzerland. At the other extreme, an infant mortality rate of 87 was reported for Albania, 72 for Yugoslavia and 65 for Portugal in 1965. Argentina's rate was nearly 60, while rates in the 30s and 40s were common in Eastern and Southern Europe. In Northern

<sup>109</sup> World Health Organization, "Causes and prevention of perinatal mortality" (1967), p. 47.

<sup>103</sup> United Nations, *Foetal, Infant and Early Childhood Mortality*, vol. 1 ... (1954), p. 26. Some tendency has been observed for the sex ratio among stillbirths to decline. Sutherland, *Stillbirths: their Epidemiology and Social Significance* (1949).

<sup>104</sup> United Nations, *Foetal, Infant and Early Childhood Mortality*, vol. 1 ... (1954), pp. 25-26.

<sup>105</sup> World Health Organization, "Causes and prevention of perinatal mortality" (1967), p. 43.

<sup>106</sup> Data from United Nations, *Demographic Yearbook*, 1961 ... (1962), table 11, and ———, 1966 ... (1967), table 12.

<sup>107</sup> Peller, *Quantitative Research in Human Biology and Medicine* (1967), pp. 147-154. In a study of the ruling families of Europe, the author found that perinatal mortality fell from about 100 in the sixteenth and seventeenth centuries to 8 in 1900-1935, the latter figure not being matched in any population today so far as is known.

<sup>108</sup> Czermak and Hansluka, "Infant mortality in Austria" (1962), p. 199. For trends in some other countries, see Shapiro, Schlesinger and Nesbitt, *Infant, Perinatal, Maternal and Childhood Mortality* ... (1968), pp. 121-122.

<sup>110</sup> See, for example, Benjamin, *Social and Economic Factors Affecting Mortality* (1965), p. 46; Heady *et al.*, "The independent effects of social class ..." (1955), pp. 499-502; Tabah and Sutter, "Influence respective de l'âge maternel et du rang de naissance ..." (1948). Heady and Heasman, *Social and Biological Factors in Infant Mortality* (1959). The British perinatal mortality survey of 1958 showed that the risk of death rose with advancing age of mother after age thirty, that it was lowest for second births, and highest for fourth and subsequent births. Butler and Bonham, *Perinatal Mortality* ... (1963), pp. 20-23.

<sup>111</sup> The infant mortality rate is usually calculated as the number of deaths occurring to infants under one year of age in a given calendar year per 1,000 live births in the same year.

<sup>112</sup> See, for example, United Nations, *Preliminary Report on the World Social Situation* (1952), p. 13; ———, *Report on International Definition and Measurement* ... (1954), p. 28; ———, *International Definition and Measurement of Levels of Living* ... (1961), p. 5; Titmuss, *Birth, Poverty and Wealth* (1943), p. 11.

America and in the USSR infant mortality rates were in the 20s.<sup>113</sup>

60. In some parts of the world's developing regions infant mortality rates have already dropped to moderate or low levels. In fact, by the mid-1960s a few countries in these regions had levels of infant mortality below those found generally in Eastern and Southern Europe. Thus, rates in the 20s were found in China (Taiwan), Hong Kong and Singapore; in the 30s in Jamaica and in the 40s in Puerto Rico and Trinidad and Tobago. Ceylon and Western Malaysia had rates in the 50s. Three countries of the Middle American Mainland with complete registration data—Costa Rica, El Salvador and Mexico—had rates of 75, 71 and 61, respectively, and the island of Mauritius had a rate of 64.<sup>114</sup>

61. Rates of 70 and less are not representative of the developing regions, however. In the more populous countries of Asia, rates are known to be much higher, though the questionable reliability of available data makes precise measurement impossible. Estimated infant mortality rates for India and Pakistan are well above 100.<sup>115</sup> Even Chile, which lies in the more developed temperate zone of South America, had an infant mortality rate above 100 in 1965. Still higher rates of infant deaths prevail in most parts of Africa. Sample surveys carried out in various parts of tropical Africa in the late 1950s and early 1960s showed that rates in excess of 200 per 1,000 live births are common. Rates of this level or above were reported, for example, for Central African Republic, Dahomey, Guinea, Senegal, Mali, and Upper Volta.<sup>116</sup>

62. Infant mortality rates of 200 or more were the rule even in the presently industrialized countries about 150 years ago.<sup>117</sup> Little, if any, decline occurred in the British Isles, France and Belgium during the nineteenth century, although such a trend had begun in certain other countries, notably in Finland, the Netherlands, Switzer-

land, and Italy, and fairly low levels of infant mortality rates had been reached in Norway and Sweden.<sup>118</sup> In the 1870s the rate in European countries is reported to have varied from 100 in Norway to nearly 300 in southern Germany,<sup>119</sup> and was approximately 260 in the Czech regions of Czechoslovakia,<sup>120</sup> 200 in Italy,<sup>121</sup> 150 in the United Kingdom (England and Wales),<sup>122</sup> and 130 in Sweden.<sup>123</sup> By the beginning of the twentieth century it had fallen considerably in some countries, but remained high in others, varying in countries of Western Europe from less than 100 in Sweden to more than 200 in Austria.<sup>124</sup> In Russia about this time, the infant mortality rate was estimated to be above 250,<sup>125</sup> and rates above 200 are shown in the official statistics for those countries of Eastern Europe for which data are available. In the eastern part of the United States the infant mortality rate at the turn of the century was estimated at about 125.<sup>126</sup>

63. In most of the industrialized countries having a long series of vital statistics records, infant mortality rates declined by three-fourths or more during the half century preceding the early 1960s. Thus, in such countries as Austria, Denmark, Finland, Japan, Netherlands, Sweden, Switzerland and the United Kingdom (England and Wales), infant mortality rates in 1960-1964 were less than 20 per cent of what they had been in the first decade of the century (table V.10).

64. The rapid fall of infant mortality began somewhat later in Southern and Eastern Europe than in Northern and Western Europe and in Australia and New Zealand. Infant mortality rates of 100 and more were the rule in Southern and Eastern Europe in the late 1930s, and it has been the successful bringing down of this component of mortality that has been responsible for the reductions in crude death rates which have occurred in these regions since the Second World War.<sup>127</sup> Nevertheless, it has been observed that while infant mortality rates have been reduced by roughly one-half in Portugal and Yugoslavia as well as in Argentina, since 1900, the current level in these countries is still well above the average for developed

<sup>113</sup> As mentioned above, the comparability of infant mortality rates is affected by differing definitions of live births and foetal deaths. Examining the impact of such diversities, Shapiro and Moriyama concluded that part, but not all, of the excess of the infant mortality rate in the United States as compared with certain European countries could be attributed to differing definitions and practices. Shapiro and Moriyama, "International trends in infant mortality ..." (1963), pp. 747-760.

<sup>114</sup> Rates quoted in these paragraphs are from United Nations, *Demographic Yearbook*, 1967 ... (1968), table 12.

<sup>115</sup> For India, see Coale and Hoover, *Population Growth and Economic Development* ... (1958), p. 357; for Pakistan, see Robinson, "Recent mortality trends in Pakistan" (1967), p. 29; Stoeckel, "Infant mortality trends in rural East Pakistan" (1970).

<sup>116</sup> Coale, "Estimates of fertility ..." (1968), pp. 182-183. For countries of former French Africa and Madagascar combined, the infant mortality rate for 1960-1964 was estimated at about 250 for males and 220 for females. France, Institut national de la statistique et des études économiques, Service de Coopération, *Perspectives de population* ... (1963), p. 25. For other estimates of very high infant mortality for parts of tropical Africa, see Blanc and Théodore, "Les populations d'Afrique noire et de Madagascar ..." (1960), pp. 430-431; Smith and Blacker, *Population Characteristics* ... (1963), pp. 41-42.

<sup>117</sup> See, for example, Mayo-Smith, *Statistics and Sociology* (1895), pp. 144-145; Germany, Statistisches Amt, *Stand und Bewegung der Bevölkerung des Deutschen Reichs* ... (1892), p. 71; Thompson and Lewis, *Population Problems* (1965), p. 356; Phelps, "The world wide effort ..." (1912), p. 136.

<sup>118</sup> Stouman, "The perilous threshold of life" (1934), p. 550; Newman, *Infant Mortality* ... (1906), pp. 1-19.

<sup>119</sup> Stouman, "The perilous threshold of life" (1934), p. 545.

<sup>120</sup> Vávra, "Změny ve specifické úmrtnosti ..." (1960), p. 42.

<sup>121</sup> Tagliacarne, "La situation démographique de l'Italie ..." (1948), pp. 467-483.

<sup>122</sup> United Kingdom, The Registrar General, *The Registrar General's Statistical Review* ... (1951), p. 19.

<sup>123</sup> Sweden, Statistiska Centralbyrån, *Statistisk årsbok för Sverige* 1951 (1951), p. 72.

<sup>124</sup> Thompson and Lewis, *Population Problems* (1965), p. 357.

<sup>125</sup> Ovcharov, "Morbidity factors and trends ..." (1967), p. 423. See also Phelps, "The world wide effort ..." (1912), p. 157. The author quotes figures presented by a Russian scholar showing infant mortality rates above 250 in about half the districts reporting, and above 300 in the remainder.

<sup>126</sup> This estimate pertains to ten states and the District of Columbia. Glover, *United States Life Tables* ... (1921), p. 52.

<sup>127</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 20-21.

TABLE V.10. INFANT MORTALITY RATES FOR SELECTED DEVELOPED COUNTRIES, 1906-1910 AND 1960-1964

Country	Average annual rates		Percentage decline	Average decennial percentage decline
	1906-1910	1960-1964		
Australia .....	76 <sup>a</sup>	20	74	14
Austria .....	202 <sup>b</sup>	33	84	16
Belgium .....	141	28	80	15
Bulgaria .....	161	38	76	14
Denmark .....	108	20	81	15
Finland .....	117	20	83	15
France .....	126	26	79	15
Hungary .....	204 <sup>b</sup>	44	78	14
Italy .....	152	40	74	14
Japan .....	159	26	84	16
Netherlands .....	114	16	86	16
New Zealand <sup>c</sup> .....	70	18	74	14
Norway .....	70	18	74	14
Portugal .....	149	77	48	9
Spain .....	159	42	74	14
Sweden .....	78	15	81	15
Switzerland .....	115	20	83	15
United Kingdom (England and Wales) .....	117	21	82	15

SOURCES: Data for 1906-1910 from Bunle, *Le mouvement naturel de la population* ... (1954), pp. 134-136; data for 1960-1964 from United Nations, *Demographic Yearbook, 1966* ... (1967), table 14.

<sup>a</sup> 1907-1910.

<sup>b</sup> Territory before 1913.

<sup>c</sup> Excludes Maoris.

regions.<sup>128</sup> A spectacular decline in infant mortality occurred in the USSR, where the rate dropped from an estimated 269 in 1913 to 182 in 1940 and 29 in 1964.<sup>129</sup>

65. Even in those countries where the reduction of mortality was most advanced and where little further decline of crude death rates was registered after the 1930s, improvements in infant mortality continued.<sup>130</sup> Recently, however, a slackening of the rate of decrease has been observed in several countries which had already reached very low levels of infant mortality.<sup>131</sup>

66. While trends in infant mortality cannot be traced with any degree of accuracy for most countries in the world's developing regions, there is evidence for a few countries with relatively good statistics of striking declines

<sup>128</sup> In Yugoslavia the infant mortality rate was reduced from about 150 per 1,000 live births in the 1920s to about 80 in the early 1960s. Playec, *Smrtnost stanovništva u Jugoslaviji* ... (1968), p. 6. See also Tasić et al., *Smrtnost odojčadi u Jugoslaviji* (1966), p. 29.

<sup>129</sup> Ovcharov, "Morbidity factors and trends ..." (1967).

<sup>130</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 20-21. For trends in Austria see Czermak and Hansluka, "Statistische Grundlagen der Pädiatrie 5 ..." (1967), p. 2.

<sup>131</sup> United States, National Center for Health Statistics, *International Comparison of Perinatal and Infant Mortality* ... (1967), pp. 22-24; Moriyama, "Infant mortality in certain countries of low mortality" (1967), p. 356; Bourgeois-Pichat, "Evolution récente de la mortalité infantile" (1964); Hunt and Chenoweth, "Recent trends in infant mortality in the United States" (1961); Shapiro, Schlesinger and Nesbitt, *Infant, Perinatal, Maternal and Childhood Mortality* ... (1968), p. 115.

in recent decades. Table V.11 shows data for ten developing countries, all of which had infant mortality rates of more than 100 as late as 1935-1939. In the succeeding twenty-five years two of these countries—China (Taiwan) and Singapore—had achieved a cut in the infant mortality rate of 80 per cent, or comparable to that which occurred during the last half century in those industrialized countries which achieved the most rapid declines. In Taiwan the infant mortality rate fell from 144 in 1935-1939 to 28 in 1960-1964, and in Singapore the comparable decline was from 152 to 31. Declines of 60 per cent or more in the infant mortality rate were also recorded in Ceylon, Jamaica, Malaysia, Mauritius, Puerto Rico and Trinidad and Tobago during the same period. Significant, though less dramatic declines in infant mortality were registered in the United Arab Republic, where the rate dropped from about 163 in 1935-1939 to 109 in 1960.<sup>132</sup>

TABLE V.11. INFANT MORTALITY RATES FOR SELECTED DEVELOPING COUNTRIES, 1935-1939 AND 1960-1964

Country	Average annual rates		Percentage decline	Average decennial percentage decline
	1935-1939	1960-1964		
Ceylon .....	182	54 <sup>a</sup>	70	28
China (Taiwan) ....	144	28	81	32 ✓
Costa Rica .....	144	73 <sup>a</sup>	49	20
El Salvador .....	125	70 <sup>a</sup>	44	18
Jamaica .....	127	48	62	25
Malaysia .....	149	58	61	24
Mauritius .....	151	61 <sup>a</sup>	60	24
Puerto Rico .....	123	45	63	25
Singapore .....	152	31	80	32 ✓
Trinidad and Tobago	104	41	60	24

SOURCE: United Nations, *Demographic Yearbook, 1966* ... (1967), table 14.

<sup>a</sup> Four-year average.

67. With the slackening of the downward trend in the more advanced countries, and continued rapid progress in other countries, greater uniformity in levels of infant mortality can be expected in the future. As pointed out above, some overlapping of rates has been observed between countries in the world's developed and developing regions. This situation has brought into question the continued utility of the level of infant mortality as an indicator of differences between countries in social and economic conditions, since it now appears that public health measures can be successfully applied to lower mortality without very great changes in the economic and social structure of the developing countries.<sup>133</sup> Thus, some of these countries have not made such great strides in respect to industrialization and social development as the levels of their infant mortality rates would ordinarily suggest.

<sup>132</sup> Sarhan, "Mortality trends in the United Arab Republic" (1967), pp. 359-360.

<sup>133</sup> United Nations, *1967 Report on the World Social Situation* (1969), p. 10.

### 3. CHARACTERISTICS OF INFANT MORTALITY

68. The levelling-off process that characterizes recent trends of infant mortality in low-mortality countries has been attributed to difficulties experienced in reducing endogenous mortality. Examining data for seven countries of low mortality, Bourgeois-Pichat found endogenous mortality to be three to seven times as high as exogenous mortality in Sweden, the Netherlands and the United States in 1963, and more than twice as high in Canada and England and Wales. He concluded that exogenous mortality would soon virtually disappear in low-mortality countries, and noted that Sweden, where exogenous mortality amounted to only 1.8 per 1,000 live births, had already almost reached that state.<sup>134</sup>

69. Variations in infant mortality levels among countries are least during the neonatal period, i.e. during the first month of life, and increase with age.<sup>135</sup> Hence, an inverse relation has been found between the general level of the infant mortality rate and the proportion of infant deaths which occur shortly after birth. An examination of infant mortality data for numerous countries for the period 1936-1945 showed that in countries where the infant mortality rate is below 50, between one-half and two-thirds of infant deaths took place in the first month of life. The corresponding proportion was only slightly more than one-third in countries where the infant mortality rate exceeded 100. The long-term trends of infant mortality in individual countries are consistent with this pattern, in that they show only a very modest decrease over time in mortality occurring during the first week of life, and a very substantial fall in infant mortality beyond this age. Thus, in Sweden between 1915-1917 and 1943-1945 the mortality rate for infants aged less than one week declined by only 4 per cent, while a decline of nearly three-fourths was registered at ages from one week to eleven months.<sup>136</sup>

70. The different trends which have been observed in neonatal and post-neonatal mortality are clearly of much significance for the probable future course of infant mortality in particular countries. In countries where

<sup>134</sup> Bourgeois-Pichat, "Evolution récente de la mortalité infantile" (1964), pp. 436-437. In contrast with the pattern in the countries studied by Bourgeois-Pichat, nearly equal rates of endogenous and exogenous mortality were found in the Czech regions of Czechoslovakia in 1957. Vysušilová, "O České kojenecké úmrtnosti" (1959), p. 95.

<sup>135</sup> For example, in 1963 neonatal mortality in Austria exceeded that in Switzerland and the Federal Republic of Germany by 38 and 8 per cent, respectively, but the post-neonatal rate in Austria was double that in Switzerland and exceeded the German rate by 38 per cent. Czermak and Hansluka, "Statistische Grundlagen der Pädiatrie 6 ..." (1967), p. 178.

<sup>136</sup> United Nations, *Foetal, Infant and Early Childhood Mortality*, vol. 1 ... (1954), pp. 34-35. In the Czech regions of Czechoslovakia between 1920 and 1950 the neonatal mortality rate attributable to exogenous causes declined by about three-fourths, while the post-neonatal infant mortality rate (exogenous) fell by about two-thirds, and the neonatal rate from endogenous causes was cut by over one-half. Vysušilová, "O České kojenecké úmrtnosti" (1959), p. 92. In England and Wales between 1911 and 1949, the total infant mortality rate declined by three-fourths, while the mortality rate in the first month of life declined by one-half. Taylor, "The changing pattern of mortality ..." (1954), p. 7. For analyses relating to Denmark and Yugoslavia, see, respectively, Matthiesen, *Infant Mortality in Denmark* ... (1965), p. 26, and Breznik and Šekarić, "Smrtnost stanovništva ..." (1963).

infant mortality has now reached a very low level, a further reduction will be difficult without revolutionary new medical discoveries, since congenital defects and diseases of early infancy, which are responsible for the major portion of infant deaths in these countries, are little subject to control through public health measures and improvements in social and environmental conditions.<sup>137</sup> In those areas where infant mortality is still high, improvements in sanitation, hygiene and health education can be expected to lower mortality throughout the period of infancy, whereas neonatal mortality should respond favourably to increasing hospitalization for deliveries, and improved ante-natal and obstetric care.<sup>138</sup>

### 4. FACTORS AFFECTING FOETAL AND INFANT MORTALITY

71. A number of factors particularly relevant to foetal mortality or to mortality in early infancy are discussed below; among these are birth weight, gestational age, age of mother, birth order and illegitimacy. Socio-economic and other factors associated with both general and infant mortality are discussed in the section on mortality differentials (section E).

72. The maturity of the infant at birth has been shown to be an important factor influencing infant mortality. The principal measure used in statistical studies to classify the newborn infant by developmental maturity has been weight at birth. Analyses of data for January-March 1950 for the United States revealed that deaths of infants with low birth weights accounted for two-thirds of all neonatal deaths. Chances of survival improved considerably with moderate increase in weight, with the optimum birth weight for survival being 3,501-4,000 grammes.<sup>139</sup> When gestational age was introduced into the analysis, "it was found that the heavier babies at each gestation age level fared better than the lighter ones".<sup>140</sup> This pattern is seen in table V.12. Studies in England and Wales, and Scotland revealed similar relationships.<sup>141</sup>

73. In the United States, low birth weight incidence has been shown to be related to a number of other variables, including urban or rural residence, size of locality, sex, plurality (i.e., single or multiple birth), birth order, age of mother, type of attendant at birth, and

<sup>137</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), p. 21; Moriyama, "Infant mortality in certain countries of low mortality" (1967), p. 357.

<sup>138</sup> See Chandrasekhar, "Infant mortality in Madras City" (1967), p. 103; McKeown, "Social and biological influences on foetal and infant deaths" (1967), pp. 52-55; Valaoras, "Foetal, peri-natal and infant mortality" (1955), p. 334. Among the factors which have been mentioned as being associated with high levels of neonatal mortality in India are too frequent pregnancies, lack of antenatal care, malnutrition among expectant mothers, and ignorant midwifery. Chandrasekhar, "Infant mortality in India, 1901-1951" (1955), p. 392.

<sup>139</sup> Shapiro, Schlesinger and Nesbitt, *Infant, Perinatal, Maternal and Childhood Mortality* ... (1968), pp. 47, 51. See also Shapiro, "Influence of birth weight, sex and plurality ..." (1954).

<sup>140</sup> Shapiro, Schlesinger and Nesbitt, *Infant, Perinatal, Maternal and Childhood Mortality* ... (1968), p. 53.

<sup>141</sup> United States, National Center for Health Statistics, *Infant and Perinatal Mortality in England and Wales* (1968); ———, *Infant and Perinatal Mortality in Scotland* (1966).

TABLE V.12. NEONATAL MORTALITY RATES PER 1,000 WHITE LIVE BIRTHS BY BIRTH WEIGHT AND WEEKS OF GESTATION: UNITED STATES, JANUARY-MARCH 1950<sup>a</sup>

Birth weight (in grammes)	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
1,000 or less .....	914.7	828.8	787.0	*	485.3
1,001-1,500 .....	762.2	560.0	416.6	377.5	351.1
1,501-2,000 .....	593.9	345.8	204.8	142.6	119.5
2,001-2,500 .....	400.0	187.6	92.7	49.9	33.5
2,501-3,000 .....	*	108.4	51.3	18.1	10.1
3,001-3,500 .....	*	*	23.8	8.3	5.9
3,501-4,000 .....	*	*	*	6.1	4.8
4,001-4,500 .....	*	*	190.5	9.6	5.9
4,501 or more .....	*	*	*	13.9	11.5

SOURCE: Shapiro and Unger, *Weight at Birth and its Effect on Survival* ... (1954).

<sup>a</sup> Based on deaths under twenty-eight days among children born 1 January to 31 March 1950. Excludes data for Massachusetts.

\* Rates not computed, less than ten deaths.

outcome of previous pregnancies,<sup>142</sup> although variation with age of mother and birth order has been shown to be only moderate.<sup>143</sup> The relationship with outcome of previous pregnancy has also been shown in data for England and Wales.<sup>144</sup>

74. No parameters of pregnancy loss have been as completely or as frequently explored as parity and age of mother. In general, the ratios of stillbirths, perinatal and neonatal mortality have been found to rise with increasing age of mother and with higher birth orders, although some exceptions have been noted.<sup>145</sup> The British perinatal mortality survey of 1958 showed that the risk of pregnancy loss rose with advancing age of mother after age thirty, that it was lowest for second births, and highest for fourth and subsequent births.<sup>146</sup> United States data for 1950 showed relatively high neonatal mortality rates for first births and high order births and for births to mothers under twenty and over thirty years of age.<sup>147</sup>

75. One of the earliest analyses of differentials in the risks of foetal and infant deaths according to legitimacy showed that in France in 1901 the male stillbirth rate was 49 for legitimate births and 76 for illegitimate births; by 1943 these rates had fallen to 30 and 47 for the two groups, respectively. Similar differences and trends were observed for female births. The same study showed that, for each

age group of mothers, infant mortality rates for illegitimate births exceeded those for legitimate births by 50 to 150 per cent in 1901, and by 1943 the differentials were even greater.<sup>148</sup>

76. The same type of differentials according to legitimacy can be traced in the statistics of other countries. For example, in Scotland the infant mortality rate of illegitimate children still remained higher than that of the legitimately born in 1963. The proportion of total births which were illegitimate had declined, however, from about 10 per cent in 1863 to about 5 per cent in 1963.<sup>149</sup> In Norway, the risk of death within the first year of life for an illegitimate birth has always been much greater than that for a legitimate one. For example, in 1901-1905, infant mortality rates per 1,000 live births were about 150 for illegitimates and 75 for legitimates. By 1956-1960, these rates had decreased to about 37 and 19, respectively, the relation between the two remaining at about 2 to 1. Although the higher mortality for illegitimates was insignificant as a factor in the national level of infant mortality, a comparison of the two groups is still of considerable interest from the socio-medical point of view, as it may throw light on the importance of the mother's environmental conditions for the viability of her child.<sup>150</sup> Substantially higher mortality among illegitimate births also exists in Denmark where, from 1951 through 1962, the mortality of illegitimate infants was 58 per cent higher than that of legitimate ones.<sup>151</sup> In England and Wales, the substantial excess mortality to which illegitimate births were formerly subject has

<sup>142</sup> United States, National Center for Health Statistics, *International Comparison of Perinatal and Infant Mortality* ... (1967), pp. 64-65.

<sup>143</sup> Loeb, "Weight at birth and survival of newborn ..." (1958).

<sup>144</sup> Butler and Bonham, *Perinatal Mortality* ... (1963).

<sup>145</sup> See, for example, Benjamin, *Social and Economic Factors Affecting Mortality* (1965), p. 46; Heady *et al.*, "The independent effects of social class ..." (1955), pp. 499-502; Tabach and Sutter, "Influence respective de l'âge maternel et du rang de naissance ..." (1948); Heady and Heasman, *Social and Biological Factors in Infant Mortality* (1959).

<sup>146</sup> Butler and Bonham, *Perinatal Mortality* ... (1963), pp. 20-23. A continuation of the analysis of data collected in the 1958 survey explores the complex interrelationships between perinatal mortality and maternal age, parity, social class and maternal height, among other factors. See Butler and Alberman, eds., *Perinatal Problems* ... (1969).

<sup>147</sup> United States, National Center for Health Statistics, *International Comparison of Perinatal and Infant Mortality* ... (1967), pp. 58-59.

<sup>148</sup> Candiotti and Moine, *La mortalité de l'enfant de première année* (1948), pp. 21-34.

<sup>149</sup> United States, National Center for Health Statistics, *Infant and Perinatal Mortality in Scotland* (1966), p. 16.

<sup>150</sup> United States, National Center for Health Statistics, *Infant Mortality Problems in Norway* (1967), pp. 13-14, 32; Norway, Statistik Sentralbyrå, *Dødelighet Blant* ... (1966), p. 32.

<sup>151</sup> United States, National Center for Health Statistics, *Infant and Perinatal Mortality in Denmark* (1967), pp. 10-11; Vedel-Petersen, in *Laerebog i Danmarks statistik* (1944), pp. 57-58, attributed the differences in Denmark to a number of factors, including the fact that a much higher proportion of illegitimate than of legitimate births are first births, which have generally higher mortality rates than second and subsequent births.



been greatly reduced since the Second World War, and illegitimate infants are no longer at a mortality disadvantage after the first week of life.<sup>152</sup>

77. Hansluwka found that infant mortality in Austria was 40 per cent higher among illegitimate than among legitimate births in 1961, and this differential was somewhat greater than had been observed at the beginning of the century. Mortality rates of illegitimates as compared with legitimates were 46 per cent higher in the neonatal group and 28 per cent higher for the post-neonatal group in 1961.<sup>153</sup> A smaller differential was observed in Yugoslavia, where in 1960-1962 the mortality of illegitimate infants was 25 per cent higher than that of legitimate ones.<sup>154</sup>

#### D. Causes of death

78. According to a recent compilation by the United Nations, statistics on deaths classified by cause were available for slightly less than one-third of the world's population. The percentage of the population covered by such statistics was over 95 in Northern America and Europe, around 80 in Oceania, and nearly 50 in Latin America, but in Africa and Asia the percentage was very low.<sup>155</sup> The existing data on causes of death are subject to many defects, e.g., when total deaths are under-registered, when the percentage of deaths not medically certified is high, or when a large proportion of deaths is attributed to senility, ill-defined and unknown causes, or to a residual category consisting of "all other diseases".<sup>156</sup> Serious obstacles to international comparisons of cause-of-death data arise from differences between countries in terminology, method of certification, diagnostic techniques and in the interpretation of death certificates by coders.<sup>157</sup>

<sup>152</sup> United States, National Center for Health Statistics, *Infant and Perinatal Mortality in England and Wales* (1968), pp. 28, 65. See also Benjamin, *Social and Economic Factors Affecting Mortality* (1965), pp. 46-47.

<sup>153</sup> Hansluwka, "Social and economic factors in mortality in Austria" (1964), p. 332.

<sup>154</sup> Tasić *et al.*, *Smrtnost odojčadi u Jugoslaviji* (1966), pp. 179-180. Earlier studies, for example, in Austria, Czechoslovakia, and Jamaica, confirmed a higher mortality among illegitimate infants. See Hecke, "Die Unehelichen in Österreich" (1936), p. 341; Srb, "Zvýšení kojenecké . . ." (1949). Roberts, in "A note on mortality in Jamaica" (1950), p. 76, explained the higher mortality rate among illegitimate infants as being related to differences in socio-economic levels of the parents rather than in terms of marital status *per se*. See also DePorte, "Inter-racial variation in infant mortality" (1925), p. 484.

<sup>155</sup> United Nations, Economic and Social Council, *Availability, Sources and Quality . . .* (1968), pp. 4-5.

<sup>156</sup> In many developing countries at least one-quarter of total deaths in 1965-1966 were allocated to such ill-defined categories. In Thailand, for example, as much as 65 per cent of total deaths in 1965 fell into ill-defined and residual categories. Even certain European countries, such as Belgium, France, Greece, Poland and Yugoslavia, reported between 26 and 31 per cent of total deaths in these categories in 1965-1966. United Nations, *Demographic Yearbook, 1967 . . .* (1968), table 24.

<sup>157</sup> For more detailed discussion of the problems of compiling, evaluating and analysing cause-of-death statistics, see the following sources: United Nations, *Demographic Yearbook, 1951* (1951), pp. 18-26; ———, *1966 . . .* (1967), pp. 35-36; United Nations,

79. Despite the limitations of the data, the broad world trend in mortality by cause of death is reasonably clear. In the developed countries, where infectious and parasitic diseases have been brought under control and some of them virtually eradicated, the proportion of deaths attributable to such diseases has decreased dramatically with declining mortality, while deaths from the degenerative ailments, mainly cancer and diseases of the heart and circulatory system, account for an ever-increasing proportion of the total. In countries where mortality is still relatively high, the opposite pattern prevails—mortality from the infectious and parasitic diseases is still of major importance.<sup>158</sup> The older age structure of the population in developed countries contributes to these differences, in view of the increasing incidence of the degenerative diseases with age.

80. A World Health Organization analysis of the leading causes of death in 1962-1964 in selected countries of both developed and developing regions brings these differing patterns into relief. Among the selected developed countries, the ten leading causes of death were responsible, on average, for 79 per cent of all deaths in 1964. This was a somewhat higher percentage than a decade earlier, and is indicative of a trend towards increasing concentration among a few leading causes.<sup>159</sup> Among the developing regions, on the other hand, there was a greater diffusion, with the ten leading causes of death accounting, on average, for only 56 per cent of all deaths.<sup>160</sup>

81. Among the developed countries whose data were analysed in the World Health Organization study, the leading cause of death in 1964 was heart disease, which accounted for nearly one-third of total deaths. Malignant neoplasms were the second most frequent cause (19 per cent), followed by vascular lesions affecting the central nervous system (13 per cent). These degenerative diseases accounted for nearly two-thirds of all deaths, thus illustrating the tendency towards concentration mentioned above. Accidents were responsible for about 5 per cent of deaths, and influenza and pneumonia together for about 3 per cent.<sup>161</sup>

*Handbook of Vital Statistics Methods* (1955), pp. 123-127; World Health Organization, "The accuracy and comparability of death statistics" (1967); Abramson, "Causes of death—international comparisons" (1967).

<sup>158</sup> According to Arriaga's classification of "infectious-communicable" diseases, deaths attributable to this group of diseases around 1960 ranged from 6 to 13 per cent in eleven developed countries, and from 33 to 61 per cent in the same number of developing countries. Arriaga, "Rural-urban mortality in developing countries . . ." (1967), p. 99.

<sup>159</sup> World Health Organization, "Causes of death: the ten leading causes of death for selected countries in North America, Europe and Oceania . . ." (1967), p. 33.

<sup>160</sup> World Health Organization, "Causes of death: the ten leading causes of death for selected countries in Africa, South and Central America and Asia . . ." (1967), p. 118. The percentage would have been even lower were it not for the distorting effect of including in the figures data for Japan and Israel, both of which have mortality patterns typical of developed countries.

<sup>161</sup> World Health Organization, "Causes of death: the ten leading causes of death for selected countries in North America, Europe and Oceania . . ." (1967), pp. 33-35. While there was little variation from country to country in the rank order of the highest-ranking causes of death, patterns became less uniform with descending



TABLE V.13. PERCENTAGE DISTRIBUTION OF DEATHS BY CAUSE IN SELECTED MODEL POPULATIONS

Cause of death	Populations with a "young" age structure		Populations with an "old" age structure	
	Model A e <sub>0</sub> = 50	Model B e <sub>0</sub> = 70	Model C e <sub>0</sub> = 50	Model D e <sub>0</sub> = 70
All causes .....	100.0	100.0	100.0	100.0
Infectious, parasitic and respiratory diseases .....	34.1	10.8	27.4	6.5
Cancer .....	5.6	15.2	7.9	16.4
Diseases of the circulatory system ...	18.7	32.2	26.0	46.5
Violence .....	4.3	6.8	4.0	5.2
All other causes .....	37.3	35.0	34.7	25.4

SOURCE: Adapted from United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 111-112. See also pages 106-110 for a description of methods used in constructing these and other models.

82. The leading cause of death in selected countries of the developing regions in 1964 was found to be gastroenteritis (comprising gastritis, duodenitis, enteritis and colitis), responsible, on the average, for about 10 per cent of total deaths. The next four leading causes were, in order, heart disease (about 8 per cent), influenza and pneumonia (about 7 per cent), malignant neoplasms (about 7 per cent) and accidents (about 5 per cent).<sup>182</sup>

83. The typical pattern of causes of death in populations of different mortality levels has been illustrated by means of a series of models in a United Nations study of world mortality trends. Four of these models are presented in table V.13. It is seen that in a standard population with a "young" age structure (models A and B), as expectation of life at birth rises from 50 to 70 years, the proportion of all deaths attributable to infectious, parasitic and respiratory diseases declines from 34 to 11 per cent, while the proportion of deaths from cancer rises from 6 to 15 per cent, and the proportion from diseases of the circulatory system rises from 19 to 32 per cent. The effect of age structure is seen by comparing these models with those based on a standard population with a much older age structure (models C and D). Thus, model D with life expectancy of 70 years, but a higher proportion of older persons than model B, shows only about 6 per cent of all deaths resulting from infectious, parasitic and respiratory diseases while diseases of the circulatory system account for nearly half of the total. The cause-of-death patterns depicted in models A and D may provide a rough indication of differences between the world's developing and developed regions, since the former have young age structures and an average life expectancy of about 50 years, while the latter have relatively old age structures and an average life expectancy of about 70 years.

order. In addition to the five causes mentioned above, the following most frequently ranked among the ten leading causes in the selected countries: diabetes mellitus, congenital malformations, birth injuries, post-natal asphyxia and atelectasis, suicide and self-inflicted injury, bronchitis, tuberculosis, cirrhosis of liver, and nephritis and nephrosis. *Ibid.*, pp. 35, 40-49.

<sup>182</sup> World Health Organization, "Causes of death: the ten leading causes of death for selected countries in Africa, South and Central America and Asia ..." (1967), pp. 118-119. Also appearing among the ten leading causes were vascular lesions affecting the central nervous system, infections of the newborn, tuberculosis, measles, and nephritis and nephrosis.

84. As mentioned above, emphatic shifts in the relative importance of certain categories of causes of death have accompanied substantial declines in mortality. These changes are illustrated in the figures for England and Wales and the United States during the first half of the present century. Around 1900, when expectation of life at birth in these countries was about 50 years, almost 30 per cent of all deaths were due to infectious (including respiratory) and parasitic diseases, while in the 1950s, when life expectancy had increased to some 70 years, the corresponding percentage was 7 for the United Kingdom (England and Wales) and 5 for the United States. This striking decrease in the relative contribution of the infectious and parasitic diseases in these countries is believed to have been roughly typical of mortality trends and patterns in other countries of European culture as their general mortality decreased. Even though sufficiently accurate cause-of-death statistics are lacking for developing countries which are now undergoing rapid mortality decline, there are grounds for believing that it is the infectious and parasitic diseases which are decreasing fastest as a cause of death.<sup>183</sup>

85. With the ageing of population in the developed countries, the ratio of cancer deaths to total deaths has increased, since the incidence of cancer rises rapidly with age. Even after standardizing the death rate to eliminate the effect of changes in age structure, however, cancer mortality seems to have increased in certain countries. In the United States, for example, the crude death rate from cancer rose nearly 2.5 times between 1900 and 1954; after adjustment for changes in age composition, the increase was 70 per cent. It is difficult to estimate what portion of this remaining rise is actually due to higher cancer mortality, as improvements in case-finding and diagnosis also contribute to the increase.<sup>184</sup> Tsukahara's analysis of trends in age-standardized death rates from cancer in twenty developed countries during the 1950s provides impressive evidence of widespread increases among males. As seen in table V.14, rates for males rose

<sup>183</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 76, 78.

<sup>184</sup> Dorn, "Ecological factors in morbidity and mortality from cancer" (1956), pp. 82-87. For a discussion of the difficulties in interpreting long-term cancer mortality trends from available statistics, see United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 84-87.

TABLE V.14. PERCENTAGE CHANGE IN AGE-ADJUSTED DEATH RATES FROM ALL CAUSES AND FROM CANCER, 1952-1953 TO 1960-1961 : SELECTED COUNTRIES

Country	All causes		Cancer	
	Male	Female	Male	Female
Australia .....	- 8	-14	+ 5	- 7
Canada .....	-10	-16	+ 8	- 4
Denmark .....	- 3	-13	+ 9	0
Finland .....	-11	-15	+ 3	- 8
France .....	-14	-22	+15	- 2
Germany, Federal Republic of	- 1	-12	+10	- 3
Ireland .....	- 4	-11	+ 7	+ 4
Israel .....	-21	-24	+ 5	- 4
Italy .....	- 9	-19	+21	+ 7
Japan .....	-17	-25	+17	+ 5
Netherlands .....	- 3	-16	+12	- 6
New Zealand .....	+ 3	- 3	+ 6	0
Norway .....	+ 2	- 9	- 1	- 7
Portugal .....	- 9	-12	+38	+20
Sweden .....	- 5	-14	+ 9	- 3
Switzerland .....	- 9	-16	- 2	- 8
United Kingdom:				
England and Wales .....	- 3	- 8	+ 6	- 2
Northern Ireland .....	+ 1	- 6	+ 9	- 5
Scotland .....	0	- 7	+ 8	- 1
United States:				
White population .....	- 5	-12	+ 5	- 7
Non-white population ....	-11	-15	+16	- 3

SOURCE: Tsukahara, "Trends in age-adjusted ..." (1966), p. 386.

in all but two of the countries studied; while the rates for females declined in most countries, the percentage decreases were substantially less than those relating to other causes.<sup>165</sup>

86. There is fairly clear evidence that mortality from cancer of the trachea, bronchi and lungs has continued to increase in the past two decades and has emerged as a major health hazard in many countries of the world. Males have been affected to a far greater extent than females by respiratory cancers, but increasing incidence has become evident among females over thirty-five years of age in a number of countries.<sup>166</sup> Mortality from leukaemia and aleukaemia has also been on the rise in recent years and constitutes a sizable fraction of cancer deaths in persons under thirty-five years.<sup>167</sup> Significant differences have been found in the structure of cancer mortality by sites among different populations. Thus, cancer of the stomach constituted more than half of all male cancer deaths in Japan in the 1950s, compared with only 10 per cent in the United States (white population).

<sup>165</sup> Tsukahara, "Trends in age-adjusted ..." (1966). Since the study covered a period of less than a decade (1952-1953 to 1960-1961), the data are not as likely to be affected by changes in diagnostic and classificatory procedures as are longer time series.

<sup>166</sup> World Health Organization, "The world health situation ..." (1967), pp. 355-356; Krohn and Weber, "Some characteristics of mortality ..." (1967), p. 334; see also Spiegelman, "Recent trends and determinants of mortality ..." (1956), pp. 54-55; Radkovský and Pirková, "Nepřiznivý vývoj rakoviny plic u mužů" (1968).

<sup>167</sup> Krohn and Weber, "Some characteristics of mortality ..." (1967), p. 335.

On the other hand, respiratory cancer as a cause of death had a much higher incidence in the United States than in Japan.<sup>168</sup>

87. With few exceptions, developed countries have also experienced a rise in mortality from cardiovascular diseases among males beyond age forty-five, whereas among females there has been a slowing down of the decline with increasing age, and in some countries, an increase in the rate beyond age seventy-five.<sup>169</sup> The fact that treatment of cardiovascular diseases is usually not curative, but is limited to postponing deaths, has been cited as a possible explanation for the observation that over a period of time, a decline in mortality among younger persons is accompanied by an increase among older persons.<sup>170</sup>

88. In the developing regions, the pattern of mortality by cause of death is markedly different from that of the developed regions. According to an analysis of deaths by cause in selected countries of Latin America, the leading causes of death in the 1960s were those prevailing in the more advanced countries early in the twentieth century, and included gastro-enteritis, pneumonia, tuberculosis, bronchitis, influenza, dysentery, measles, whooping cough, tetanus and typhoid. While great gaps in death rates for young children still exist between Latin American countries and the more developed regions, some notable improvements have been recorded over a short period. In Venezuela, for example, the gastro-enteritis death rate of 818 per 100,000 in the age group one to four years in 1941-1945 fell to 344 in 1950. Malaria eradication programmes, whereby flies as well as mosquitos succumbed to insecticides, are said to have contributed greatly to this decline.<sup>171</sup>

89. A striking example of the response of a disease to specific measures aimed at eradicating it has been the case of the parasitic disease, malaria. Data on the epidemiological status of malaria show that out of the 1,635 million people living in the originally malarious areas of the world, by the end of 1966, three-fourths were in areas where malaria had been eradicated or where eradication programmes were in progress.<sup>172</sup> In Ceylon total deaths from malaria numbered over 12,500 in 1946, the first year of the extensive DDT spraying programme, and the malaria death rate was 184 per 100,000 population. Ten years later, in 1956, 144 persons died from malaria,

<sup>168</sup> Segi and Tsukahara, "Comparison of the age-adjusted ..." (1965), p. 301.

<sup>169</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 87-95. The decline in rheumatic heart disease and increasing control over infections which have residual effects on the heart have contributed to mortality decline at the younger ages. World Health Organization, "Cardiovascular diseases ..." (1967), p. 3; Spiegelman, "Mortality trends for causes of death ..." (1965), p. 120.

<sup>170</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 95-96. However, this explanation cannot account for the substantial increase in male mortality from cardiovascular diseases at ages 45-64, according to Brass, who suggests that smoking, overeating and stress may all play some role. Brass, "The changing patterns ..." (1966), p. 5.

<sup>171</sup> Gabaldon, "Leading causes of death in Latin America" (1965).

<sup>172</sup> World Health Organization, "Malaria eradication in 1966" (1967), pp. 373-374.

a rate of less than 2 per 100,000 population.<sup>173</sup> Among other countries having benefited from malaria eradication programmes are Guatemala, Guyana, Mauritius, Pakistan and Venezuela.<sup>174</sup>

90. Smallpox has been completely eliminated from Europe, North America, Oceania, and most parts of Latin America, but it is still endemic in Africa, South-East Asia and part of the Eastern Mediterranean. Over 80 per cent of the world's smallpox cases are recorded in Asia, mainly in India, Indonesia and Pakistan. The institution of mass vaccination campaigns in recent years under the auspices of the World Health Organization has not yet produced a noticeable downward trend in the incidence of the disease, although the total world area with endemic smallpox has been shrinking.<sup>175</sup>

91. Cholera again became a threat to the health of the world when its containment to India and Pakistan and a few neighbouring countries was suddenly reversed in 1961. Epidemic waves of the disease invaded large areas of Asia, affecting many countries which had long been free of it. The control of cholera is more problematic than that of the other infectious diseases because it requires the construction of modern sanitation facilities and the education of the public in proper personal hygiene—measures which are both costly and time-consuming.<sup>176</sup>

92. Tuberculosis has lost much of its importance as a cause of death in a number of developed countries where it was once a grave problem. In England and Wales, for example, tuberculosis was the leading cause of death early in the century, and was responsible for one out of nine deaths. By 1960-1964, only one death in 180 was due to this disease.<sup>177</sup> That there is still room for substantial improvement in tuberculosis mortality in certain developed countries, however, is evident from the widely divergent death rates for the disease. A tabulation of age-standardized male death rates from tuberculosis of the respiratory system for 1961-1963 for twenty-one selected countries gave a rate of 2.8 (per 100,000 males) for the Netherlands, 8.5 for the United Kingdom, 37.5 for Hungary, 43.6 for Japan and 53.1 for Portugal.<sup>178</sup>

<sup>173</sup> Meegama, "Malaria eradication and its effect on mortality levels" (1967), pp. 207-208. Rates are computed from mid-year population figures in United Nations, *Demographic Yearbook, 1961* ... (1961), table 4. The relationship of malaria control to general mortality decline in Ceylon is discussed in section H.

<sup>174</sup> See Pampana, "Effect of malaria control on birth and death rates" (1955); Meegama, "Malaria eradication and its effect on mortality levels" (1967), pp. 230-237; Robinson, "Recent mortality trends in Pakistan" (1967), p. 34.

<sup>175</sup> World Health Organization, "A decade of smallpox" (1968); ———, "The smallpox eradication programme" (1968); ———, *Third Report on the World Health Situation, 1961-1964* (1967), pp. 10-11.

<sup>176</sup> World Health Organization, "The world health situation ..." (1967), p. 351; ———, *WHO Expert Committee on Cholera; Second Report* (1967), pp. 3-6; ———, "Cholera: prevention and treatment" (1967).

<sup>177</sup> World Health Organization, "The world health situation ..." (1967), pp. 352-353.

<sup>178</sup> World Health Organization, "Standardized death rates ..." (1966). On the remarkable decrease in mortality from tuberculosis in the younger age groups in Japan, see Mizushima, "Nihonjin shiboritsu ..." (1959).

In certain of the developing countries the death rates from tuberculosis, though decreasing, are still high. The disease has been estimated to cause from two to three million deaths annually at present, more than four-fifths of which are in the developing countries. With the preventive and curative tools now available, it is possible to carry out effective programmes against the disease, even under adverse socio-economic conditions.<sup>179</sup>

93. Although maternal mortality (i.e., deaths arising from deliveries and complications of pregnancy, childbirth, and the puerperium) has fallen to low levels in most of the developed countries, it is still a major cause of death among women of childbearing ages in many parts of the world, resulting in some countries in a higher female than male death rate at these ages. Maternal mortality levels have generally been declining, in developing as well as developed countries. For example, in 1950-1952 the number of maternal deaths per 100,000 live births was 571 in Ceylon and 72 in Denmark,<sup>180</sup> while the corresponding figures for a more recent year were 245 for Ceylon (1963) and 14 for Denmark (1965). There are considerable differences in reported maternal mortality levels even among the developed countries. For example, in 1965 the number of maternal deaths per 100,000 live births was 71 in the Federal Republic of Germany, whereas in the neighbouring countries it was as follows: Belgium, 23; Denmark, 14; France, 32; Netherlands, 29, and Switzerland, 38.<sup>181</sup> Among the factors contributing to the decrease of maternal mortality in the developing countries are increases in the proportion of women receiving pre-natal medical care and in the proportion of deliveries taking place in hospitals or maternity centres.<sup>182</sup>

94. Deaths from accidents rank fourth among the causes of death in most developed countries. In fact, they occupy first place in the cause-of-death list in the age-group from one to thirty-five years, reflecting the greatly diminished importance of fatal disease at these ages. Due to increasing automobile ownership, mortality from motor vehicle accidents has been rising, and in general constitutes over 40 per cent of all deaths attributable to accidents. Home accidents—caused by falls, burns, scalds and poisoning—are the number one cause of death during childhood after the first year of life.<sup>183</sup>

<sup>179</sup> World Health Organization, "The world health situation ..." (1967), p. 353.

<sup>180</sup> World Health Organization, "Maternal mortality, 1950-1960" (1964).

<sup>181</sup> Compiled from United Nations, *Demographic Yearbook, 1966* ... (1967), tables 7 and 20; and ——— 1967, ... (1968), tables 7 and 24.

<sup>182</sup> These proportions are still quite low in the developing countries, however, as indicated by the crude estimates presented in a recent review of world-wide conditions of maternity care. Among countries replying to a questionnaire, those in Asia reported, on average, that only about one-fifth of all deliveries took place in hospitals or maternity centres, while the corresponding proportion for Africa was about one-third. See Joint Study Group of the International Federation of Gynaecology and Obstetrics and the International Confederation of Midwives, *Maternity Care in the World* ... (1966), pp. 7-9.

<sup>183</sup> United Nations, *1967 Report on the World Social Situation* (1969), p. 28; *Population Bulletin of the United Nations, No. 6* ... (1963), p. 101; World Health Organization, "Causes of death: the ten leading causes of death for selected countries ..." (1964).

(Continued on next page)

95. Deaths from suicide number an estimated half million persons a year<sup>184</sup> and are one of the leading causes of death among certain age groups in developed countries. A World Health Organization study in selected countries of North America, Europe and Oceania for the years 1956-1966 showed that suicide ranked third, fourth or fifth as a cause of death among persons aged 15-44 years. Suicide death rates increase progressively with age; in 1965 the rate was 6.4 per 100,000 population for persons 15-24 years old, and four times as high for persons aged 65-74 years. The total rate for males was over twice that for females. Several countries showed marked upward or downward trends in the death rate from this cause. Among the former was Hungary whose rate increased steadily from 20.6 to 29.8 per 100,000 population between 1955 and 1965, while the Japanese rate decreased from 25.2 to 14.7 during the same period.<sup>185</sup>

### E. Mortality differentials

96. Within the boundaries of individual countries important differences can be observed in the death rates for different subgroups of the population which share certain common characteristics. Among the characteristics identified as being related to mortality differences are geographic residence, socio-economic factors such as occupation, income level and educational attainment, ethnic group membership and marital status. Some of these differences are maintained over a period of time, despite reductions in general death rates, while others tend to diminish or disappear. Because of the interrelations among the various factors, interpretation of observed differentials is often difficult. For example, regional or ethnic differences in mortality may in some instances be the product of socio-economic differences, such as income and occupation.

#### 1. URBAN-RURAL DIFFERENTIALS

97. From the limited quantity of information available, it appears that mortality differences between urban and rural areas in most industrialized countries are now rather small, though they were not so formerly. Life tables representing recent mortality conditions showed less than one-half year's difference in average life expectancy at birth between urban and rural residents in such countries as Finland (1961-1965), Poland (1965-1966) and Sweden (1951-1960), and between residents of metropolitan areas and other inhabitants of the United States

(1959-1961).<sup>186</sup> Fairly uniform conditions of mortality seem also to have characterized urban and rural areas of the Soviet Union around 1958-1959, when average life expectancy at birth was reported to be 68.1 years in urban areas and 68.9 in rural areas.<sup>187</sup> In Denmark (1965) and in England and Wales (1960), mortality conditions appear to have been somewhat more favourable for rural residents.<sup>188</sup> A study of age-adjusted mortality rates by regions in Czechoslovakia for 1960-1961 showed that higher mortality levels were more prevalent in industrial districts having higher population density, whereas lower mortality rates were more frequent in agricultural districts with a lower percentage of urban population.<sup>189</sup> On the other hand, in Romania, life table data for 1963 suggest that urban inhabitants could expect to live almost two years longer than their rural counterparts.<sup>190</sup>

98. Data for most of the countries mentioned above show that the excess of male over female mortality is greater in urban than in rural areas. The particular pattern and possible causes of this phenomenon appear to vary in the few countries in which they have been investigated. In the Soviet Union, for example, the gap in excess male mortality between urban and rural areas has been found to be widest for young adults, a fact which Pressat attributed to the likelihood of a greater number of male accidental deaths in urban industries.<sup>191</sup> In England and Wales, on the other hand, the greater mortality disadvantage of males over females in urban, as compared with rural areas, manifests itself at ages above forty-five

<sup>186</sup> The values of life expectancy for urban and rural areas, respectively, were: for Finland, 68.8 and 69.1; for Poland, 70.1 and 69.7; for Sweden, 72.4 and 72.5; for the United States, 69.8 and 70.0. The data were derived from the following sources: Strömmer, *Väestöllinen muuntuminen Suomessa* . . . (1969), p. 147; Poland, Główny Urząd Statystyczny Polskiej Rzeczypospolitej Ludowej, *Polskie tablice wymieralności, 1965-1966* (1968), pp. 15-32; Sweden, Statistiska Centralbyrån, *Livslängdstabeller för årtiondet, 1951-1960* (1964), p. 24; United States, National Center for Health Statistics, *Life Tables for Metropolitan* . . . (1967).

<sup>187</sup> USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Itogi vsesoyuznoi perepisi naseleniia* . . . (1962), pp. 254-279. Pressat, "Les premières tables de mortalité de l'Union soviétique . . ." (1963), p. 69.

<sup>188</sup> For Denmark, standardized death rates based on the age structure of the total population were 10.5 per 1,000 population in urban areas and 9.6 in rural. Computed from United Nations, *Demographic Yearbook, 1967* . . . (1968), pp. 184-185, 421. Age-standardized death rates for England and Wales in 1960 were 12.4 in conurbations and urban areas with population of 100,000 and over, 12.1 in other urban areas and 11.0 in rural districts. Benjamin, *Social and Economic Factors Affecting Mortality* (1965), p. 36. See also United Kingdom, General Register Office, *The Registrar General's Decennial Supplement* . . . (1967), pp. xii, 1.

<sup>189</sup> Kučera and Růžička, "Regionální rozdíly . . ." (1964). In Austria around 1960 mortality rates from lung cancer were found to increase with size of locality, and at ages 65 and over the rate for Vienna was nearly double that of the smallest municipalities. Denk, Hanslówka and Karrer, "Regionale Unterschiede . . ." (1968), p. 25.

<sup>190</sup> Ferenbac and Nițescu, "Cresterea duratei medii . . ." (1964), p. 37; see also Romania, Direcția Centrală de Statistică, *Anuarul demografic* . . . (1967), pp. 150-161. In Argentina also life expectancy was higher in urban than in rural areas in 1946-1948. See Souto, "Indices de . . ." (1955).

<sup>191</sup> Pressat, "Les premières tables de mortalité de l'Union soviétique . . ." (1963), pp. 85-86.

(Footnote 183 continued)

pp. 55-58; Spiegelman, "Mortality trends for causes of death . . ." (1965), pp. 123-124. See also Swaroop, Albrecht and Grab, "Accident mortality among children" (1956); and Norman, *Road Traffic Accidents* . . . (1962).

<sup>184</sup> World Health Organization, *Prevention of Suicide* (1968), p. 9.

<sup>185</sup> World Health Organization, "Mortality statistics: suicides" (1968), pp. 365, 392-394. For age-sex patterns of suicide in selected developed countries, see Daric, "L'évolution de la mortalité par suicide . . ." (1956), pp. 694-695. On suicide in Czechoslovakia, see Růžička, *Sebevražednost v Československu* . . . (1968).

TABLE V.15. MORTALITY TRENDS IN URBAN AND RURAL AREAS OF SELECTED COUNTRIES

SWEDEN			NORWAY		
Expectation of life at birth both sexes			Standardized death rates per 1,000 population		
Period	Urban	Rural	Period	Urban	Rural
1881-1890	43.4	51.6			
1891-1900	47.3	53.6			
1901-1910	52.6	56.7			
1911-1920	55.6	57.5			
1921-1930	61.5	62.3			
1931-1940	64.9	65.0			
1941-1950	69.2	69.4			
1951-1960	72.4	72.5			
POLAND			Males		
Expectation of life at birth			Standardized death rates per 1,000 population		
Period	Urban	Rural	Period	Urban	Rural
			1889-1892	23.0	17.2
			1899-1902	20.1	14.8
			1909-1912	17.2	13.0
			1919-1922	15.9	12.6
			1929-1932	13.1	10.8
			1949-1952	8.9	7.4
			Females		
			1889-1892	19.2	15.8
			1899-1902	16.0	13.6
			1909-1912	13.8	11.7
			1919-1922	12.3	11.6
			1929-1932	10.2	9.6
			1949-1952	6.5	6.4
JAPAN			Standardized death rates per 1,000 population		
Year	Urban	Rural	Year	Urban	Rural
1920	28.4	25.0			
1925	21.8	19.8			
1930	18.8	18.0			
1935	17.0	17.0			

SOURCES: Sweden, Statistiska Centralbyrån, *Historisk statistik för Sverige* . . . (1955), p. 61; ———, *Livslängdstabeller för åriondet 1951-1960* (1964), p. 24; Norway, Statistisk Sentralbyrå, *Dødeligheten og dens årsaker* . . . (1961), pp. 48, 193; Ogino, "Shibo-ritsu no chiiki-teki . . ." (1967), p. 109; Poland, Główny Urząd Statystyczny, *Rocznik demograficzny 1945-1966* (1968), p. 540. See also Zaremba, "Zmiany długotrwałości . . ." (1964).

years.<sup>192</sup> In Austria, recent data show that the largest difference between urban and rural areas in male excess mortality occurred among persons under forty-five years of age, but in this case it was rural residence that proved to be highly disadvantageous to males, owing to a high accident death rate.<sup>193</sup>

99. Prior to the twentieth century, mortality was generally higher in urban than in rural areas of countries of Europe and Northern America, and differences were often substantial. In the United States in 1830, mortality conditions were far worse in the large cities than in the small cities or the rural areas, according to a life table for that time constructed by Jaffe and Lourie.<sup>184</sup> While an average life expectancy of about 40 years was calculated

<sup>192</sup> Martin, "A study of sex, age and regional differences . . ." (1956), p. 89; U.K., General Register Office, *The Registrar General's Decennial Supplement* . . . (1967), pp. 1, 66.

<sup>193</sup> Hansluwka, "Unterschiede in der Sterblichkeit ..." (1967).

<sup>194</sup> Jaffe and Lourie, "An abridged life table . . ." (1942), pp. 355-357.

for males in England and Wales in 1841, the corresponding figure for London was 35 years, and for the industrial towns of Liverpool and Manchester, 25 and 24 years, respectively.<sup>195</sup> In Finland during 1871-1875, the standardized death rate was about one-fourth lower in rural areas than in urban areas,<sup>196</sup> and a differential of approximately the same magnitude was found in Norway around the turn of the century.<sup>197</sup> Reporting that urban mortality exceeded rural mortality in the United States, in Prussia, in England and Wales and in the Netherlands toward the end of the nineteenth century, Weber generalized that death rates varied with the degree of agglomeration of population.<sup>198</sup> The reasons for this excessive urban mortality are discussed in section F (4) below.

<sup>195</sup> Glass, "Some indicators . . ." (1964), pp. 263-265.

<sup>196</sup> Strömmer, *Väestöllinen muuntuminen Suomessa ...* (1969), p. 111.

<sup>197</sup> Norway, Statistisk Sentralbyrå, *Dødeligheten og dens årsaker* . . . (1961), p. 48.

<sup>198</sup> Weber, *The Growth of Cities* ... (1899, 1963 ed.); chap. 6, p. 367.

100. Long-term mortality trends in most of these countries have been characterized by a progressive narrowing of the urban-rural differential. As shown in table V.15 above, more rapid mortality decline in urban than in rural areas had eliminated the once substantial differential in Sweden by the 1930s. In Norway, a near equality of urban and rural mortality rates was reached around 1950 for females, though for males the rural districts retained an advantage. Urban mortality appears to have exceeded that in rural areas in Japan in 1920, but a decade and a half later rates in the two areas were equal.

101. The pattern of urban-rural mortality differentials may have differed in parts of Eastern and Southern Europe which industrialized later than did the Western and Northern regions. For Poland, the earliest data available pertain to 1931-1932 and show a decided urban advantage in life expectation. But with the more rapid decline in mortality in the rural areas, the gap narrowed and differences between urban and rural life expectancies had been virtually eliminated by 1960-1961 (table V.15).

102. Within a given country, rural-urban residence has usually been related to infant mortality in much the same way as to general mortality. Prior to the twentieth century the infant mortality rate, like the total death rate, was higher in cities than in rural areas.<sup>199</sup> In Sweden, for example, the infant mortality rate in the middle of the eighteenth century was about 400 per 1,000 live births in Stockholm, while the average rate for Sweden was about 200.<sup>200</sup> In both Norway and Sweden, where statistics on urban and rural infant mortality go back a long way, infant mortality rates were approximately 50 per cent higher in urban than in rural areas throughout the second half of the nineteenth century (see table V.16). Thereafter, the gap began to close, and in the 1920s in Sweden and in the late 1930s in Norway, urban and rural rates were nearly equal; in succeeding periods rates have been slightly lower in the towns in both countries. In the Netherlands, while infant mortality was higher in the cities at the beginning of the industrial revolution, by the end of the nineteenth century the urban areas had gained an advantage owing to the development of better hygienic measures. Before the Second World War infant mortality rates showed an inverse correlation with size of municipality, but as infant loss came under greater control after the war, differences by size of municipality largely disappeared.<sup>201</sup>

103. In Bulgaria, infant mortality levels appear to have been uniformly high in urban and rural areas in the early 1920s when the country was little industrialized, but a widening gap between urban and rural rates developed

TABLE V.16. INFANT MORTALITY TRENDS IN URBAN AND RURAL AREAS OF SELECTED COUNTRIES  
(Deaths under one year per 1,000 live births)

BULGARIA		
Period	Urban	Rural
1921-1925 .....	157.4 <sup>h</sup>	155.5
1931-1935 .....	134.3 <sup>h</sup>	149.5
1941-1945 .....	109.3 <sup>h</sup>	145.8
1951-1955 .....	72.5 <sup>h</sup>	98.9
1961-1965 .....	28.2 <sup>h</sup>	39.3
1966-1967 .....	26.5 <sup>h</sup>	38.8

NORWAY		
Period	Urban	Rural
1856-1860 .....	135.0 <sup>h</sup>	95.1
1876-1880 .....	135.3 <sup>h</sup>	90.7
1896-1900 .....	125.7 <sup>h</sup>	83.0
1916-1920 .....	73.3 <sup>h</sup>	57.7
1936-1940 .....	38.5 <sup>h</sup>	39.6
1946-1950 .....	29.6 <sup>h</sup>	31.5
1956-1960 .....	18.7 <sup>h</sup>	20.3
1961-1963 .....	16.4 <sup>h</sup>	17.8

SWEDEN		
Period	Urban	Rural
1811-1820 .....	243 <sup>h</sup>	177
1831-1840 .....	229 <sup>h</sup>	161
1851-1860 .....	219 <sup>h</sup>	137
1871-1880 .....	193 <sup>h</sup>	119
1891-1900 .....	130 <sup>h</sup>	95
1911-1920 .....	76 <sup>h</sup>	67
1921-1930 .....	58 <sup>h</sup>	59
1931-1940 .....	40 <sup>h</sup>	49
1941-1950 .....	25 <sup>h</sup>	29
1951-1960 .....	17 <sup>h</sup>	19
1964 .....	14 <sup>h</sup>	15

SOURCES: Bulgaria, Tsentralno Statisticheskio Upravlenie pri Ministerskiya Savet, *Statisticheski godishnik na narodna Republika Bulgaria* (1968), p. 52; Norway, Statistisk Sentralbyrå, *Dødeligheten og dens årsaker* ... (1961), p. 60; Backer and Aagaenæs, *Dødelighet blant spedbarn* ... (1966), p. 39; Sweden, Statistiska Centralbyrån, *Historisk statistik för Sverige*, ... (1955), p. 60; ———, *Befolkningsrörelsen, översikt* ... (1964), pp. 24, 26; ———, *Statistisk årsbok för Sverige 1965* (1965), p. 52.

in succeeding years as urban rates began to fall, while rural rates for a time showed little improvement. After the Second World War, infant mortality fell rapidly in both rural and urban areas, and in the mid-1960s rural rates were still substantially higher than the urban (table V.16). Data for the Soviet Union for 1958-1959 show that the fairly similar general mortality rates in urban and rural areas masked a considerable excess of mortality among rural children, which may reflect less satisfactory health education and facilities for prevention and treatment of disease in the rural areas.<sup>202</sup>

<sup>202</sup> Infant mortality did not show a rural excess, but was about the same in urban and rural areas. There was some suggestion of a possible underregistration of infant deaths in rural areas, however. Pressat, "Les premières tables de mortalité de l'Union soviétique ..." (1963), pp. 81-85.

<sup>199</sup> See, for example, Bailey, *Modern Social Conditions* (1906), p. 321; and Newman, *Infant Mortality: a Social Problem* (1906), pp. 38-42.

<sup>200</sup> Price, *Observations on Reversionary* ... (1812), pp. 233, 235.

<sup>201</sup> United States, National Center for Health Statistics, *Infant Loss in the Netherlands* (1968), p. 9. Recent figures for Denmark show a very slight differential in favour of rural areas. United States, National Center for Health Statistics, *Infant and Perinatal Mortality in Denmark* (1967), pp. 17, 56. For an analysis of differentials in infant mortality rates in different zones within selected towns in Czechoslovakia, see Musil and Balík, "Územní rozložení kojenecké úmrtnosti ..." (1961).

104. In the developing countries, the greater concentration of medical facilities and public health services in cities, as well as certain characteristics of the urban population—better education, higher incomes, an awareness of health problems—might be expected to result in lower urban than rural mortality. On the other hand, problems of sewage disposal, contamination of drinking water and poor housing conditions may be more critical to health in urban areas owing to the high density of population.<sup>203</sup> Because the available data on mortality conditions in the urban and rural sectors of developing countries are meagre and their quality poor, it is difficult to establish the size and direction of the urban-rural mortality differential with certainty. In any comparison of rural and urban mortality rates in developing countries, there is a strong possibility of a greater deficiency in rural than in urban death registration. This, together with the better health conditions in urban areas mentioned above, has led many authors to hypothesize an urban mortality advantage, even when the statistics show no clearcut trend, or even show a lower rural mortality.

105. A case in point is Arriaga's analysis of mortality data for Mexico. While the official data showed similar urban and rural mortality levels, Arriaga's analysis of these data by states led him to doubt the completeness of the statistics for rural areas. He constructed for each state an index of accessibility of the registry offices, and found that in states where this index was lower than average, the rural death rates were also lower than average, and lower than the urban rate, supporting his hypothesis that registered rural mortality is incomplete.<sup>204</sup> The view has frequently been expressed that urban mortality is lower than rural in other parts of Latin America as well.<sup>205</sup>

106. Data for Africa appear to confirm a similar pattern of lower urban than rural mortality. Despite poor urban living conditions, infant and early childhood mortality is almost everywhere lower in and around the towns of tropical Africa than in the rural areas. Certain rural surveys suggest that one out of three African children dies before age five, while in the towns the figure is thought to be about one out of four.<sup>206</sup>

107. Using data from a sample survey conducted in the Democratic Republic of the Congo in the mid-1950s, Romaniuk estimated an expectation of life at birth of only about 35 years in the rural areas, compared with

about 50 years in the urban areas.<sup>207</sup> The results of a series of sample surveys conducted in some countries of Francophone Africa in the early 1960s showed urban mortality to be consistently lower than rural mortality. Although the differential was slight in some countries (e.g., Central African Republic and Chad), in others it was substantial (e.g., Dahomey, Gabon and West Cameroon). The more favourable mortality conditions in the urban areas have been attributed to the concentration there of the highest income groups, the highest school attendance ratios, superior public health services and hospital and medical facilities, and to differences in the way of life. The poor hygienic conditions often found in urban areas, however, serve to retard the improvements in mortality which the afore-mentioned advantages of urban living would be expected to bring about.<sup>208</sup>

108. For recent years death rates for health bureau localities in rural areas of the United Arab Republic surpassed those in urban areas, even without adjustments for the under-registration which is certain to exist. This is not surprising in view of the substantial differences in medical personnel and hospital facilities between the two types of areas.<sup>209</sup> In Turkey, according to a demographic survey, mortality rates in rural areas were higher than those in urban areas at nearly all ages, the estimated crude death rate being 17 per 1,000 in the former and 11 in the latter.<sup>210</sup> Taking into account the limitations of available data for India, Sovani concluded that urban death rates are lower than rural death rates. In his view, certain unfavourable aspects of the urban environment are more than compensated for by the availability of greater medical facilities and the increased disposition on the part of urban dwellers to take advantage of them.<sup>211</sup> Results of the National Sample Survey, eighteenth round, taken in India in 1963-1964, showed an infant mortality rate of about 124 for males and 110 for females in rural areas, as compared with 88 and 82, respectively, in urban areas. For both sexes, the urban-rural differential was greater in the neonatal than in the post-neonatal period.<sup>212</sup>

<sup>207</sup> Romaniuk, "The demography of the Democratic Republic of the Congo" (1968), pp. 310-311.

<sup>208</sup> Cantrelle, *Mortalité: facteurs* (1967), p. 44; Cameroon, Direction de la statistique, *La population du Cameroun occidental* ... (1965), pp. 81-82; Central African Republic, Service de la statistique générale, and France, Service de Coopération, *Enquête démographique en République centrafricaine, 1959-1960* ... (1964), pp. 117-124; Chad, Service de statistique, and France, Service de Coopération, *Enquête démographique au Tchad, 1964* ... (1966), vol. 1, pp. 153-157; Dahomey and France, Service de Coopération, *Enquête démographique au Dahomey, 1961* ... (1964), pp. 143-147; Gabon, Service de statistique, and France, Service de Coopération, *Recensement et enquête démographiques, 1960-1961* ... (1965), pp. 97-98.

<sup>209</sup> El-Badry, "Trends in the components of population growth ..." (1965), pp. 145-147.

<sup>210</sup> Turkey, Ministry of Health and Social Welfare, *Vital Statistics* ... (1970), pp. 69, 78.

<sup>211</sup> Sovani, "Internal migration and the future trend ..." (1967), pp. 42-43.

<sup>212</sup> India, Cabinet Secretariat, National Sample Survey, *Tables with Notes on Differential Fertility* ... (1968), p. 12. The large urban-rural differential in neonatal mortality may result in part from less satisfactory conditions at delivery in the rural areas. Of 100 births, only three in the rural areas took place in hospitals, whereas the corresponding figure in urban areas was twenty-eight. *Ibid.*, pp. 46-47, 73-78.

<sup>203</sup> See Johnson, "Health conditions ..." (1964), pp. 295-300.

<sup>204</sup> Arriaga, "Rural-urban mortality in developing countries ..." (1967).

<sup>205</sup> In the rural areas, inadequate medical care, low levels of public health service, conditions of extreme poverty and chronic malnutrition have been said to contribute to high mortality levels. See United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), p. 31; Bogue, *Principles of Demography* (1969), p. 564; Centro Latinoamericano de Demografía, *Determinantes de la evolución* ... (1968), p. 24; World Health Organization, "Urbanization and public health" (1967); Smith, *Brazil* ... (1963), pp. 110-111; Puffer and Griffith, *Patterns of Urban Mortality* ... (1967), p. 36; Elizaga, *Métodos demográficos para el estudio* ... (1969), p. 83.

<sup>206</sup> Smith and Blacker, *Population characteristics* ... (1963), p. 42. On the reasons for lower mortality in tropical African towns see Caldwell, "Introduction" (1968), p. 11.



Data from the Mysore Population Study point to lower mortality in Bangalore City than in the rural areas of Mysore State, but it is not clear from the survey results whether the towns have higher or lower mortality than the rural areas.<sup>213</sup> In Madras City, infant mortality rates have been found to be considerably lower than those in the adjacent rural areas, because of the superior health and medical services that the city residents enjoy.<sup>214</sup>

109. A strong association has been shown to exist between infant mortality rates and the proportion of rural population in each of the eleven states of the former Malaya. The two states having the lowest infant mortality rates in 1961-1963 were the most highly urbanized states, while the four states with the highest infant mortality rates were among the states with the greatest percentage of rural population. These states also had the lowest literacy rates and an acute shortage of medical personnel.<sup>215</sup>

110. In Taiwan, a country with reliable vital statistics, 1961 data showed death rates to be inversely correlated with the size of localities, being lowest in the principal cities and highest in the rural areas.<sup>216</sup> From the results of a demographic survey in Indonesia, Ueda estimated that infant mortality was higher in the rural areas of Java-Madura in 1963 than in the large cities and other urban places.<sup>217</sup>

## 2. GEOGRAPHICAL DIFFERENTIALS

111. Geographical differences in mortality are found in countries of both high and low death rates, and seem to be the result, in large measure, of geographical differences in social and economic conditions. In general the magnitude of geographical differentials tends to decrease with the fall in death rates. In Czechoslovakia, for example, as general mortality fell between 1929-1932 and 1960, the gap in life expectancy between Czech and Slovak regions decreased from about six years to less than one year. This contraction was due to a more pronounced mortality decline among the Slovaks.<sup>218</sup>

112. Of the six major regions in Yugoslavia, Slovenia had the highest expectation of life for both males and females (65.6 years and 70.7 years, respectively) in 1958-1959. The lowest life expectancy for males was found in Bosnia and Herzegovina (58.4 years) and for females in Macedonia (60.6 years).<sup>219</sup> In 1962 infant mortality

rates ranged from a low of 30 per 1,000 live births in Slovenia to a high of 138 in Macedonia.<sup>220</sup>

113. In France in recent years the north has had higher infant mortality rates than the country as a whole, even if allowance is made for geographical differences in the socio-occupational structure of the population, and despite the fact that the north is far from being an economically backward region.<sup>221</sup> A sample survey in this region found the excess infant mortality to be due to social and cultural factors and to poorer knowledge of sanitary hygiene.<sup>222</sup> In Italy, geographical differences in socio-economic structure also help to explain variations in the prevalence of specific diseases as, for example, the higher cardiovascular mortality rates in northern, industrial Italy than in the south.<sup>223</sup>

114. In the United States in 1950 there was still a 40 per cent difference between the highest and lowest mortality rates among the states, after making adjustments for differences in age structure.<sup>224</sup> However, geographical differences become quite small if separate calculations are made for the white and non-white populations.<sup>225</sup> In Australia, Canada and New Zealand, as well as in the United States, geographical variations in crude death rates and infant mortality rates have been decreasing in magnitude in recent decades.<sup>226</sup>

115. Considerable geographical differentials in mortality rates are also reported for countries of high mortality, though in many cases the accuracy of the estimates is very uncertain. In Tanganyika, the more developed Northern Province was estimated to have a crude death rate of 19 and an infant mortality rate of about 150 in 1957, whereas the comparable rates for the Western Province were 27 and 200, respectively.<sup>227</sup> Sharp geographical variations also appear in 1962 estimates for Kenya, where the infant mortality rate in the region of highest mortality was more than double that in the region having the lowest mortality rates.<sup>228</sup>

116. Estimates calculated from Indian census data show a crude death rate of about 23 for the country as a whole in 1951-1960, with the lowest rate (16) estimated for Kerala State, and the highest (27) for Assam. The state variations were said to reflect differences in the pace of the spread of preventive and curative health

<sup>213</sup> United Nations, *The Mysore Population Study* ... (1961), pp. 78-79.

<sup>214</sup> Chandrasekhar, "Infant mortality in Madras City" (1967), p. 408.

<sup>215</sup> Saw, "State differential mortality in Malaya" (1966).

<sup>216</sup> Arriaga, "Rural-urban mortality in developing countries ..." (1967), pp. 105-106.

<sup>217</sup> Ueda, *The First and Second Demographic Surveys in Indonesia* (1965), table 4.

<sup>218</sup> Srb, "Population development and population policy in Czechoslovakia" (1962), p. 154. See also Kučera and Růžicka, "Regionální rozdíly v úrovni úmrtnosti obyvatelstva ČSSR" (1964). For a study of mortality trends in Slovak regions of Czechoslovakia, see Grunt, "Vývoj úmrtnosti obyvatelstva Slovenska od r. 1900-1960" (1964).

<sup>219</sup> Breznik and Šekarić, "Smrtnost stanovništva ..." (1963).

<sup>220</sup> Tasić *et al.*, *Smrtnost odojčadi u Jugoslaviji* (1966), p. 30.

<sup>221</sup> Girard, Henry and Nistri, "La surmortalité infantile ..." (1959).

<sup>222</sup> Girard, Henry and Nistri, *Facteurs sociaux et culturels de la mortalité infantile* ... (1960). Unlike the trend in some other countries, the gap between infant mortality rates in the north and the national average had been widening since 1930. Girard, "Mortalité infantile et milieu social ..." (1959), p. 396.

<sup>223</sup> Federici, "Incidence of mortality from cardiovascular diseases ..." (1967).

<sup>224</sup> Dorn, "Mortality" (1959), p. 468.

<sup>225</sup> Bogue, *The Population of the United States* (1959), pp. 195-196.

<sup>226</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 26-27.

<sup>227</sup> Smith and Blacker, *Population Characteristics* ... (1963), p. 69.

<sup>228</sup> Coale, "Estimates of fertility and mortality in tropical Africa" (1968), p. 183.

services.<sup>229</sup> In the nine provinces of Ceylon, crude death rates ranged from 6.6 to 10.9 in 1960.<sup>230</sup>

117. Estimates of life expectancy for the different states of Brazil, calculated from census age data, suggest a wide geographical variation, though full confidence cannot be placed in their reliability. For the period 1940-1950 highest life expectancy—53 years—was found in Rio Grande do Sul, and lowest life expectancy—36 years—in Mato Grosso. Mortality conditions also appeared to be relatively unfavourable in the Amazon Basin, and relatively favourable in the more developed States of São Paulo, Santa Catarina and the Federal District.<sup>231</sup>

### 3. OCCUPATIONAL AND OTHER DIFFERENTIALS

118. Although mortality recently has fallen to moderate levels in many countries that have achieved only modest advances in economic development, it is generally true that rich countries have lower death rates than poor countries. Within countries, it is the groups which have achieved the highest socio-economic status, as measured by such indicators as income, occupation, education and the like, who are found to have lower than average mortality. As pointed out earlier, these various factors affecting mortality are interdependent—occupation is related to education; income is related to occupation, and both income and education may influence diet, housing conditions and living habits. Since it is not feasible to attempt to assess the influence on mortality of these factors individually, writers have often taken one factor as an index of all others. The factor most frequently studied is occupation, or social class based on occupation, although the measurement of occupational mortality presents many problems.<sup>232</sup>

119. One of the earliest analyses, that for Copenhagen and other Danish towns for the period 1865-1874, identified three broad social classes based on occupation of the head of household. The age-adjusted average annual death rate for males twenty years of age and over in Copenhagen was found to be nearly twice as high for the "poor" class (made up of workmen, servants and persons in almshouses) as for the "high" class (made up of capitalists, professionals, wholesale dealers and higher officers). The rates were 31.2 and 16.5 per 1,000, respectively. Smaller inverse correlations between mortality rates and social class were observed for males in other towns and for females. Particularly in Copenhagen, differences between the "middle" and "high" classes were

found to be considerably smaller than those between the "middle" and "low" groups.<sup>233</sup> Large class differences in mortality still persisted in Copenhagen in the early part of the twentieth century, when death rates among manual workers were found to be about twice as high as those for "white-collar" workers.<sup>234</sup>

120. In a study of deaths among male workers in France in 1907-1908, Huber found that mortality among employers was very much lower than among wage and salaried workers. Wage workers generally had higher mortality than salaried workers, with great variations occurring among the different occupations according to the particular risks involved. Thus, death rates for plumbers were double those for textile workers in most age groups.<sup>235</sup>

121. Systematic studies of occupational and social class mortality differentials have a long history in England and Wales, where data on occupational mortality go back to 1851. Analyses of data for five social classes showed that in 1921-1923 and 1930-1932, mortality rates for males aged twenty to sixty-four years rose progressively from social class I (professional) to social class V (unskilled). By 1950, however, these relationships had altered, and males in social class II (intermediate occupations) and social class IV (partly skilled occupations) were found to have the lowest and next lowest rates, respectively. Class V, however, still had substantially higher mortality than the other classes.<sup>236</sup> The fact that the pattern of mortality rates for married women, grouped according to occupational class of the husband, was similar to that for males, suggests that the influence of the different social and economic situations of the various occupational groups exceeded the influence of occupational hazards.<sup>237</sup>

122. In the United States, the relationship of mortality level to occupational status underwent a notable change during the first half of the twentieth century, with a marked narrowing of the differential between industrial workers and the remainder of the population. In 1911-1912 white male industrial workers aged twenty years could look forward to a life expectancy of only 36.9 additional years, six years less than the corresponding figure for all white males. By 1949, the expectation for industrial workers aged twenty had increased to 48.4 years, and was

<sup>229</sup> Jain, "State growth rates and their components" (1967), pp. 25-26. See also Raman, "A study of some aspects of mortality ..." (1968).

<sup>230</sup> Abhayaratne and Jayewardene, *Fertility Trends in Ceylon* (1967), pp. 70-73.

<sup>231</sup> Smith, *Brazil* ... (1963), pp. 108-109. See also Mortaras' estimates for 1940-1950 in Elizaga, *Métodos demográficos para el estudio* ... (1969), pp. 84-85.

<sup>232</sup> The limitations of data on mortality by occupation have been reviewed in a number of sources. See, for example, Daric, "Mortalité, profession et situation sociale" (1949); United Nations, *Handbook of Vital Statistics Methods* (1955), pp. 130-134; ———, *Demographic Yearbook, 1967* ... (1968), pp. 40-41; United States Public Health Service, *Mortality by Occupation and Industry* ... (1962).

<sup>233</sup> Cited in Collins, *Economic Status and Health* ... (1927), pp. 34-38.

<sup>234</sup> Jensen and Koefoed, *Befolkningsforholdene i det nittende Aarhundrede* (1919), p. 80.

<sup>235</sup> Huber, "Mortalité suivant la profession, d'après les décès ..." (1912). See also Daric, "Mortalité, profession et situation sociale" (1949), pp. 678-679.

<sup>236</sup> Logan, "Social class variations ..." (1955), p. 204. See also Wilson, "On mortality trends by occupation and social class" (1966). The narrower range of class differences in mortality in England and Wales as compared with the United States was considered to be possibly related to the more homogeneous population, more uniform climate and earlier introduction of medical insurance in the former country. Guralnick, "Socioeconomic differences in mortality ..." (1964), p. 296.

<sup>237</sup> Stocks, "The effect of ..." (1938), pp. 669-709.

only one year less than that of all white males of the same age.<sup>238</sup>

123. Occupational class variations were still present in 1950, however, as shown in various studies conducted by Guralnick and others. Among males 20-64 years of age, the death rate was 6.4 per 1,000 for the professional group, 7.6 for the intermediate group, and 10.6 for white labourers. The class differential was substantial at all ages studied with the exception of the group 55-64 years.<sup>239</sup>

124. Deviations from the usual inverse relationship between mortality levels and measures of socio-economic status have been observed recently in Hungary. Data for 1959-1960 show that the lowest age-standardized mortality rates occurred among the population classified as agricultural-manual (9.5 deaths per 1,000 population), and the highest among the non-agricultural manual group (11.2). The death rate for the non-agricultural non-manual population was intermediate. Thirty years earlier, in 1930-1931, the agricultural-manual group had had the highest age-standardized death rate (17.4) and the non-manual group the lowest (11.3). The reversal of the traditional order is said to have resulted partly from the significant improvement of living conditions of the agricultural population, and partly from increased social mobility.<sup>240</sup>

125. An analysis of mortality differentials in Austria by broad socio-economic categories showed that in 1951-1953 mortality rates were higher for males in working class occupations than for those in middle and upper class occupations at all ages above eighteen years. Males engaged in agricultural occupations, on the whole, also had more favourable mortality than did those in non-agricultural working class occupations.<sup>241</sup> In Amsterdam, where mortality had fallen to a low level, age-standardized death rates for six occupational groups for 1947-1952 showed very little variation, and the risk of death among the working class males aged 15-64 years appeared to be scarcely significantly higher than that for males in the liberal professions and civil service. These findings were attributed in part to the system of social legislation

affecting workers and the favourable standard of medical care.<sup>242</sup>

126. Summarizing the results of studies conducted in various countries, Antonovsky concluded that there was ample evidence of social class influence on mortality, but that such differentials may decline when mortality falls to a low level. He observed that whereas earlier studies had frequently shown a two to one ratio between mortality rates for the lowest and highest social class groups, the difference had narrowed to 1.4 to 1 or 1.3 to 1 by the 1940s. Moreover, not only have over-all class differentials narrowed, but differences among all but the lowest social class have been nearly eliminated. So far as age is concerned, the greatest class differences are found in young and middle adulthood—at about ages 30-44 years.<sup>243</sup>

127. An inverse correlation has also been found between social class and infant mortality, which has been shown to be particularly sensitive to social and environmental conditions. One early study found that in Dublin, 1883-1885, the children of professional and independent groups had a low rate of mortality, whereas those of the general service group, whose income was small, had a higher rate.<sup>244</sup>

128. Statistics for England and Wales since 1911 have shown an inverse relationship between parental social class, as determined by the father's occupation, and foetal and infant mortality.<sup>245</sup> An outstanding feature of this relationship is that, although foetal and infant mortality have been greatly reduced, there has been no narrowing of the differentials by social class. The range of the rates between the highest and lowest social classes has been much smaller for neonatal than for post-neonatal mortality. In 1949-1950, the neonatal mortality rates in class I (professional and managerial) and class V (unskilled workers) were, respectively, 13.5 and 21.9, while the post-neonatal rates were 4.9 and 17.9.<sup>246</sup> Other studies as well have shown that class differences in infant mortality are greater after the first month of life than in the early weeks following birth, when biological factors are of greatest importance.<sup>247</sup> Very limited data for the United States (upstate New York in 1950-1952 and California

<sup>238</sup> The Metropolitan Life Insurance Company, "Longevity of industrial workers" (1950), pp. 4-7. Whitney found that, as late as 1930, mortality rates of unskilled workers were nearly twice as high as those of professional workers. Whitney, *Death Rates by Occupation* ... (1934), p. 17.

<sup>239</sup> Guralnick, "Socio-economic differences in mortality ..." (1964), p. 298. See also United States Public Health Service, *Mortality by Occupational Level and Cause of Death* ... (1963); ———, *Mortality by Occupation and Industry* ... (1962); Moriyama and Guralnick, "Occupational and social class differences in mortality" (1956).

<sup>240</sup> Szabady, "Recent changes in the socio-economic factors of Hungary's mortality" (1964); ———, "A magyar halandóság ..." (1963).

<sup>241</sup> Hansluwka, "Social and economic factors in mortality in Austria" (1964), p. 326. Except at ages below eighteen years, both males and females who were gainfully occupied had lower mortality rates than those who were not gainfully occupied, the process of selection being mainly responsible for this differential. *Ibid.*, pp. 322-323. Lower mortality rates for the working, as compared with the non-working, population were also found in Czechoslovakia. See Růžička, *Úmrtnost a příčiny smrti obyvatelstva* ... (1966), pp. 77-79.

<sup>242</sup> De Wolff and Meerdink, "Mortality rates in Amsterdam according to profession" (1955).

<sup>243</sup> Antonovsky, "Social class, life expectancy and overall mortality" (1967), pp. 66-67.

<sup>244</sup> Humphreys, "Class mortality statistics" (1887), p. 282. A similar relationship was observed in Prussia. See Seutemann, "Kindersterblichkeit sozialer ..." (1894), pp. 69-167.

<sup>245</sup> United States, National Center for Health Statistics, *International Comparison of Perinatal and Infant Mortality* ... (1967), p. 67.

<sup>246</sup> United States, National Center for Health Statistics, *Infant and Perinatal Mortality in England and Wales* (1968), p. 31; see also Lessof, "Mortality in New Zealand and England and Wales" (1949).

<sup>247</sup> This was the finding, for example, in the following studies, which refer respectively to France, Hungary, Austria and Italy: Croze, "La mortalité infantile en France ..." (1963), p. 267; Szabady, "A csecsemőhalandóságot ..." (1961), p. 444; Hansluwka, "Die Säuglingssterblichkeit in Österreich ..." (1966); Chiassino, "Mortalità infantile e 'stratificazione sociale'" (1965).

in 1959) reaffirm an inverse relationship between mortality and level of father's occupation group.<sup>248</sup>

129. In addition to the many studies which have been concerned with mortality differentials by social class as defined according to broad occupational groupings, a number of other studies have examined mortality differences among income groups. In some early studies it was noted only that mortality was higher in the poorer districts of cities than elsewhere. This is said to have been true in Glasgow, as well as in some French cities, before the present century.<sup>249</sup> At the end of the nineteenth century, infant mortality was reported to be lower in the three rich quarters of the city of Breslau than in the three poor ones.<sup>250</sup> In the early 1920s in the United States, an infant mortality rate of about 170 per 1,000 live births was found in families where the father earned less than \$450 per year, as compared with a rate of 60 in the group where the father earned \$1,250 or more.<sup>251</sup> An inverse correlation between infant mortality and father's earnings was also found for the city of Stockholm during 1918-1922.<sup>252</sup> An analysis of mortality by income class in fourteen middle-size cities in Japan in 1939 showed that, for the most part, the higher the income, the lower the mortality, and this was especially true with respect to infant mortality.<sup>253</sup>

130. The educational attainment of the parents, especially of the mother, has also been found to have a significant relation to the level of infant mortality. A comparison of female illiteracy levels and infant mortality in twenty-seven countries for selected years in the 1930s and 1940s showed a positive correlation between the two variables.<sup>254</sup> Szabady observed that in Hungary (1959) there was a strong inverse association between parents' educational achievement and the level of infant mortality, with the mother's education having the greater influence.

<sup>248</sup> New York State, Department of Health, *The Relationship of Certain Biologic and Socioeconomic Factors* ... (1961-1963), parts 1, 2, 3; California, Department of Public Health, *Perinatal Mortality and Survival* ... (1963). In contrast, virtually no correlation between socio-economic indices and infant mortality was found in a study for the city of Bologna. Bellettini, "Le relazioni fra i fenomeni ..." (1966). Other studies presenting information on class differentials in infant mortality include the following: Federici, "Aspetti sociali della mortalità infantile a Roma" (1964); Douglas, "Social class differences in health and survival during ..." (1951); Febvay and Croze, "Nouvelles données sur la mortalité infantile" (1954); de Wolff and Meerdink, "La mortalité infantile à Amsterdam selon les groupes sociaux" (1954), pp. 293-314; Hansluwka, "Social and economic factors ..." (1964); Hansluwka, "Biological and socio-economic factors ..." (1963); Guralnick, "Socioeconomic differences ..." (1964); Kučera, "Infant and perinatal mortality ..." (1963); Liberati, "Infant mortality in Italy ..." (1967).

<sup>249</sup> Newsholme, *The Elements of Vital Statistics* (1899), p. 162; Levasseur, *La population française* (1891), vol. 2, p. 403. See also George, *Introduction à l'étude* ... (1951), p. 186.

<sup>250</sup> Mayo-Smith, *Statistics and Sociology* (1895), p. 145.

<sup>251</sup> Woodbury, *Infant Mortality and its Causes* (1926), p. 130; —, "Economic factors in infant mortality" (1924), pp. 137-155.

<sup>252</sup> Titmuss, *Birth, Poverty and Wealth* (1943), p. 97, citing Rietz, *Sterblichkeit und Todesursachen* ... (1930).

<sup>253</sup> Koyama and Nakagawa, "Shotoku kaikyū ni yoru shibo no hendo" (1941).

<sup>254</sup> United Nations, *Foetal, Infant and Early Childhood Mortality*, vol. 2 ... (1954), pp. 22-23.

The infant mortality rate decreased progressively from 95 per 1,000 live births for mothers who had not attended school to 27 for those with thirteen or more years of schooling.<sup>255</sup> In Yugoslavia also, a correlation was found between infant mortality and female illiteracy. The level of health education among women was believed to be of particular importance, and although there was no way to measure this factor, the authors considered that a primary education provides the basis for obtaining health education.<sup>256</sup> In his analysis of infant mortality in France, Croze found that the cultural level—which is closely related to education—played a decisive role in social group differences in infant mortality.<sup>257</sup>

131. Some of the studies on differences in general mortality by socio-economic status have included analyses by cause of death. In the case of certain diseases, the differentials have been found not to favour the upper classes. A study for England and Wales carried out in the 1940s revealed that although pulmonary tuberculosis caused about twice as high a death rate among semi-skilled and unskilled workers as among professional and white collar workers, the mortality from diabetes mellitus, angina pectoris and appendicitis was much higher in the latter group than in the former.<sup>258</sup> Guralnick's analysis of data for England and Wales (1949-1953) and for the United States (1950) showed that while death rates from tuberculosis, malignancies, influenza and pneumonia, and motor-vehicle accidents varied inversely with status in both countries, in England and Wales, death rates specific for arteriosclerotic heart disease were much higher among the professional group than in the lower classes. There was no clear class differential for this cause of death in the United States. Social class gradients for several other causes of death were inconsistent, possibly reflecting the influence of different modes of living among different population groups. For example, drinking habits could be an important factor in establishing the pattern of death rates from cirrhosis of the liver, while dietary habits could greatly affect death rates from diabetes mellitus.<sup>259</sup>

132. Information on mortality differentials by occupation, income and education for the developing countries is sparse. The Guanabara Demographic Pilot Survey conducted in Guanabara State, Brazil, in 1961 found a slightly higher crude death rate in the lowest social class (9.1 per 1,000 population), than in the medium and highest social classes (about 8 per 1,000).<sup>260</sup> In Chile

<sup>255</sup> Szabady, "Social and biological factors ..." (1963), pp. 773-774; —, "A csecsemőhalandóságot ..." (1961).

<sup>256</sup> Tasić et al., *Smrtnost odojčadi u Jugoslaviji* (1966), p. 274.

<sup>257</sup> Croze, "La mortalité infantile en France ..." (1964), pp. 268, 278. See also Girard, Henry and Nistri, *Facteurs sociaux et culturels de la mortalité infantile* ... (1960).

<sup>258</sup> Sutherland, "Variations in occupational mortality ..." (1947).

<sup>259</sup> Guralnick, "Socioeconomic differences in mortality ..." (1964), pp. 291, 293-295, 300. For analyses of mortality differentials by cause of death and industry or occupation in Czechoslovakia and Hungary, see Vávra, "Rozdíly v diferenční úmrtnosti ..." (1960); Klinger, "Social-professional ..." (1964); and his "A rákhalandóság társadalmi-foglalkozási ..." (1963).

<sup>260</sup> United Nations, *Guanabara Demographic Pilot Survey* (1964), pp. 39-40.

(1957) there were substantial differences in infant mortality between the children of labourers and those of non-labourers, with the former having 88 per cent higher mortality than the latter. The differential was considerably greater for post-neonatal mortality than for that occurring in the first month of life.<sup>261</sup> Results of the population survey of Mysore State, India, disclosed that in both the urban and rural zones surveyed, infant mortality rates varied inversely with the economic status of the household as defined by various indicators.<sup>262</sup> A 1958 survey in Nagpur District in central India provides data on child mortality according to educational attainment of father and mother. For husbands with no education, the percentage of their children having died prior to the interview was 40.4. This percentage decreased, although not regularly, with increased educational achievement, and was 27.5 for the college-educated group. The percentage of children no longer alive at the time of interview was 39.1 for wives with no schooling, 34.0 for the primary school group, and 23.7 for those with more than primary education.<sup>263</sup>

#### 4. DIFFERENTIALS AMONG ETHNIC GROUPS

133. Within any given country, different levels of mortality are frequently found among the various ethnic, racial or religious groups. Interpretation of such differences may be difficult because the needed detailed data are often lacking. For example, an analysis of the mortality rates of different religious groups would require data on the distribution of population and deaths by religion for the same time period, as well as information on the age structure of the population, in order to eliminate the effects of different age structures on mortality. The observed variations in mortality among ethnic, racial or religious groups probably reflect mainly differences in such factors as socio-economic status and accessibility of health facilities and services, rather than innate differences among the groups themselves. In view of the lack of detail in cross-classifications, however, it is rarely possible to determine the effect of these different factors.

134. In the United States, mortality has been consistently higher for the non-white as compared with the white population, and this has been true for every age group except the oldest (seventy-five years and older), and for most causes of death. In 1963, age-standardized mortality among non-whites was 47 per cent higher than among whites, compared with a differential of 58 per cent in 1900. Maternal mortality, tuberculosis, influenza and pneumonia, vascular lesions affecting the central nervous system, and homicides were among the causes showing the highest excess rates for non-whites. Suicide, on the other hand, is two to three times as prevalent among the white population. The reasons given for these differentials

"... include hereditary factors, the distribution and availability of medical facilities and services, socioeconomic factors which affect the utilization of available medical services, and the personal motivation to achieve a state of positive health".<sup>264</sup> In an earlier study for the U.S. Public Health Service, Guralnick determined that, with a few exceptions, mortality was consistently lower among white than among non-white males in the same occupation and age categories.<sup>265</sup> Mazur's estimates of life expectancy at birth for the different nationalities of the Soviet Union for 1959-1960 show a wide range from about 50 years for Chechens to 73.1 years for Latvians. He attributed these differences to the interaction of a number of economic and social factors.<sup>266</sup>

135. Ethnic differences in mortality have also been found in Asia and Africa. In Cape Town, for the period 1948-1953, the European infant mortality rate of 26.6 per 1,000 live births was only a small fraction of the non-European rate (104.8). Even greater differences were reported at ages 1-2 years. For the period 1946-1951 the mortality rate for European children was 3.0 and that of non-European children 44.0.<sup>267</sup> Economic and social conditions obviously play a major role in these differentials. Kark and Chesler found significantly lower neonatal mortality in Hindu, as compared with Zulu, communities in Durban. In the authors' view the observed differences could not be fully accounted for by general social and environmental factors, but required further study of biological and cultural factors.<sup>268</sup>

136. It seems probable that cultural factors are important in accounting for mortality differences between Malays, Chinese and Indians in the former Federation of Malaya. In 1948 the crude death rates for the three groups were about 20, 13 and 13, respectively. The fact that the Malays have not participated in the post-war mortality decline to the same extent as the Chinese and Indians has been attributed to their greater reluctance to make full use of modern health treatment and facilities.<sup>269</sup> An analysis of 1953-1954 sample census data for Burma found the Chinese and Indian minorities to have distinctly lower child mortality than the Burmese, whose probability of dying before age five was 28 per cent greater than that of the Indians and Pakistanis, and 59 per cent greater than that of the Chinese. It was suggested that the lower mortality of the Chinese might reflect their

<sup>264</sup> Chase, "White-nonwhite mortality differentials in the United States" (1965).

<sup>265</sup> United States Public Health Service, *Mortality by Occupation and Industry* ... (1962), pp. 84-88. Demeny and Gingrich estimated that the official statistics, at least for the period 1910-1940, have considerably understated negro-white mortality differentials. See their "A reconsideration of negro-white mortality differentials in the United States" (1967).

<sup>266</sup> Mazur, "Expectancy of life at birth in 36 nationalities of the Soviet Union: 1958-1960" (1969), p. 246.

<sup>267</sup> Phillips, "An inter-racial study ..." (1957), pp. 15, 19.

<sup>268</sup> Kark and Chesler, "Survival in infancy; a comparative study of stillbirths ..." (1956), pp. 156-157.

<sup>269</sup> Smith, *Population Growth in Malaya* ... (1952), pp. 61, 88-89. This reason has also been offered as partial explanation for the lag in mortality reduction among the Maoris of New Zealand, as compared with the non-Maori population. Pool, "Post-war trends in Maori population growth" (1967), p. 88.

<sup>261</sup> Behm Rosas, *Mortalidad infantil y nivel de vida* (1962), pp. 89-90.

<sup>262</sup> United Nations, *The Mysore Population Study* ... (1961), pp. 80-81.

<sup>263</sup> Driver, *Differential Fertility in Central India* (1963), pp. 111-112. In this survey of 2,314 couples, child mortality refers to deaths of all children (age unspecified) at time of interview. *Ibid.*, p. 103.

TABLE V.17. DEATH RATES BY MARITAL STATUS AND SEX FOR SELECTED AGE GROUPS:  
UNITED STATES, 1960

(Deaths per 1,000 population in specified group)

Sex and age (in years)	Total	Single	Married	Widowed	Divorced
<i>Males</i>					
25-34 .....	1.9	3.4	1.5	6.8	5.3
45-54 .....	9.9	15.7	8.4	21.0	25.9
60-64 .....	28.6	38.0	25.3	44.0	57.0
70-74 .....	59.5	76.3	53.4	77.0	96.6
<i>Females</i>					
25-34 .....	1.1	2.0	0.9	3.0	2.2
45-54 .....	5.3	6.4	4.6	8.5	7.2
60-64 .....	15.0	14.6	13.1	18.7	17.3
70-74 .....	36.7	35.1	32.9	40.2	41.6

SOURCE: Grove and Hetzel, *Vital Statistics Rates in the United States, 1940-1960* (1968), p. 334.

relatively favourable economic position as well as cultural patterns of cleanliness conducive to good health.<sup>270</sup>

137. A comparison of mortality among the Dusun and the Chinese of the former British North Borneo showed strikingly higher child mortality among the Dusun, a primitive tribe, despite the fact that both groups live under the same climatic conditions and are exposed to similar disease hazards. The lower mortality of the Chinese was attributed to their better standards of housing, diet and cleanliness, and the better education of Chinese women, which provides them with some knowledge of hygiene and child care.<sup>271</sup>

138. Mortality in relation to marital status has long attracted wide interest. According to a comprehensive study of this subject in the United States based on 1940 data, married persons generally had the most favourable mortality, while single persons had a lower mortality than either the widowed or divorced.<sup>272</sup> Similar patterns were observed in data for 1950 and 1960 (see table V.17 for 1960 data). Lower mortality rates for married persons than for persons of other marital status were also shown by the National Mortality Survey of 1962 and 1963. The importance of socio-economic factors in establishing this differential was suggested by the fact that married persons were revealed to have completed more years of schooling than those in other marital status categories.<sup>273</sup> The substantially lower mortality noted among the married has also been attributed partly to the selection of healthier persons by marriage, and partly to the more healthful environment of family life.<sup>274</sup>

<sup>270</sup> Williams, "Infant and child mortality in Burma by ethnic group" (1966).

<sup>271</sup> Koblenzer and Carrier, "The fertility, mortality and nuptiality of the Rungus Dusun" (1960), pp. 271, 274.

<sup>272</sup> United States, Bureau of the Census, *Mortality by Marital Status* ... (1945).

<sup>273</sup> United States, National Center for Health Statistics, *Socio-economic Characteristics of Deceased Persons* ... (1967), pp. 6-7.

<sup>274</sup> Dublin, Lotka and Spiegelman, *Length of Life* ... (1949), p. 137. Errors in census data and the misclassification of death certificates may also affect the observed patterns. Sheps, "Marriage and mortality" (1961).

139. The mortality pattern in England and Wales in 1959 was generally similar to that of the United States. As in the latter country, the mortality of the married was lower than that of the other marital status groups at all ages, but at ages 25-44, the mortality of the widowed and divorced combined was lower than that of the single for both males and females.<sup>275</sup> Mortality in Sweden also was found to be lower for married persons than for those in other marital status categories. As the proportion of married couples in the older age groups is expected to increase in the next few decades, the favourable mortality which the married enjoy may contribute to an over-all reduction of mortality in these age groups.<sup>276</sup>

140. Other studies have examined the relationship of marital status to causes of death. In the United States in 1940, mortality from each of the leading causes of death was found to be higher among single men than among the married, with the exception of cancer of the genital organs. Among women, on the other hand, the single had lower mortality than the married for quite a few causes of death, but widowed and divorced women had consistently higher mortality for all leading causes, with the exception of diseases of the puerperal state.<sup>277</sup> However, findings from several studies that have investigated the relationship of marital status to mortality from coronary disease are inconsistent, some results indicating an inverse relationship with marriage, and some a direct relationship.<sup>278</sup>

141. Cause-of-death differentials by marital status were also found in the 1959 data for England and Wales. Mortality from tuberculosis, poliomyelitis and chronic rheumatic heart disease was higher in single persons, partly because of the selection factor and partly because of the less protective conditions of single life. Among

<sup>275</sup> Benjamin, *Social and Economic Factors Affecting Mortality* (1965), p. 43.

<sup>276</sup> Larsson, "The development of mortality in Sweden ..." (1963), p. 694.

<sup>277</sup> United States, Bureau of the Census, *Deaths from Selected Causes, by Marital Status* ... (1945).

<sup>278</sup> Marks, "A review of empirical findings" (1967), pp. 89-91.



women, carcinoma of the breast, corpus uteri and ovary was more common among the single, while carcinoma of the cervix uteri was a more frequent cause of death among the married and formerly married. Single males had a higher mortality from cancer of the buccal cavity, pharynx, larynx and prostate.<sup>279</sup>

#### F. Factors related to high mortality in the past

142. Before the significant fall in mortality began in Europe, North America and Oceania in the nineteenth century, death rates in these regions were high and subject to violent and recurrent fluctuations. Although the peak rates were associated with catastrophes such as war, famine and disease, the view has been expressed that the first two were often more significant for the scope which they gave to the third—disease and pestilence—rather than for their direct contribution to mortality.<sup>280</sup> In any event, the various factors making for high mortality in the past cannot be isolated, as they are often closely interwoven. Regarding famines, for example, although there are many references in the registers to deaths from starvation, it is more likely that hunger, by weakening the body, increased its susceptibility to disease rather than killing outright, except in the case of specific deficiency diseases such as scurvy. But good nutrition was no guarantee against disease. While many diseases attacked and killed those with weakened constitutions, others—such as plague and smallpox—took an equal toll of the healthy and well-nourished.<sup>281</sup> Another indirect effect of food scarcity was that during such periods rats, finding granaries empty, moved closer to the towns, creating the possibility of epidemics.<sup>282</sup> Wars affected mortality levels not merely through the number of deaths on the battlefield, but also through diseases spread by travelling armies, and through the problems posed by maintaining large numbers of soldiers without the public health facilities available to modern societies.<sup>283</sup>

<sup>279</sup> Benjamin, *Social and Economic Factors Affecting Mortality* (1965), pp. 42-43.

<sup>280</sup> Habakkuk, "English population in the eighteenth century" (1965), p. 272. This author has postulated that societies were particularly vulnerable to high death rates from disease and harvest failures after periods of rapidly increasing population, when the resources of the society were already being strained. *Ibid.*, pp. 273-274.

<sup>281</sup> Eversley, "Population, economy and society" (1965), p. 55. Numerous localized epidemics have been recorded which have not coincided with bad harvests. Reinhard, Armengaud and Dupaquier, *Histoire générale de la population mondiale* (1968), p. 147. In eighteenth-century Sweden, for example, serious crop failures were followed on occasion with only slightly higher mortality (e.g., 1726-1728, 1781-1783), while good harvests were sometimes followed by a steep rise in mortality (e.g. 1736-1738, 1779). Utterström, "Two essays on population in eighteenth-century Scandinavia" (1965), p. 545.

<sup>282</sup> Sigerist, *Civilization and Disease* (1945), p. 112. See also Zinsser, *Rats, Lice and History* (1935).

<sup>283</sup> Sigerist, *Civilization and Disease* (1945), pp. 112-129; Krause, "Changes in English fertility and mortality, 1781-1850" (1958), p. 64; Meuvret, "Demographic crisis in France ..." (1965), pp. 507-508; see also Landry, *Traité de démographie* (1949), pp. 196-197.

#### 1. FAMINES AND FOOD SHORTAGE

143. Although chronic food shortage has probably been more deadly to man, the effects of famines, being rather spectacular, have received greater attention in the literature. Because of pre-industrial man's limited control over his environment, his food supply was uneven, being affected by the vicissitudes of the weather—droughts, too much rain with its accompanying floods, prolonged winters and cold summers. Agricultural output was limited by the inefficiency of labour, by plagues of insects or rodents and by plant diseases. Even when harvests were abundant, their benefits could not be fully reaped due to inadequate methods of food storage, transportation and distribution, which hindered the movement of produce from areas of abundance to those of scarcity.<sup>284</sup> In Western Europe alone, 450 more or less localized famines were recorded from 1000 to 1885.<sup>285</sup>

144. In the 1690s poor harvests resulted in serious food shortages throughout most of Europe, with substantial repercussions on the mortality level. While important crop failures continued into the eighteenth century (e.g., 1740-1741 and the 1770s), the resultant death rates for the most part no longer assumed the catastrophic proportions of the seventeenth century, partially owing to achievements in agriculture, transportation and marketing.<sup>286</sup> That adequate food supply still remained a problem, however, is illustrated by the estimate that in the 1840s one-third of the population of the United Kingdom and Ireland subsisted on potatoes alone, and another third could add to this only coarse bread and "refuse of the shambles" twice a week.<sup>287</sup>

145. Using wheat prices as a barometer of food supply, Meuvret found them positively correlated with mortality in certain areas of seventeenth-century France. Following an agricultural crisis, wheat prices as well as deaths tripled and even quadrupled in some parts of the country in 1693-1694.<sup>288</sup> Poor harvests and crop failures—some strictly local and some more generalized—also afflicted the population in the eighteenth century, but their demographic repercussions have been difficult to measure, except in a broad sense.<sup>289</sup>

146. The Northern countries, too, suffered heavy population losses as a result of poor harvests. In the

<sup>284</sup> Thompson and Lewis, *Population Problems* (1965), pp. 387-388; Southard, "Famine" (1948).

<sup>285</sup> Southard, "Famine" (1948), p. 85.

<sup>286</sup> Helleiner, "The vital revolution reconsidered" (1965).

<sup>287</sup> Stern, *Society and Medical Progress* (1941), p. 145.

<sup>288</sup> Meuvret, "Demographic crisis in France ..." (1965), pp. 513-519. In the British Isles also, a period of great hardship towards the end of the seventeenth century is believed to have checked population growth in Scotland, if not in England. Helleiner, "The vital revolution reconsidered" (1965), p. 80.

<sup>289</sup> Reinhard, Armengaud and Dupaquier, *Histoire générale de la population mondiale* (1968), pp. 241-271. For example, the widespread crop failures which followed the long harsh winter of 1708-1709 caused high mortality among the poorer classes. Helleiner, "The vital revolution reconsidered" (1965), p. 80, Chevalier, basing his discussion on Labrousse's analysis, has indicated that up to the mid-eighteenth century, France had a high death rate due to poor harvests, famines and inadequate means of communication. Chevalier, "Pour une histoire de la population" (1946), p. 249.



1690s, as much as 16 per cent of the population may have perished in certain regions of Sweden after severe crop failures, and about one-third of the inhabitants are believed to have died in one Finnish province.<sup>290</sup> An analysis of annual harvest results and vital rates for Sweden between 1740 and 1800 has shown a clear association between fluctuations in mortality levels and harvest yields, although the correlation is far from perfect due to the intervention of war years, epidemics, and other circumstances.<sup>291</sup> Thomas, who also analysed the relationship between the harvest index and mortality levels in Sweden, but for a longer period—from the mid-eighteenth century to 1914—found that in the earlier years of this period, there was a significant correlation between the two variables, with a tendency for the impact of the harvest on mortality to lessen towards the latter part of the period.<sup>292</sup> For Denmark and Finland, rye prices rather than harvest statistics have been studied in relation to eighteenth-century vital rates. According to the results of this analysis, the death rate for these countries, on the average, seems to have been 3 to 4 per 1,000 population lower in years after good, than in years after bad agricultural conditions. Despite occasional important epidemics, the main cause of the fluctuations in the death rate has been attributed to changes in the food supply. Where epidemics coincided with years of bad harvest, poor food conditions probably intensified the devastation inflicted by the diseases.<sup>293</sup> In Norway, about one-fifteenth of the total population perished in 1741, constituting a death rate more than three times higher than that of 1736-1740. The main cause is believed to have been acute crop failures in the Northern countries at that time.<sup>294</sup>

147. Among certain European countries with currently low mortality, severe famines occurred in the not too distant past. The Irish famine of 1846-1851, a result of the failure of the potato crop upon which the populace depended for subsistence, was the most disastrous one in nineteenth-century Western Europe. It killed an estimated 850,000 persons from starvation and disease in addition to the normal number of expected deaths.<sup>295</sup> Famides

were frequent in nineteenth-century Russia, and mortality was unusually high in the affected regions. For example, the crude death rate in Astrahanskaya district rose as high as 78 per 1,000 population in 1892 following a bad harvest in 1891. The economic dislocations resulting from the wars of intervention and the events surrounding them were accompanied by famines and epidemics which took a toll of millions in the period 1918-1922.<sup>296</sup>

148. Historically, famines have been frequent and devastating in a number of Asian countries. Severe famines occurred in Western Japan during the 1730s, probably contributing to the drop in population in those years, and national crop failures occurred in the 1780s and the 1830s.<sup>297</sup> In North-west China, the great drought of 1876-1879 is believed to have caused between nine to thirteen million deaths from the combined effects of prolonged hunger and the disease and violence accompanying it. Large death tolls from famine were again recorded in 1920-1921 and 1929-1930.<sup>298</sup> Davis estimated that about 19 million persons died in India during the decade 1891-1901 as a result of famines, and he refers to the "relentless recurrence of famines" in India prior to and continuing into the twentieth century.<sup>299</sup> In 1943 and 1944 there were large outbreaks of famines in Bengal and Tonkin,<sup>300</sup> and as recently as 1965-1966, poor harvests resulted in near famine conditions over wide areas of Africa and Asia.<sup>301</sup>

## 2. EPIDEMIC DISEASES

149. Mankind has apparently suffered from the ravages of infectious diseases such as typhoid, smallpox, dysentery, malaria, pneumonia, tuberculosis, typhus, yellow fever, plague, etc., as well as infants' and children's diseases such as enteritis, measles, whooping cough, scarlet fever and diphtheria, for untold centuries. These diseases, which until fairly recently took a heavy toll of human life, were rapidly spread among concentrations of persons in villages and towns by personal contact, by community use of contaminated water and food supplies, and by the migration of persons and disease-carrying insects from one population centre to another. While increased deaths from disease often followed famines, epidemic crises are also known to have occurred in the absence of famine.<sup>302</sup>

150. Until 150 to 200 years ago, scientific knowledge regarding disease was so meagre that even when methods of prevention or cure were attempted, they were usually

<sup>290</sup> Helleiner, "The vital revolution reconsidered" (1965), p. 79.

<sup>291</sup> Gille, "The demographic history of the Northern European countries ..." (1949), pp. 44-45. In Sweden during the severe famine of 1773, the death rate rose to 52.5 per thousand population. Sundbärg, *Forsatta bidrag till en svensk befolkningstatistik* (1909), vol. 10, p. 178.

<sup>292</sup> Thomas, *Social and Economic Aspects of ...* (1941), pp. 81 ff. The gradual but progressive lowering of the peaks of mortality during famines has been explained by the lessening of economic isolation among the various regions, the development of grain trade and changes in the agricultural system. These developments became pronounced during the first half of the nineteenth century. Utterström, "Two essays on population ..." (1965), p. 541.

<sup>293</sup> Gille, "The demographic history of the Northern European countries ..." (1949), pp. 45-48. According to Jutikkala, the violent fluctuations in Finland's mortality rate during the thirty years following the Great Northern War of 1700-1721 were not appreciably affected by variations in the harvest. Jutikkala, "Finland's population movement ..." (1965), p. 561.

<sup>294</sup> Gille, "The demographic history of the Northern European countries ..." (1949), p. 50.

<sup>295</sup> Cousens, "Regional death rates in Ireland ..." (1960), pp. 56-64; Thompson and Lewis, *Population Problems* (1965), p. 493.

<sup>296</sup> Uralnis, *Rost naseleniia v SSSR* (1966), pp. 12-23; and his *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 83-87; see also Kozlov, *Dinamika chislennosti narodov* (1969), pp. 208-209.

<sup>297</sup> Hanley, "Population trends and economic ..." (1968), p. 630.

<sup>298</sup> Thompson and Lewis, *Population Problems* (1965), pp. 390-391.

<sup>299</sup> Davis, *The Population of India and Pakistan* (1951), pp. 39-40.

<sup>300</sup> United Nations, *The World Population Situation in 1970* (1971), p. 9.

<sup>301</sup> United Nations, *1967 Report on the World Social Situation* (1969), p. 33.

<sup>302</sup> Habakkuk, "The economic history ..." (1965), p. 156. For a discussion of the complex relations between disease and food shortages, see Meuvret, "Demographic crisis in France ..." (1965), pp. 510-513.

ineffectual, if not actually harmful. In the sixteenth century, for example, the main remedy against plague was blood-letting, a measure which no doubt increased mortality from this disease.<sup>303</sup> Even in the seventeenth and early eighteenth centuries, the great majority of people received no medical attention, and those who did would probably have been better off without the radical purgings and bleedings administered by the medical practitioners of the times. There was little that medical men could do to cure the major ills before the advent of antiseptic surgery (mortality following surgery was extremely high), and the discovery of drugs such as salvarsan, insulin, the sulfonamides and the antibiotics.<sup>304</sup> Although many drugs for the treatment of disease were known during the eighteenth century, they were either used incorrectly or had limited efficacy in postponing or preventing death. McKeown and Brown, writing of England, have indicated that up to the early nineteenth century, the importance of segregating infectious patients in hospitals was not fully appreciated, and any patient admitted to a hospital risked contracting a mortal infection.<sup>305</sup>

151. Despite the paucity of medical knowledge, it could hardly be overlooked that some diseases such as plague, which affected great proportions of the population, must be communicable, even though the agent of transmission might be unknown. As a result, certain measures such as the setting up of protective cordons to isolate areas known to be affected were taken, though their efficacy varied.<sup>306</sup> As early as the Middle Ages, the quarantine was used in Italy, southern France and neighbouring areas to isolate patients with certain infectious diseases.<sup>307</sup>

152. Although the endemic infectious diseases, which took heavy tolls of life year after year probably had a greater effect on population growth than the occasional great epidemics, the epidemics, because of their deadliness, have attracted much attention. Europe's worst epidemic, the Black Death of 1348-1350, has been said to have killed between 25 and 35 million persons in Europe, or from one-fourth to one-third of Europe's population. Italy is reputed to have lost one-half of its population, and France and England one-third.<sup>308</sup> From 1603 to 1759, five epidemic outbreaks of plague were recorded in differ-

ent parts of Europe, always causing a tremendous rise in mortality.<sup>309</sup>

153. As certain diseases were brought under control, the virulence of others appears to have increased. Cyclical outbreaks of smallpox, which had claimed large numbers of lives before the introduction of vaccination in the nineteenth century, subsided, but a pandemic of diphtheria swept Europe from the mid-nineteenth century to the 1880s.<sup>310</sup> Although cholera had always taken its toll of life, repeated epidemics of Asiatic cholera afflicted Europe from 1831 on.<sup>311</sup> In 1918, the most severe influenza pandemic in history killed millions of persons throughout the world; one estimate places the number of persons perishing from the disease at 20 million over a period of a few months.<sup>312</sup>

### 3. WAR LOSSES

154. Although war has been an important population check throughout man's history, its precise effects on mortality have been exceedingly difficult to measure. Deaths among military personnel may occur on the battlefield, later on as a result of wounds received during combat, or from war-associated deprivation and disease. Most wars have also caused heavy civilian casualties indirectly through disease carried by armies, plunder, famine following the laying waste of agricultural lands, and other hardships accompanying social and economic disorganization. During the Second World War, civilians became the target of direct attacks on an unparalleled scale. Tremendous losses were inflicted on civilian populations through massive aerial bombings, the systematic extermination by the Nazis of Jews and certain other ethnic groups, and the decimation, under forced labour conditions, of numerous Poles, Ukrainians and other nationals. Because of problems of classifying and estimating such varied types of losses, estimates of war deaths often differ widely.<sup>313</sup>

155. Regarding the Second World War, early estimates of war-induced population losses were made by Frumkin

<sup>303</sup> Thompson and Lewis, *Population Problems* (1965), p. 394; Harsin and Hélin, "Compte-rendu des débats ..." (1965), p. 26.

<sup>304</sup> Helleiner, "The vital revolution reconsidered" (1965), pp. 83-84; Sigerist, *Civilization and Disease* (1945), p. 176.

<sup>305</sup> McKeown and Brown, "Medical evidence related to ..." (1965), pp. 286-291. It was not until well into the nineteenth century, according to these authors, "... that hospital patients could be reasonably certain of dying from the disease with which they were admitted". *Ibid.*, p. 291.

<sup>306</sup> See Sigerist, *Civilization and Disease* (1945), p. 173; Meuvret, "Demographic crisis in France ..." (1965), pp. 508-509; Harsin and Hélin, "Compte-rendu des débats ..." (1965), p. 19; Biraben, "Certain demographic characteristics ..." (1968).

<sup>307</sup> Rosen, "Public health" (1968), p. 166.

<sup>308</sup> Thompson and Lewis, *Population Problems* (1965), pp. 396-397. See also Creighton, *A History of Epidemics in Britain* (1891).

<sup>309</sup> Stern, *Society and Medical Progress* (1941), p. 145. The last important epidemic of plague in Western Europe spread from Marseille in 1720 and raged through Provence till autumn 1721. In Marseille, nearly half of the eighty thousand inhabitants died. Biraben, "Certain demographic characteristics ..." (1968). See also Harsin and Hélin, "Compte rendu des débats ..." (1965), p. 29.

<sup>310</sup> Utterström, "Two essays on population in eighteenth-century Scandinavia ..." (1965), pp. 545-546.

<sup>311</sup> Marshall, "The population problem ..." (1965), p. 258; Sigerist, *Civilization and Disease* (1945), p. 52.

<sup>312</sup> Francis, "Influenza" (1957), p. 347; for other estimates (not necessarily world-wide) of influenza mortality during the pandemic, see Thompson and Lewis, *Population Problems* (1965), p. 397; Sigerist, *Civilization and Disease* (1945), p. 236. See also Landry, *Traité de démographie* (1949), pp. 199-200.

<sup>313</sup> Among the sources which give estimates of war deaths for selected periods, or discuss problems in making such estimates, are Landry, *Traité de démographie* (1949), pp. 196-203; Thompson and Lewis, *Population Problems* (1965), pp. 421-428; Frumkin, *Population Changes in Europe since 1939 ...* (1951), pp. 9, 26-28, 158-164, 173; George, *Introduction à l'étude géographique ...* (1951), pp. 182-184; Notestein et al., *The Future Population ...* (1944), chap. 3.

after an exhaustive and painstaking analysis of all the pertinent data available to him at the time. Frumkin concluded that Europe and the Soviet Union may have sustained losses of some 30 to 35 million people as a result of the Second World War, at least 17 million in the Soviet Union and around 15 million in Europe.<sup>314</sup> Other estimates for the Soviet Union range from about 12 million to more than 20 million.<sup>315</sup> Efforts to estimate deaths attributable to the Second World War for the world as a whole are further complicated by the absence of a statistical basis for obtaining even a crude numerical assessment of the heavy casualties suffered by China.<sup>316</sup> Some recent estimates have placed the global total of military and civilian losses at more than 50 million.<sup>317</sup>

loss, dwarfs all the figures reported for the past and is a matter of continuous concern.<sup>318</sup>

#### 4. POOR CONDITIONS IN URBAN AREAS

158. As has been seen from the discussion in section E above, urban mortality was generally higher than rural in countries of Europe and Northern America prior to the twentieth century. The following is a brief summary of the reasons for this excessive urban mortality.<sup>319</sup> Cities and towns were congested, insanitary and consisted largely of overcrowded, grimy tenements gathered around the place of work. In the early industrial towns, often no provisions were made for police and fire protection, water and food inspection or hospital care. Industrial wastes were dumped into the rivers, destroying the aquatic life and polluting the water. Inside the factories, there was little ventilation, temperatures were much too hot in summer and too cold in winter, light was inadequate, hours of work were long and exhausting, and the risk of accidents was great. Such conditions caused an enormous sacrifice of life, especially among children.

159. There was an absence of zoning regulations to segregate the more noxious or noisy industries from residential areas, with the result that living quarters occupied the leftover spaces between factories, sheds and railroad yards. Whole families often occupied a single room, with as many as eight people sleeping in the same bed. The workers' houses, like the factories, had poor light and ventilation, rubbish was thrown into the streets, there was a dire lack of toilets, and cellars were used as dwelling places. This dirt and congestion attracted rodents and lice which spread diseases such as bubonic plague and typhus, and the dark, dank quarters formed an ideal breeding ground for bacteria.

160. The seepage of excrement into wells helped to spread disease, and the absence of an adequate water supply made domestic cleanliness or personal hygiene an impossibility. These conditions were reflected not only in the levels of mortality, but also in the causes of death: smallpox, typhus, typhoid, cholera and scarlet fever, because of unspeakable sanitary conditions; tuberculosis, because of poor diet, lack of sunshine and overcrowding; occupational diseases; bronchitis and pneumonia, whose incidence was increased by foul concentrations of poisonous chemicals which pervaded the atmosphere.

<sup>318</sup> A speculative study on the demographic effects of a hypothetical nuclear attack on the United States has been made by Heer, *After Nuclear Attack* . . . (1965). According to this study, an attack directed at both military and major industrial targets might be expected to kill 30 per cent of the total population of the United States, though the author points out that a fatality rate exceeding 50 per cent of the total population has been considered likely by others. *Ibid.*, p. xxiii.

<sup>319</sup> This discussion is based largely on Mumford, *The City in History* . . . (1961), pp. 458-474. See also Engels, *The Condition of the Working Class* . . . (1887); Weber, *The Growth of Cities in the 19th Century* (1899; 1963 ed.), pp. 343-367; Stern, *Society and Medical Progress* (1941), pp. 109-125; Sydenstricker, *Health and Environment* (1933), pp. 177 ff.; Cole, *The Irrepressible Conflict* . . . (1934), p. 181; Howard, *Public Health Administration and the Natural History of Disease* . . . (1924), p. 127; Meuvret, "Demographic crisis in France . . ." (1965), p. 508. Reinhard, Armengaud and Dupaquier, *Histoire générale de la population mondiale* (1968), pp. 334-335.

TABLE V.18. DEATHS OF EUROPEAN MILITARY PERSONNEL, 1600-1918

Period	Number of military deaths (millions)	Annual military death rates per 1,000 population of Europe
1600-1699 .....	3.3	0.3
1700-1788 .....	3.9	0.3
1789-1815 .....	5.0	1.0
1816-1913 .....	2.2	0.1
1914-1918* .....	9.1	5.3

SOURCE: Adapted from a table in United Nations, *The World Population Situation in 1970* (1971), p. 9. This table, in turn, is based in part on an extensive study by Ulanis of war losses in Europe. See his *Voyny i narodonaselenie Evropy* (1960), pp. 404-406.

\* Considered as a period of 4 1/4 years.

156. Considering the wide divergencies in war-loss estimates for such a recent period, figures for earlier periods, such as those in table V.18, are obviously also highly uncertain. The time periods have been selected to distinguish separately those of most intensive warfare.

157. The enormous loss of life suffered as a result of war in the twentieth century underlines the fact that of the three major causes of catastrophic mortality—famine, pestilence and war—war remains the least subject to control. In fact, advances in science and technology, which have played such an important role in the reduction of mortality from hunger and disease, continue to increase the possibilities for devastation inherent in modern warfare. The huge casualties during the Second World War resulted, for the most part, from the use of conventional armaments, and not thermonuclear weapons. The destructive potential of nuclear war, in terms of human

<sup>314</sup> Frumkin, *Population Changes in Europe* . . . (1951), pp. 9, 164, 173. These figures for the most part do not include indirect losses, i.e., "... deaths due to malnutrition and other privations brought about by war conditions". *Ibid.*, p. 26.

<sup>315</sup> Ulanis, *Voyny i narodonaselenie Evropy* (1960), pp. 224-226; USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Strana Sovetov za 50 let* (1967), p. 33.

<sup>316</sup> Sketchy data on Chinese war losses are presented by Ho. See his *Studies on the Population* . . . (1959), pp. 249-253.

<sup>317</sup> Boyarsky et al., *Kurs demografii* (1967), pp. 346-347. Also Reinhard, Armengaud and Dupaquier, *Histoire générale de la population mondiale* (1968), pp. 570-576.

161. Ferguson has described as wretched the conditions of life in the towns of England early in the nineteenth century, citing as examples the insanitary conditions in Glasgow and London.<sup>320</sup> It is reported that in 1850 New York City had 8,141 cellars sheltering one-thirtieth of its population, and that in Boston about one-twentieth of the population lived in damp, vermin-ridden, underground rooms.<sup>321</sup>

162. While living conditions in urban areas were deplorable, there is no reason for believing that those in rural areas were much superior. On the basis of an examination of early nineteenth-century reports of a society concerned with the housing of agricultural labourers in England, Ashton expressed doubts whether the rural population was as well housed as people living in the towns. Moreover, the poor housing conditions in the rural areas also gave rise to ailments, although perhaps different ones from those prevailing in the towns.<sup>322</sup>

## G. Factors in mortality decline in developed countries

163. Some of the spectacular declines in mortality which occurred in Europe, Northern America and Oceania in the late nineteenth and early twentieth centuries have been discussed in section A above. The factors responsible for these declines are numerous, although at times elusive. In discussing them, different writers have devised different classification schemes, the simplest being a twofold division between factors which are mainly related to economic and social development, and those related to advances in medical science, public health and sanitation.<sup>323</sup> In other classifications public health measures and improved sanitation have been included with other "environmental" factors, and distinguished from improvements in preventive and curative medicine.<sup>324</sup> Some more extensive classifications, such as that provided by Carr-Saunders, have identified improvements in sanitation as a separate category.<sup>325</sup>

164. Whatever the broad categories used for analysis, it is clear that underlying the multitude of individual factors responsible for the reductions in mortality have been the more or less continuous economic advances resulting from the so-called agricultural and industrial

revolutions; this progress made possible the development and applications in technology, public health, sanitation and medicine which were crucial for substantial mortality decline.

165. Statistical analyses which attempt to quantify the influence of the various factors affecting mortality are rarely found in the literature. Because of data deficiencies, the imprecision of analytical tools, and the inherent difficulties resulting from the mutual interdependence of factors, it is not possible to measure separately the effects of such diverse factors as improvements in nutrition, housing, environmental sanitation, personal hygiene, and medical knowledge and services, or the increasing health consciousness of the people. It is even less feasible to isolate the effects of various underlying economic and social changes such as the rise in real wages, the improvement of agricultural techniques, the development of transportation facilities or the enactment of specific laws relating to employment conditions, housing, etc.<sup>326</sup>

## 1. ECONOMIC DEVELOPMENT AND RISING INCOME LEVELS

166. While the substantial declines in mortality in the now industrialized countries took place only after the middle of the nineteenth century, trend data show that a slow, though irregular, mortality fall began much earlier. This trend during the eighteenth and early nineteenth centuries resulted not so much from a decline in the general death rates as from a lowering of the peaks of mortality which, during famines and epidemics, had periodically swept away the accumulation of many years' natural increase.<sup>327</sup> These declines in catastrophic mortality had already begun prior to industrialization,<sup>328</sup> and have been attributed to the fact that subsistence crises in agriculture occurred less frequently and were less often followed by epidemic diseases.<sup>329</sup> The main underlying causes include a complex of factors associated with improvements in the level of living and environment.<sup>330</sup>

<sup>320</sup> Ferguson, "Public health ..." (1964), pp. 213-214. Recent studies of housing and sanitary conditions in urban communities of the United Kingdom, documenting the effects of these conditions upon health and mortality, are as follows: Glass, "Some indicators ..." (1964), pp. 263-267; and Benjamin, "The urban background ..." (1964), pp. 225-248.

<sup>321</sup> Stern, *Society and Medical Progress* (1941), p. 110.

<sup>322</sup> Ashton, "Some statistics of the Industrial Revolution in Britain" (1966), p. 242.

<sup>323</sup> Stolnitz, "A century of international mortality trends, I" (1955), p. 29; Thompson and Lewis, *Population Problems* (1965), p. 429.

<sup>324</sup> McKeown and Brown, "Medical evidence ..." (1965), p. 304. The authors also added a third category to account for changes in the virulence of infective organisms.

<sup>325</sup> Carr-Saunders's classification was as follows: (1) political, that is the maintaining of external and internal order; (2) social, including advances in the production and use of food and clothing; (3) sanitary, including improvements in housing, drainage and water supply; and (4) medical, including the application of known measures for the prevention and cure of disease to the public at large. Carr-Saunders, *World Population* ... (1936), p. 75.

<sup>326</sup> See, for example, Ariès, *Histoire des populations françaises* ... (1948), p. 527; United Kingdom, Royal Commission on Population, *Report* (1949), p. 18; Dublin and Lotka, "Trends in longevity" (1945); Veselovsky, *Kurs ekonomiki* ... (1945), pp. 172, 506; and Sautin, "Pod'em materialnogo i kulturnogo urovnia ..." (1939), p. 115. On the difficulties of measuring the influence of different factors on mortality, see Benjamin, *Social and Economic Factors Affecting Mortality* (1965), pp. 5-14; Buckatzsch, "The influence of social conditions ..." (1947). The controversy regarding the reasons for early mortality decline in Britain is also discussed in chapter XIV, section B.

<sup>327</sup> Utterström, "Two essays on population ..." (1965), p. 541; Helleiner, "The vital revolution reconsidered" (1965), p. 85; Henry, "The population of France ..." (1965), p. 448. In some parts of Italy, these checks to population growth became more and more rare after 1820. Cipolla, "Four centuries of Italian demographic development" (1965), p. 575.

<sup>328</sup> Harsin and Hélin, "Compte-rendu des débats ..." (1965), pp. 42-43.

<sup>329</sup> See, for example, Thomas, *Social and Economic Aspects of* ... (1941), p. 87; Henry, "The population of France ..." (1965), pp. 447-448; Eversley, "Population, economy and society" (1965), p. 61; Habakkuk, "The economic history ..." (1965), p. 157.

<sup>330</sup> See, for example, Eversley, "Population, economy and society" (1965), p. 57; McKeown and Brown, "Medical evidence related to ..." (1965), pp. 305-307. The rising level of living is said to have begun affecting British mortality at least as early as 1770. McKeown, "Medicine and ..." (1965), p. 1076.

167. One of the favourable developments affecting the mortality of European peoples since the eighteenth century has been an improvement in the supply of food and in diet. Farming methods and implements were very primitive prior to the Agricultural Revolution, which began in England and several other European countries around 1700 and spread throughout Europe and to European overseas settlements. Changes in the systems of land tenure and crop rotation, the development of improved strains of plants and animals, and the introduction of new crops and better farm machinery, began to increase the productivity of labour and of land, and reduced the risks of crop failures, resulting in a steadier supply of food. It thus became possible to reduce mortality which may previously have been caused by chronic insufficiency of the food supply, and to create surpluses for the support of a rapidly growing population.<sup>331</sup> Further technological advances in agriculture during the nineteenth and twentieth centuries, including the use of artificial fertilizers and finally the mechanization of agriculture, brought the major nations of Europe, Northern America and Oceania to the point where they could feed themselves with a declining proportion of their labour force employed on the land. The workers thus freed from the necessity of producing food turned to the production of a multitude of other goods and services which enabled them to prolong and enrich their lives as well as the lives of agricultural workers.

168. Technological advances in transportation, such as the invention and development of the steam engine, also contributed to a more reliable food supply by facilitating the movement of food from areas of plenty to those of scarcity, thus mitigating the effects of local harvest failures and consequent famines and epidemics. The improved means of transportation, by making easier the exchange of agricultural commodities both internally and between countries, increased the commercialization of crops, with America becoming an important supplier of grain. In addition, better methods of storing food reduced the waste formerly characteristic in years of abundant harvests, by permitting the storage of certain commodities for use during leaner years.<sup>332</sup>

169. Although large numbers of people lived under conditions of misery and pauperism, especially in the early stages of industrialization,<sup>333</sup> gradual increases in real wages in the long run contributed to a better nourished

population.<sup>334</sup> While there have been few studies of the relation of nutritional improvement to mortality decline, it has been suggested that a better diet was probably the main cause of the substantial fall in tuberculosis mortality in England and Wales during the second half of the nineteenth century, and was probably a factor, although to a lesser extent, in the decline of mortality from typhus.<sup>335</sup>

170. The advances in technology and in levels of living affected health favourably in a number of other ways. More adequate housing was constructed, better clothing became available, and health services and medical research were extended.<sup>336</sup> Some measures directly concerned with sanitation and hygiene are discussed below.

## 2. SANITARY REFORMS AND PUBLIC HEALTH MEASURES

171. While the earliest mortality declines resulted mainly from causes associated with general improvements in the level of living, after the middle of the nineteenth century, sanitary reform and public health movements were increasingly important factors.<sup>337</sup> The modern concern of Governments as well as private agencies with public health is an outgrowth of the sanitary reform movement which began in nineteenth-century England as a reaction to the many evils arising from the Industrial Revolution. In the early stages of the movement, care was taken to prevent excessive intrusion by the State upon personal liberty, in accordance with the predominant *laissez-faire* philosophy, but as time went on, State intervention in health matters became broader.<sup>338</sup>

172. Even before the microbial origins of infectious disease were established, the relationship of filth and congestion to disease had been observed, and cleanliness on a community, as well as a personal level, became a central feature of the hygienic movement.<sup>339</sup> Edwin Chadwick, an early leader of the sanitary reform movement in England, published his monumental *Report on*

<sup>334</sup> In England, for example, food was very much cheaper in real terms in 1850 than it had been a century before, and after 1870 prices fell further as a result of imports. Eversley, "Population, economy and society" (1965), p. 61. As an example of increased consumption of foodstuffs, between 1850 and 1860 the average Frenchman is said to have consumed 187 kilogrammes of wheat, 77 litres of wine and 4 kilogrammes of sugar; between 1900 and 1910 the corresponding quantities had been raised to 234 kilogrammes, 141 litres and 14 kilogrammes, respectively. Reinhard and Arment-gaud, *Histoire générale de la population mondiale* (1961), p. 263.

<sup>335</sup> McKeown and Record, "Reasons for the decline of mortality ..." (1962), pp. 119-120; see also McKeown, "Medicine and world population" (1965), pp. 1072-1074. Pending further research, one writer has tentatively attributed to nutritional reasons most of the nineteenth-century mortality improvement. Anderson, "Age-specific mortality in selected Western European countries ..." (1955), p. 249.

<sup>336</sup> See, for example, Eversley, "Mortality in Britain ..." (1965), pp. 363-364.

<sup>337</sup> According to McKeown, sanitary measures became the main factor in advances in health in Britain from about 1870. McKeown, "Medicine and world population" (1965), p. 1076.

<sup>338</sup> Rosen, "Public health" (1968), pp. 167, 169.

<sup>339</sup> See, for example, Sigerist, *Civilization and Disease* (1945), p. 27; Mumford, *The City in History* ... (1961), pp. 474-475; Rosen, "Public health" (1968), pp. 167 ff.; Spiegelman, "Mortality in the United States ..." (1968), p. 526.

<sup>331</sup> See, for example, Thompson and Lewis, *Population Problems* (1965), pp. 402-404, 410, 414; Thomas, *Social and Economic Aspects of ...* (1941), pp. 51-52; Carr-Saunders, *World Population ...* (1936), p. 76; Harsin and Hélin, "Compte-rendu des débats ..." (1965), p. 36; Eversley, "Mortality in Britain ..." (1965), p. 366.

<sup>332</sup> See Dorn, "Mortality" (1959), p. 455; Thompson and Lewis, *Population Problems* (1965), pp. 404-405, 412, 416; Thomas, *Social and Economic Aspects of ...* (1941), pp. 73-74, 87-88; Harsin and Hélin, "Compte-rendu des débats ..." (1965), p. 39; Eversley, "Mortality in Britain ..." (1965), pp. 365-366.

<sup>333</sup> See, for example, Taylor, "Progress and poverty in Britain ..." (1966); Krause, "Changes in English fertility and mortality, 1781-1850" (1958), p. 65; Hobsbawm, "The British standard of living, 1790-1850" (1957). According to this author, some 10 per cent of the total population of Britain in the early 1840s were probably paupers. *Ibid.*, p. 53.

the Sanitary Condition of the Labouring Population of Great Britain in 1842, showing the relationship between filthy environmental conditions and disease. The following year a Royal Commission was appointed to study health conditions in urban areas, and in 1848 Parliament passed the first Public Health Act. This was an important landmark in the modern public health movement. It not only established the General Board of Health, creating a basis for future progress in public health administration, but also influenced public health far beyond England's shores, particularly in the United States. From 1855-1876, Chadwick's work was carried on by John Simon, whose writings set down the principles upon which nearly all subsequent public health work has been based.<sup>340</sup> Although mortality levels in Britain did not show much change during the first years of interest in sanitary reform and public health, a steady but slow decline amounting to about 30 per cent occurred between 1871-1901, a period which witnessed the introduction of new compulsory public health legislation, as well as economic and social advances.<sup>341</sup>

173. In the United States an early proponent of communal responsibility for health was Lemuel Shattuck, who, after a sanitary survey in Massachusetts in 1849, urged the creation of a State Health Department. It was not until 1869, however, that his suggestion was adopted. This event, together with the establishment of the New York Metropolitan Board of Health three years earlier, were landmarks in the development of American public health, and served as important guides in the establishment of other state and municipal health departments which followed soon after.<sup>342</sup>

174. The work of the sanitary reformers led to various concrete measures for the improvement of environmental sanitation. Public agencies for refuse removal began operations in London in 1848. In 1865, the London Metropolitan Board of Works provided a new network of sewers which permitted the abandonment of cesspools and open ditches. The purification of the water supply began on a small scale in the first half of the nineteenth century in Paris and London, but it was not until the last quarter of the century that public water systems and the filtering of water became widespread in the big cities of Europe and the United States.<sup>343</sup> By the beginning of the twentieth century, most of the cities of the Western world and of Russia had introduced systems of refuse removal and had greatly increased the purity of their water supplies.<sup>344</sup> The disinfection of water through chlorination came into use after the turn of the century and provided a more effective method of water treatment

than filtration.<sup>345</sup> As a result of the improvements in public sanitation, mortality rates from the bowel diseases (cholera, dysentery, diarrhoea), and typhoid, declined to a small fraction of their former levels.<sup>346</sup>

175. Along with the advances made in environmental sanitation, there was also greater concern with personal hygiene.<sup>347</sup> Soap, which had been taxed as a luxury throughout the centuries, came into more common use in the nineteenth century. The substitution of cotton for woollen undergarments may also have contributed to personal hygiene because of the relative ease of washing cotton clothing.<sup>348</sup> The growing concern with personal hygiene is considered to have been an important factor in the disappearance of typhus, which is transmitted by the body louse.<sup>349</sup>

176. Other measures designed to promote the health of the population were gradually introduced. Notification of the more important infectious diseases was made compulsory and quarantine was imposed where deemed necessary. There was an increase in the number and quality of hospitals and tuberculosis sanatoria. Community health departments and boards of health were established, and health visitor services were provided to advise mothers in hygiene, nutrition and the physical development of their young offspring. Medical consultation services were made available for pre-school children and routine medical examinations for school children.<sup>350</sup>

### 3. SOCIAL REFORM

177. In addition to the reforms oriented specifically toward disease control, the nineteenth century saw the introduction of important measures to improve living and working conditions in England and a number of other countries undergoing industrialization. Since that time a mass of legislation has been enacted dealing with various aspects of man's environment which may affect his health and well-being, directly or indirectly. In Britain a series of Factory Acts beginning as early as 1802 and continuing into the mid-twentieth century, gradually raised the minimum age of employment, shortened the length of the working day, and sought to improve physical working conditions and reduce industrial

<sup>345</sup> Wolman, "Water purification" (1957).

<sup>346</sup> See, for example, McKeown, "Medicine and world population" (1965), p. 1073; Newsholme, *Evolution of Preventive Medicine* (1927), pp. 132-133.

<sup>347</sup> Sigerist, *Civilization and Disease* (1945), p. 27.

<sup>348</sup> Buer, *Health, Wealth and Population* . . . (1926), pp. 196-197; on the use of soap in personal hygiene, see also Mumford, *The City in History* . . . (1961), pp. 468-469. Krause has pointed out, however, that it is not known with certainty that the cotton clothing was actually washed more frequently, and the increased production of soap could have been for industrial use. See his "Changes in English fertility . . ." (1958), p. 65.

<sup>349</sup> McKeown, "Medicine and world population" (1965), pp. 1072-1073.

<sup>350</sup> Some of these measures as they relate to Britain are discussed in Benjamin, "The urban background . . ." (1964). In Britain, milk depots which made clean cows' milk available for infants began to be opened around the turn of the century. *Ibid.*, p. 239; this and other efforts to improve the care of infants was followed by a decline in infant mortality. Lessof, "Mortality in New Zealand . . ." (1949), p. 77.

<sup>340</sup> Dublin, Lotka and Spiegelman, *Length of Life* . . . (1949), pp. 144-145; Rosen, "Public health" (1968), p. 167; Gale, *Epidemic Diseases* (1959), pp. 135-137.

<sup>341</sup> United States, National Center for Health Statistics, *Changes in Mortality Trends* . . . (1965), p. 3.

<sup>342</sup> Dublin, Lotka and Spiegelman, *Length of Life* . . . (1949), pp. 145-146; Rosen, "Public health" (1968), p. 168.

<sup>343</sup> Turneaure and Russell, *Public Water Supplies* (1940), pp. 6-10; Whipple, *Typhoid Fever* (1908), pp. 228-266.

<sup>344</sup> Russia, Tsentralny Statisticheskii Komitet M.V.D., *Goroda Rossii v 1910 godu* (1914), pp. 62, 173, 345, 511, 689, 763, 874, 1008, 1079, 1150.



accidents. British factory legislation served as a model for similar legislation elsewhere.<sup>351</sup>

178. Among the landmark housing legislation enacted in Great Britain were the Shaftesbury Acts of 1851 which provided statutory authority to condemn unfit houses and to impose occupancy standards in the interest of public health. On the Continent, France passed an act in 1850 which provided authority to improve insanitary housing. An act authorizing the condemnation of unfit houses was drawn up in Naples in 1885, following a severe cholera epidemic. Similarly, in Belgium (1889), Holland (1901) and the United States (1901) significant housing measures were enacted.<sup>352</sup>

179. Among other social measures contributing to improved health (and therefore to lower mortality) have been social security schemes providing such benefits as old-age pensions, health insurance, medical care, unemployment insurance and payments to the indigent. In some countries of Europe, voluntary groups such as trade unions undertook schemes to protect their members from the financial hazards of accidents and illness long before the establishment through legislation of national social insurance systems. The earliest State systems usually provided for benefits to industrial workers in case of accident or illness, but gradually the coverage became broader.<sup>353</sup>

180. Compulsory health insurance for workers was introduced in Germany in 1883, and subsequently in a number of other Western countries;<sup>354</sup> Germany was also first to adopt a comprehensive old-age retirement plan (1889).<sup>355</sup> In Britain old-age pensions on a limited scale and industrial health insurance were introduced in 1908 and 1911. After the Second World War health and welfare services were considerably broadened, and the National Health Service Act offered, beginning in 1948, free comprehensive medical care to all wishing to avail themselves of it.<sup>356</sup> In the Soviet Union free and comprehensive health services, as well as a broad range of social benefits, are provided by the State. In the period 1913-1964 there was a twelvefold increase in the ratio of doctors to population. These are among the factors contributing to the sharp mortality decline from 29.1 deaths per thousand population in 1913 to 7.2 in 1963.<sup>357</sup> The first national programme of social insurance in the United States was embodied in the Social Security Act of 1935, which established a comprehensive nationally

operated plan of old-age insurance and made available Federal grants-in-aid for various programmes on the State level, such as public health services.<sup>358</sup>

181. The institution of free and universal compulsory schooling, resulting in mass literacy, and the inclusion of lessons in personal hygiene in the school curriculum, have created a greater awareness of health matters among the population, encouraging the application of basic good health practices, and leading to earlier recognition and treatment of disease.<sup>359</sup>

#### 4. ADVANCES IN MEDICINE

182. The point in time at which the contribution of medicine became an important factor in mortality decline has been a matter of debate. McKeown, Brown and Record have challenged the traditional belief that the substantial increase in population in Britain prior to the twentieth century owes much to the work of doctors in bringing about mortality decline. They believe that, with the exception of smallpox vaccination, the course of mortality could not have been significantly affected by medical practices before the twentieth century. Although there had been earlier important advances in the knowledge of anatomy, physiology, and morbid anatomy, they had no practical significance from the patient's point of view until they could contribute to the preservation of health or recovery from illness. While the discovery of several kinds of anaesthesia in the nineteenth century increased the scope of surgery, it did not increase its safety until antiseptic surgery came into widespread practice.<sup>360</sup>

183. There is some evidence that improved medical practices, aside from smallpox vaccination, did make a contribution—however modest—to mortality decline before the twentieth century. For example, around the middle of the last century, Semmelweis introduced the practice of antiseptic precautions during childbirth, abruptly reducing maternal mortality. In his own practice, mortality from puerperal fever declined from 10 per cent to 1 per cent.<sup>361</sup> Eversley has mentioned the possibility that the best medical practice of the day may have saved some lives among the upper classes.<sup>362</sup>

<sup>358</sup> Watt, "Social security and the workers . . ." (1938), p. 716; Pribram, "Social insurance in Europe . . ." (1937).

<sup>359</sup> See, for example, Benjamin, "The urban background . . ." (1964), p. 248.

<sup>360</sup> See McKeown and Brown, "Medical evidence related to . . ." (1965); McKeown and Record, "Reasons for the decline of mortality . . ." (1962); McKeown, "Medicine and world population" (1965). Anderson, too, has suggested that medicine contributed little or nothing to mortality improvements during the nineteenth century. See his "Age-specific mortality in selected Western European countries . . ." (1955), p. 249. The importance even of smallpox vaccination in early mortality decline is a subject of debate. Krause, writing of England, has indicated that there was no widespread system of free vaccination until the 1840s, and as late as 1889 medical opinion was not unanimous as to its value. Krause, "Changes in English fertility and mortality, 1781-1850" (1958), p. 63.

<sup>361</sup> Dublin, Lotka and Spiegelman, *Length of Life . . .* (1949), p. 154.

<sup>362</sup> Eversley, "Population in England in the eighteenth century . . ." (1963), p. 579.

<sup>351</sup> See International Labour Office, *The Law and Practice . . .* (1949), pp. 3 ff.; Cole, *A Short History . . .*, vol. 1 (1925), pp. 133, 165; and his *Introduction to Economic History . . .* (1952), p. 61; also Samuels, *Factory Law* (1957), p. 1; Deane, *The First Industrial Revolution* (1965), pp. 137, 215, 267; and Hutt, "The factory system . . ." (1954), p. 160.

<sup>352</sup> See Benjamin, "The urban background . . ." (1964), pp. 228-230; Newman, "Slums" (1948), pp. 96-97; and Fisher and Ratcliff, *European Housing Policy and Practice* (1936), p. 9.

<sup>353</sup> Pribram, "Social insurance in Europe . . ." (1937), pp. 742-743.

<sup>354</sup> Sigerist, *Civilization and Disease* (1945), p. 61.

<sup>355</sup> Pribram, "Social insurance in Europe . . ." (1937), p. 755.

<sup>356</sup> United States, National Center for Health Statistics, *Changes in Mortality Trends . . .* (1965), p. 3; Benjamin, "The urban background . . ." (1964), pp. 234, 243.

<sup>357</sup> Freidlin, "State measures in the field of public health . . ." (1967).



184. It is beyond the scope of this chapter to chronicle the numerous achievements in medical therapy which have recently contributed so much to mortality reduction, in some cases eliminating completely from the developed countries mortality from certain dread diseases of only a century or less ago. However, some of the most significant medical advances are summarized below.<sup>363</sup> It should be kept in mind that substantial time periods often elapsed between a medical discovery and its being put into widespread practice. Such time lags may have resulted from inertia or resistance to innovation; from the slow dissemination of knowledge; or from the lack of adequate resources for taking the required medical action. Some of these factors are especially important in the present-day developing countries.

185. At the end of the eighteenth century (in 1798), Edward Jenner published his famous essay presenting evidence that inoculation for cowpox prevents smallpox. However, prior to the work of the great bacteriologists in the latter part of the nineteenth century, little was known of the role of pathogenic organisms in the causation of disease, although an awareness existed of a relation between filth and infectious disease. Progress in the prevention and control of these diseases could only proceed from a scientific knowledge of their nature and causes. One of the giants of this period was Louis Pasteur, whose pioneer researches proved that micro-organisms were not spontaneously generated, and established the microbial origin of infectious diseases. His work had important repercussions on surgery and the sterilization of food products, especially milk (which contributed greatly to the reduction of infant mortality). During the same period, the bacteriological investigations of Robert Koch resulted in his isolation of the organisms causing anthrax, plague and Asiatic cholera, but his most momentous discovery was the identification of the tubercle bacillus in 1882. In the area of preventive medicine, he developed a method of inoculation against anthrax. Together, the work of Pasteur and Koch laid the foundations for modern bacteriology and the science of immunization. In 1883, Ilya Mechnikov discovered phagocytes and his views on their importance in protecting the body against infectious agents were firmly established by 1892. Dmitri Ivanovski's discovery of the virus towards the end of the century expanded knowledge of the agents causing infectious diseases, giving further scope to progress in immunology.

<sup>363</sup> The discussion is based on the following sources: American Medical Association, *Commission on the Cost of Medical Care, Significant Medical Advances* ... (1964); Benenson, *Control of Communicable Diseases* ... (1970); Benjamin, "The urban background ..." (1964); Cruickshank, "The background to immunization" (1961); Dublin, Lotka and Spiegelman, *Length of Life* ... (1949), pp. 150-166; Edsall, "Efficacy of immunization procedures ..." (1961); Sigerist, *Civilization and Disease* (1945); Spiegelman, "Mortality in the United States ..." (1968); Thompson and Lewis, *Population Problems* (1965), pp. 433 ff.; United States, National Center for Health Statistics, *Changes in Mortality Trends* ... (1965); Zhdanov, "Immunization in communicable disease control" (1961); and the appropriate subject headings in the *Encyclopaedia Britannica* (1957) ed.) and in *Bolshaia sovetskaia entsiklopediia* (1949-1958). See also the following World Health Organization publications: *Research in Immunology* ... (1964); *WHO Expert Committee on Tuberculosis* ... (1964); *The Use of Human Immunoglobulin* ... (1966); *Human Viral and Rickettsial Vaccines* ... (1966).

186. Among other important medical advances in and around the second half of the nineteenth century were Joseph Lister's introduction of antiseptic surgery in 1865, which, together with William Morton's use of anaesthesia around the middle of the century (1846) eventually revolutionized surgical practice. In the 1890s, Emil von Behring's researches produced effective immunizing agents against tetanus and diphtheria, and Wilhelm Röntgen's discovery of the X-ray in 1895 provided the physician with an important tool for diagnosis, as well as for the treatment of certain diseases. An early contribution to curative, as opposed to preventive, medicine was Paul Ehrlich's discovery of salvarsan in 1910, a compound which was highly effective against certain types of protozoa, including the infectious agent causing syphilis.

187. The research in immunology and bacteriology in the late nineteenth century bore important fruit in the twentieth century, especially the second quarter, with the development of preparations for immunization against many infectious diseases, and for their cure once the disease had taken hold. Among the important diseases for which immunizing agents were available by the 1960s, aside from the ones already mentioned, were tuberculosis, typhoid fever, typhus fever, cholera, yellow fever, measles, whooping cough, poliomyelitis, plague and influenza. In certain diseases vaccination is the only satisfactory method of control, whereas in others it is merely an auxiliary method.

188. Great strides in chemotherapy (i.e., the use of drugs to cure or halt the progress of an infectious disease) began in the late 1930s with the widespread use of the sulfonamides in the treatment of respiratory and urinary tract infections, certain types of meningitis, and other infections. Penicillin, which came into widespread use among civilians after the Second World War, has been especially effective against infections of the respiratory and genito-urinary tracts, but also has been useful in other infections. The most important anti-tuberculosis drugs—streptomycin, para-aminosalicylic acid (PAS) and isoniazid—were introduced in the mid-1940s and early 1950s. Other important broad-spectrum antibiotics, such as the tetracyclines and chloramphenicol, also came into use after the Second World War. They are highly effective against a wide variety of infectious diseases, including plague and typhoid fever. As a consequence of these developments in drug therapy, mortality from many infectious diseases declined to a new low.

189. The use of pharmaceuticals in the treatment of non-infectious diseases has also contributed to mortality decline in the present century. One such group of drugs is the hormones, which consist of different types of glandular extracts administered in certain deficiency diseases, e.g. insulin to diabetics, and thyroid and liver extracts to persons suffering from thyroid deficiency and pernicious anaemia, respectively.

190. As improved medical treatment is only one among many factors affecting mortality trends, its contribution to mortality decline is difficult, if not impossible, to assess. However, in certain cases medical intervention can be reasonably assumed to have played a major role in mortality decline from specific diseases. For example,

TABLE V.19. DEATHS FROM RESPIRATORY TUBERCULOSIS IN SELECTED COUNTRIES, 1947 AND 1967

Country	Number of deaths		Deaths per 100,000 population		Percentage decrease in death rate 1947-1967
	1947	1967	1947	1967	
Australia .....	2,081	249	27.5	2.1	92.4
Canada .....	4,616	611	36.8	3.0	91.8
Denmark .....	1,010	74 <sup>a</sup>	24.4	1.5 <sup>a</sup>	93.9 <sup>b</sup>
Ireland .....	2,831	213	95.3	7.3	92.3
Netherlands .....	2,526	144	26.2	1.1	95.8
Norway .....	1,457	121 <sup>a</sup>	46.1	3.2 <sup>a</sup>	93.1 <sup>b</sup>
United States .....	44,462	6,351	31.0	3.2	89.7

SOURCES: United Nations, *Demographic Yearbook, 1951 ... (1951), table 22; ——— 1968 ... (1969), table 20.*

<sup>a</sup> For 1966.

<sup>b</sup> For 1947-1966.

in England and Wales, an intensive national immunization campaign against diphtheria was begun in 1940-1941. By 1949, diphtheria mortality had fallen by 98 per cent, and ten years later no deaths occurred from this cause.<sup>364</sup> The complete eradication of smallpox has been accomplished in many countries through widespread immunization of the population with high-quality vaccines, and the maintenance of the immunity by periodic revaccination.<sup>365</sup> Vaccination against poliomyelitis gives excellent protection against the disease, which has decreased dramatically, or even disappeared, in countries where immunization has been systematic.<sup>366</sup> In the United States, for example, the number of deaths from poliomyelitis dropped from 1,368 in 1954, the year before immunization began, to 16 in 1967.<sup>367</sup>

191. A large portion of the substantial decline in tuberculosis mortality following the Second World War has been attributed to the introduction of anti-tuberculosis drugs. In England and Wales, for example, a dramatic reduction in mortality from tuberculosis followed the introduction of specific chemotherapy with streptomycin in 1947-1948, and the decline continued as new drugs subsequently became available.<sup>368</sup> Table V.19 shows the recent trend in deaths from respiratory tuberculosis for selected countries.<sup>369</sup>

192. Among the non-pharmaceutical medical advances which have contributed to lowered mortality are new and improved diagnostic techniques, making possible the detection of disease at an early and curable stage. An

example of such a technique is the vaginal smear ("Pap" test, after George N. Papanicolaou, who first published a report on its use in 1928, and was co-author of "The diagnosis of uterine cancer by the vaginal smear" in 1943). In the United States, the age-standardized death rate for uterine cancer decreased from 27.5 to 13.6 per 100,000 women during 1930-1960. Improved surgical and radiological treatment also contributed substantially to the decline, but it is believed that early detection through annual examinations can virtually eliminate mortality from this type of cancer.<sup>370</sup>

193. The development of effective insecticides with residual action has greatly reduced mortality from insect-borne diseases such as typhus and malaria. The most common of these insecticides is DDT, which was widely used during the Second World War, and dramatically proved its effectiveness in the prevention of malaria and typhus among military personnel. The latter disease had been a deadly companion of armies as late as the First World War. Since 1945 anti-malarial campaigns, in which DDT figured prominently, have practically wiped out the disease in many areas where it was once endemic (see section H). Other insecticides have been developed for use where resistance to DDT has occurred among the vectors.<sup>371</sup>

## 5. "NATURAL" FACTORS

194. Among the factors mentioned as having contributed to mortality decline from certain diseases have been a change in the virulence of the disease-causing organism or in the resistance of the human host, or both. Mortality from smallpox, scarlet fever and diphtheria, and possibly some other diseases, is believed by certain writers to have been favourably affected by such changes.

<sup>364</sup> United States, National Center for Health Statistics, *Changes in Mortality Trends ... (1965), p. 37.*

<sup>365</sup> Zhdanov, "Immunization in communicable disease control" (1961), p. 9.

<sup>366</sup> World Health Organization, *Human Viral and Rickettsial Vaccines ... (1966), p. 39.*

<sup>367</sup> American Medical Association, Commission on the Cost of Medical Care, *Significant Medical Advances ... (1964), p. 34; United Nations, Demographic Yearbook, 1968 ... (1969), p. 420.*

<sup>368</sup> United States, National Center for Health Statistics, *Changes in Mortality Trends ... (1965), p. 38.*

<sup>369</sup> Trends in death rates from all types of tuberculosis for twenty-one countries in the period 1952-1953 to 1960-1961 are given in Tsukahara, *Trends in Age-adjusted ... (1966), p. 386.*

<sup>370</sup> American Medical Association, Commission on the Cost of Medical Care, *Significant Medical Advances ... (1964), pp. 47-57.*

<sup>371</sup> Sigerist, *Civilization and Disease (1945), pp. 118-122; Dublin, Lotka and Spiegelman, Length of Life ... (1949), pp. 149-150; Thompson and Lewis, Population Problems (1965), p. 434; Benenson, Control of Communicable Diseases ... (1970), pp. 141-142, 275-278.*

Although the effects of these factors are difficult to measure, they are not believed to have been of major importance in the over-all mortality decline under analysis.<sup>372</sup>

195. Regarding smallpox, for example, it has been noted that its virulence had been declining not only before vaccination became compulsory, but even before the publication of the results of Jenner's studies on the subject. This is not, however, to suggest that vaccination has not played a major role in the eradication of the disease.<sup>373</sup> The change in scarlet fever during the nineteenth and twentieth centuries from a serious killer to a relatively mild disease is believed to be due in large measure to a lowered virulence of the causal streptococcus, rather than to environmental or medical factors, especially as the disease had gone through several cycles of varying severity in the past. Moreover, in contrast to earlier periods, scarlet fever now tends to attack older children and adults, who have greater powers of resistance than younger children.<sup>374</sup> In his analysis of mortality trends for specific infectious diseases in a number of Western European countries during the first half of the present century, Pascua concludes that the great declines in mortality from diphtheria cannot be explained by medical practice, and that a change in the infective organism or in human resistance to the disease, or in both, has probably taken place, even though the nature of the changes is not understood.<sup>375</sup> The reasons for the disappearance of epidemics of one of the biggest killers—plague—from Western Europe since the mid-seventeenth century (except for the relatively localized epidemic in southern France in 1720-1722) remain a mystery, although a number of theories, unrelated to economic or medical progress, have been advanced.<sup>376</sup>

<sup>372</sup> Habakkuk suggests, for example, that the effects on mortality of inadequate food supplies in late eighteenth-century England were less severe than formerly, principally because the diseases usually following such scarcities were milder. Habakkuk, "The economic history ..." (1965), p. 157. McKeown and Record estimate that a change in the character of certain infectious diseases may have been responsible for roughly between one-fifth and one-third of mortality decline in England in the latter half of the nineteenth century. McKeown and Record, "Reasons for the decline of mortality ..." (1962), p. 119. Pascua maintained that the role of possible changes in pathogenicity of the causal agents in mortality decline in Europe during the first half of the twentieth century could not be appraised. Pascua, "Evolution of mortality ..." (1951), p. 137.

<sup>373</sup> On this subject, see Eversley, "Mortality in Britain ..." (1965), pp. 361-362; Harsin and Hélin, "Compte-rendu des débats ..." (1965), p. 23; McKeown and Record, "Reasons for the decline of mortality ..." (1962), p. 97; Pascua, "Evolution of mortality ..." (1951), p. 133.

<sup>374</sup> McKeown, "Medicine and world population ..." (1965), p. 1073; McKeown and Brown, "Medical evidence related to ..." (1965), p. 304; Dublin, Lotka and Spiegelman, *Length of Life* ... (1949), pp. 157-158; Pascua, "Evolution of mortality ..." (1951), pp. 70-72.

<sup>375</sup> Pascua, "Evolution of mortality ..." (1951), pp. 104-111. Although immunization programmes were carried out in some areas, diphtheria mortality also decreased significantly in countries where the number of immunizations was inconsequential. *Ibid.*, pp. 109-111.

<sup>376</sup> See Cipolla, "Four centuries of Italian demographic development" (1965), p. 574; Biraben, "Certain demographic characteristics ..." (1968), pp. 543-544.

## H. Factors in mortality levels and trends in developing countries

### 1. FACTORS IN RECENT MORTALITY DECLINE

196. As in the developed countries, the factors affecting mortality in developing countries have been classified differently by various writers, although generally the classifications permit a distinction between the broad categories of socio-economic factors on the one hand, and medical and health factors on the other.<sup>377</sup> Most analyses have stressed the fact that the rapid decline in mortality in developing countries during the past several decades has been largely independent of economic conditions. Though an inverse correlation still exists between levels of economic development and mortality, the linkage between the two has been considerably weakened.<sup>378</sup> The declines have rather been attributed mainly to technological advances in the prevention and control of disease and the growth and expansion of public health and medical services.<sup>379</sup>

197. Among the most important discoveries were insecticides like DDT, antibiotics like penicillin, and vaccines like BCG (*Bacillus Calmette-Geurin*). Owing to increased scientific communication and co-operation among nations, it has proved possible for developing countries to import techniques developed in the industrialized countries and to apply them in mass public health programmes at relatively small cost, often with the assistance of international agencies, such as the World Health Organization.<sup>380</sup>

198. The above view of the principal factors in recent rapid mortality declines is supported by the results of a study of mortality change in Latin America carried out by Arriaga and Davis. They found that up to 1930, declines in death rates progressed at a modest pace with economic development in some of the more advanced

<sup>377</sup> Bourgeois-Pichat and Pan, for example, considered the relative influence of socio-economic factors and the level of living as opposed to that of the state of medicine and public health. See their "Trends and determinants of mortality in underdeveloped areas" (1956), pp. 23-25. Robinson's classification distinguished between "medical" and "socio-economic" factors, the latter including also the expansion of health facilities and environmental improvements. Robinson, "Recent mortality trends in Pakistan" (1957), p. 7.

<sup>378</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 ... (1963), pp. 10-11; Sauvy, *Malthus et les deux Marx* ... (1963), pp. 64-68. Stolnitz pointed out that rapid mortality decline has taken place during periods of relatively slight economic growth (as in Ceylon), as well as during periods of relatively rapid economic growth (as in Mexico). Stolnitz, "Recent mortality trends ..." (1965), p. 117. See also Glass, "Population growth and population policy" (1965), p. 1090; National Academy of Sciences, Committee on Science and Public Policy, *The Growth of World Population* ... (1963), pp. 14-16; Jain, "State growth rates and their components" (1967), p. 26; Vallin, "La mortalité dans les pays du Tiers Monde ..." (1968).

<sup>379</sup> Balfour, "Some considerations regarding the permanence ..." (1956); Stolnitz, "Comparison between some recent mortality trends ..." (1956); Coale and Hoover, *Population Growth and Economic Development* ... (1958), pp. 14-15; Dorn, "Mortality" (1959), p. 457; United Nations, *Some Issues of Development Policy* ... (1969), p. 7.

<sup>380</sup> Davis, "The population specter ..." (1956); "The unpredicted pattern of population change" (1956), pp. 56-57,

countries of the region, but very slowly in the economically backward countries. After 1930, however, there were extremely rapid gains in life expectancy in which all countries of the region shared nearly equally, regardless of the level or rate of their economic development.<sup>381</sup>

199. A number of studies have emphasized the role of disease control, sanitation measures and medical care in recent mortality decline in developing countries. Impressive recent reductions in infant and childhood mortality in Latin America have been linked *inter alia* to expansion in the provision of pre-natal care for mothers and post-natal care for infants, to campaigns against diphtheria, whooping cough and malaria, as well as to progress in extending the coverage of safe water supplies in both urban and rural areas.<sup>382</sup> The provision of a safe water supply for over ninety per cent of the population and a relatively satisfactory ratio of physicians to population numbers have been mentioned as factors in the striking rise of life expectancy in Trinidad and Tobago between 1920 and 1960.<sup>383</sup>

200. Most students of African population believe that death rates on that continent are falling, though there are few precise data to document such a trend. Mass campaigns against specific diseases and extension of health services are generally credited with much of the achievement thus far,<sup>384</sup> though the decreasing incidence of famines resulting from better agricultural methods and improved transport and storage facilities, and the better nutrition resulting from rising levels of living, have also been mentioned.<sup>385</sup> A sharp fall in the death rate in the United Arab Republic between 1945 and 1947 has been attributed mainly to the nation-wide DDT dusting programme, which was directed against typhus, but may have been effective in destroying vectors of other diseases as well. The introduction and increasing use of antibiotics, such as sulfa compounds and penicillin, are believed to have significantly curtailed mortality from

pneumonia, other respiratory diseases, typhoid fever and a large group of enteric diseases.<sup>386</sup>

201. A malaria control programme and vaccination against whooping cough were considered to be important causes of a decline of more than fifty per cent in death rates in certain rural areas of New Guinea between 1949 and 1965.<sup>387</sup> In Madras City, where the infant mortality rate declined from 165 in 1951 to 115 in 1962, this trend was attributed to various factors such as compulsory vaccination, the Malaria Eradication Programme which also increased the population's resistance to other diseases, the training of midwives, the provision of basic pre-natal and post-natal services to mothers and infants in maternity clinics, and the increasing frequency with which confinements take place in hospitals.<sup>388</sup> Effects of the introduction of safe water supplies in Asian countries are illustrated by the sharp reductions in the incidence of communicable diseases which occurred in Japan, and in deaths due to cholera, typhoid fever and diarrhoeal diseases in Uttar Pradesh, India.<sup>389</sup>

202. In contrast to the emphasis placed on public health and disease control measures by most of the authors cited above, Taylor and Hall believe that the principal forces accounting for recent mortality declines in developing countries have been general economic and nutritional improvement. They cite such factors as improved agricultural methods resulting in more and better food, better transportation resulting in a reduction of food losses, decreased crowding in housing and improved water supply, which reduce the spread of communicable diseases, and better basic education which increases understanding of personal hygiene.<sup>390</sup> Like Taylor and Hall, Frederiksen has credited economic development with having been the major influence in recent gains in life expectancy. In analysing data for Ceylon, Guyana and Mauritius, he found a close correspondence between trends in the death rate and in economic conditions.<sup>391</sup>

203. Various other writers have also cited general improvements in economic conditions and the standard of living as having played a role in recent mortality declines, though few have gone as far as Taylor and

<sup>381</sup> Arriaga and Davis, "The pattern of mortality change in Latin America" (1969).

<sup>382</sup> Johnson, "Public health activities as factors in levels and trends of mortality and morbidity in developing countries" (1966), p. 327. A considerable fall in Brazil's death rate is said to have been due to the application of modern medical knowledge and improved sanitation measures. Smith, *Brazil* . . . (1963), p. 110.

<sup>383</sup> Das Gupta, "Mortality patterns in developing countries" (1970). The author also cited the existence of fairly satisfactory housing conditions and a higher standard of living than is found in many developing countries, as factors favourable to mortality decline in Trinidad.

<sup>384</sup> Caldwell, "Introduction" (1968), p. 11; Coale, "Estimates of fertility and mortality in tropical Africa" (1968), p. 185; Caldwell, "Population policy: a survey of Commonwealth Africa" (1968), p. 370. Campaigns against malaria, yellow fever, smallpox and bilharzia are believed to have been effective, mainly in urban areas. Johnson, "Health conditions in urban and rural areas of developing countries" (1964), p. 302. It is thought that the relatively low mortality in Ghana, in comparison with the rest of tropical Africa, is related to the accessibility of modern health services in the southern part of the country, where 80 per cent of the population resides. Caldwell, *Population Growth and Family Change in Africa* (1968), pp. 10-11.

<sup>385</sup> Barkhuus, "Non-European general and infant mortality . . ." (1955), pp. 358-359.

<sup>386</sup> Grais, Waggoner and Mauldin, "The role of mortality in recent population trends in Egypt" (1956), pp. 180-182, 193-194.

<sup>387</sup> Scragg, "Mortality decline in a sample population in New Guinea" (1967).

<sup>388</sup> Chandrasekhar, "Infant mortality in Madras City" (1967), p. 102. A fairly rapid decline in the neonatal mortality rate among the Maoris in New Zealand was found to be associated with a sharp rise in the proportion of confinements occurring in hospitals. Pool, "The isolation of various components . . ." (1967), p. 511.

<sup>389</sup> Dieterich and Henderson, *Urban Water Supply Conditions and Needs* . . . (1963), p. 20. On the range of diseases affected by improvements in community sanitation, see Swaroop, "On infant and childhood mortality . . ." (1955), p. 559.

<sup>390</sup> Taylor and Hall, "Health, population and economic development" (1967).

<sup>391</sup> Frederiksen, "Determinants and consequences of mortality and fertility trends" (1966), pp. 716-717. In another study of twenty-one countries, most of them industrialized, the same author found a high negative correlation between trends in economic indicators and age-specific mortality rates, particularly in the younger age groups. See his "Dynamic equilibrium of economic and demographic transition" (1966).

Hall and Frederiksen in evaluating their importance. Robinson's analysis of the factors contributing to the acceleration of mortality decline in Pakistan after 1950 led him to conclude that this trend was due to "... an interrelated complex of socio-economic and medico-environmental causes; that increases in *per capita* income and the more general availability of modern drugs on the market may have been at least as important as disease-specific health programmes by government."<sup>392</sup> Janer has suggested that the rise in life expectancy in Puerto Rico from 38 years in 1920 to 46 years in 1940 was mainly the result of public health and sanitation measures adopted by the Government, while a further rapid rise to 61 years by 1950 reflected profound social and economic improvements as well as intensified health and sanitation efforts, which, *inter alia*, eliminated malaria as a cause of death and brought a safe water supply to the entire population.<sup>393</sup>

204. The reasons for the remarkable post-war mortality decline in Ceylon—often cited as an example of the results which public health measures alone can achieve—have been examined by various authors, who reached differing conclusions. Nearly all analyses have credited the malaria eradication programme, which introduced DDT spraying to destroy the malaria-carrying mosquito, with having played a leading role in bringing down the death rate from an average of about 21 per 1,000 population in 1936-1945 to about 12 in 1950-1952.<sup>394</sup> Coale and Hoover estimated that the DDT campaign accounted for somewhat less than half of this decline, and Newman's analysis implied that about 42 per cent of the fall in average crude death rates from 1930-1945 to 1946-1960 was due to that cause.<sup>395</sup> On the other hand, Frederiksen questioned the finding that malaria control was a major cause of post-war mortality decline. His studies found that the per cent decline in the death rate between 1946 and 1947 was about the same in malarious and non-malarious areas and was associated with a rise in food imports and improvement in a range of economic indicators.<sup>396</sup> Meegama also stressed the contribution of factors not directly associated with malaria control. He showed that some improvements in mortality had been achieved prior to the advent of DDT spraying, even in endemic malarial areas in which efforts had been made to develop health services. Moreover, like Frederiksen, he noted that declines in mortality occurred in 1947 in certain non-malarious areas in which there had been no eradication campaign and little new hospital construction, apparently as a result of improvements in food supplies following the severe shortages of the war period. Comparing the

situation in Ceylon and Guatemala, Meegama concluded that although both countries had post-war malaria eradication programmes, the much more rapid fall of mortality in Ceylon was due to the existence of rural hospitals and maternity homes, para-medical services and distribution of free milk, whereas these favourable conditions were either absent or were much less developed in Guatemala.<sup>397</sup> In Mauritius, where post-war mortality trends closely paralleled those in Ceylon, Dowling ascribed the fall in the death rate in part to malaria control, but also to improvements in environmental sanitation and prosperity in the sugar industry.<sup>398</sup>

205. The view has been expressed that while public health programmes for the control of disease and progress in environmental sanitation have been extremely successful in bringing about rapid short-term declines in mortality, social and economic factors might assume greater importance in achieving long-run effects.<sup>399</sup> Moreover, at least a slowly rising level of living would seem essential in order for the developing countries to achieve and maintain the low mortality levels now prevailing in advanced industrialized countries.<sup>400</sup> The latter thesis gains support from the research of Behm and Gutierrez, who examined mortality trends in Chile from 1937 to 1963. They found a sharp acceleration in the decline in mortality from infectious diseases in 1945 and 1950, coinciding with the introduction of antibiotics, sulfas and other modern drugs. However, by the early 1960s death rates had stabilized, although at a level still well above that prevailing, for example, in England and Wales. According to the authors, these trends suggest that there is a limit to the mortality decline that can be achieved primarily through medical techniques, if economic development remains at a low level.<sup>401</sup> Similarly, Sarkar, in analysing

<sup>397</sup> Meegama, "Malaria eradication and its effect on mortality levels" (1967). Stolnitz also recognized the contribution of factors other than the malaria eradication programme, notably other health activities and the rapid recovery of food supplies. Stolnitz, "Comparison between some recent mortality trends ..." (1956), pp. 27-29. See also Sarkar, *The Demography of Ceylon* (1957), pp. 124-125; Pampana, "Effect of malaria control on birth and death rates" (1955), pp. 498-500; Newman, "Malaria eradication and its effect on mortality levels ..." (1969); Meegama, "The decline in maternal and infant mortality and its relation to malaria eradication" (1969); Newman, "Rejoinder" (1969); Meegama, "A reply" (1969); and Frederiksen, "Malaria eradication and the fall of mortality ..." (1970).

<sup>398</sup> Dowling, "Control of malaria in Mauritius" (1953), pp. 183-184. See also Frederiksen, "Determinants and consequences of mortality and fertility trends" (1966), pp. 716-717.

<sup>399</sup> Bourgeois-Pichat and Pan, "Trends and determinants of mortality in underdeveloped areas" (1956), p. 25; Raman, "A study of some aspects of mortality ..." (1968), p. 4.

<sup>400</sup> Vallin, "La mortalité dans les pays du Tiers Monde ..." (1968), pp. 859-861; Thompson and Lewis, *Population Problems* (1965), p. 441. It has been said that in those Asian countries where crude death rates have already fallen below 10 per 1,000, further reductions are likely to be increasingly dependent on improvements in economic and social conditions. United Nations Economic Commission for Asia and the Far East, *Report of the Asian Population Conference, 1963 ...* (1964), p. 80.

<sup>401</sup> Behm and Gutierrez, "Structure of causes of death and level of mortality: an experience in Latin America" (1967). Commenting on the rather small gain in life expectancy in Chile between 1952 and 1960 (0.2 years annually for males and 0.4 years for females) despite the rather advanced state of public health services, Miró

<sup>392</sup> Robinson, "Recent mortality trends in Pakistan" (1967), p. 38.

<sup>393</sup> Janer, "Medidas de salud pública y saneamiento ..." (1955).

<sup>394</sup> See, for example, Cullumbine, "An analysis of the vital ..." (1950); Stolnitz, "Comparison between some recent mortality trends ..." (1956), p. 29; Abhayaratne and Jayewardene, *Fertility Trends in Ceylon* (1967), p. 22.

<sup>395</sup> Coale and Hoover, *Population Growth and Economic Development ...* (1958), pp. 66-67; Newman, *Malaria Eradication and Population Growth* (1965), pp. 48-49.

<sup>396</sup> Frederiksen, "Malaria control and population pressure in Ceylon" (1960); ———, "Determinants and consequences of mortality trends in Ceylon" (1961).

post-war mortality trends in Ceylon, speculated that while methods external to the community had been applied effectively to achieve rapid mortality decline in a short period, future progress would depend more on rising income and general economic and social development.<sup>402</sup>

206. In examining the factors responsible for the existing differences in mortality levels among sixty-three developing countries, Kusakawa tentatively concluded that "... the combined effect of urbanization, literacy, energy consumption, non-agricultural activities and income in that order, may account for one-half or even more of the variations in  $\%_0$  in developing countries, while a little less than one-third of the variation may be attributable to health services alone." The author considered that while specific medical and public health measures were the main factors in the sharp post-war fall of death rates in developing countries, favourable economic conditions were important in permitting the realization of maximum benefits from health programmes.<sup>403</sup>

207. As pointed out in the earlier discussion of the determinants of mortality trends in industrialized countries, owing to the complicated interrelationships of factors, it is difficult to isolate the influences of particular medical advances, public health measures or economic and social conditions. If more were known of this complex subject, Governments of developing countries could benefit by making the most advantageous allocation of available resources.<sup>404</sup>

## 2. FACTORS IN THE PERSISTENCE OF HIGH MORTALITY IN CERTAIN REGIONS

208. Despite the remarkable advances in extending life expectancy which have been achieved in the world's developing regions—mainly in the 1950s and 1960s—mortality levels remain high in large parts of Asia and in most of Africa, compared with conditions prevailing in the more developed regions. The former areas are still beset by infectious diseases not yet brought fully under control (see section D above), unsatisfactory sanitation conditions, food shortages and malnutrition, all of which contribute to their excess mortality.<sup>405</sup> In addition to insufficient quantities of food, diet deficiencies in many of the less-developed regions produce nutritional disorders such as kwashiorkor (resulting from protein deficiency),

concluded that further progress might depend on a general rise in the standard of living. Miró, "The population of Latin America" (1964), p. 40.

<sup>402</sup> Sarkar, *The Demography of Ceylon* (1957), pp. 275-276. Davis has also pointed out that while it is possible to lower death rates substantially through modern techniques, unless there is accompanying social change (for example, an improved understanding of health among the population), the gains achieved may be in jeopardy. Davis, *The Population of India and Pakistan* (1951), pp. 51-52.

<sup>403</sup> Kusakawa, "Social and economic factors in mortality in developing countries" (1967).

<sup>404</sup> Benjamin, "Mortality trends in the world" (1966), p. 219. See also World Health Organization, *Programmes of Analysis of Mortality Trends and Levels* ... (1970), p. 12.

<sup>405</sup> Swaroop, "On infant and childhood mortality ..." (1955), pp. 558-559.

rickets, scurvy, beriberi and pellagra—all of which are now virtually unknown in the industrialized countries.<sup>406</sup> The fact that the mortality rate from certain infectious diseases such as measles and whooping cough is many times as great among children in the developing countries as in Western Europe is believed to be associated with the relatively poor nutritional state of the population in the former areas.<sup>407</sup>

209. The provision of safe water supplies can contribute much to eliminating severe water-borne diseases such as cholera and typhoid, as well as to reducing the incidence of dysentery and gastro-enteritis which are sometimes transmitted by water. But, in the 1960s it was estimated that only about one-third of the urban population in developing countries had drinking water supplies in their houses or on their premises, while a much worse situation prevailed in the rural areas. Moreover, the present rate of progress in increasing water supplies in the urban communities of many developing countries is not sufficient to keep pace with rapid population growth.<sup>408</sup> So far as medical services are concerned, the target ratio of one doctor for every 10,000 inhabitants in developing countries set for the United Nations Development Decade is far from achievement in many parts of the world.<sup>409</sup>

210. At the Asian Population Conference in 1963 it was considered that the wide differences then existing in mortality levels among countries in the region as a result of unequal progress in reducing death rates would disappear with the application of modern medical knowledge and further development of public health activities in the more backward areas. Both India and Pakistan, for example, still have far to go in controlling such diseases as malaria, typhoid, tuberculosis and cholera.<sup>410</sup>

211. Even where mass disease control campaigns have achieved outstanding success, it has proved difficult to establish sufficient complementary health services for the population in view of its rapid growth and the huge costs involved. A considerable lag in providing services for the rural population is evident, partly because of the reluctance of personnel to serve in remote areas under poor conditions. Poor urban environmental conditions accompanying rapid urbanization, and the fact that Asia is the least adequately fed region in the world, further complicate health problems.<sup>411</sup>

<sup>406</sup> Benjamin, *Social and Economic Factors Affecting Mortality* (1965), pp. 21-23; Brockington, *World Health* (1958), pp. 31-32.

<sup>407</sup> World Health Organization, *Nutrition and Infection* (1965), p. 9.

<sup>408</sup> World Health Organization, *Community Water Supply* ... (1969), pp. 6-8.

<sup>409</sup> United Nations, *1967 Report on the World Social Situation* (1969) p. 24.

<sup>410</sup> United Nations, Economic Commission for Asia and the Far East, *Report of the Asian Population Conference, 1963* ... (1964), pp. 5, 80; Robinson, "Recent mortality trends in Pakistan" (1967), p. 34. According to the author, by the late 1960s the malaria eradication programme was estimated to have reached about 40 per cent of the population in Pakistan.

<sup>411</sup> United Nations, "Recent social trends and developments in Asia" (1968), pp. 55-56. Although health experts have pointed out that the provision of pure water supply and sanitary means of waste disposal would be more effective than any other measure to promote

(Continued on next page)



212. In the Philippines it was estimated that in the late 1960s less than half the population was provided with safe water supply and an adequate waste disposal system. Pneumonia was still the leading cause of death. Its high incidence probably was related to a high frequency of malnutrition among young children, failure to seek early medical attention—particularly in rural areas which suffer most from inadequate medical facilities—and the inability of many to afford the “wonder drugs” which greatly reduce mortality from this disease.<sup>412</sup>

213. In addition to nutritional deficiencies and poor housing conditions, both of which result from low income, various social and cultural factors are believed to contribute to the high infant mortality levels still prevailing in India. The latter are said to include various unhealthy customs surrounding confinement and the feeding of young infants, the preference of Indian women for their babies to be delivered at home even when hospital facilities are available, the traditional role of the untrained midwife, and generally poor “mothercraft”.<sup>413</sup>

214. Malaria eradication remains a primary problem in Africa, where the great majority of the population living in malarious areas is not yet protected against this disease.<sup>414</sup> In addition to the infectious diseases still prevalent in Africa, insufficient food and poorly balanced diets are also factors making for high mortality. In 1949 a WHO-FAO committee linked kwashiorkor to high mortality rates in some parts of Africa,<sup>415</sup> but medical surveys in Gambia in the 1950s, the results of which were believed to be typical also of conditions elsewhere in rural West Africa, found kwashiorkor to be rare, and infection and poor care, rather than malnutrition, to be the main causes of high mortality. It was considered likely that the incidence of gastro-intestinal infections would remain high in tropical Africa until effective vaccines were produced.<sup>416</sup> In a study of infant mortality in rural Tanganyika, high mortality rates were found to

be associated with unhygienic practices at childbirth, insanitary home conditions, and unhygienic feeding.<sup>417</sup>

215. The shortage of trained medical personnel in Africa is shown by the high ratio of inhabitants per physician; while this ratio varies widely among African countries, the regional mode was estimated to be about 21,000.<sup>418</sup> The inadequacy of such a ratio is apparent by comparison with the situation in developed countries; for example, in the Soviet Union the number of inhabitants per physician was only about 500 in the early 1960s.<sup>419</sup>

216. Despite the fact that Latin America has progressed further than the world's other developing regions in bringing mortality to a low level, health conditions in that region cannot be considered satisfactory. The still high incidence of preventable infectious diseases as causes of death has already been mentioned.<sup>420</sup> It has been conjectured that Brazil's death rate, estimated at around 20 in 1950, was double what it would have been if modern medicine and sanitation measures were applied to the same extent as in developed countries. Climate, poor dietary habits and the absence of a strong health tradition, are said to be among the factors holding back more rapid progress in combating disease.<sup>421</sup>

217. For the region as a whole it was suggested in the late 1960s that previously rapid downward trends in mortality may have slowed, since the mass disease eradication efforts had already had their maximum impact, and nutritional and environmental inadequacies were imposing limitations on the results of present public health work. Diseases spread by polluted water were said to be the leading causes of death in many Latin American countries and while provision of safe water supply and sanitation systems are costly undertakings, ambitious improvement programmes were underway, with an impressive proportion of external financing.<sup>422</sup> As of 1964, it was estimated that close to 70 per cent of the urban population of Latin America lived in homes with piped water, though for rural population the figure was less than four per cent. A little over half of the urban population was served by sewerage systems. Goals for 1971 established in the 1961 Charter of Punta del Este called for the provision of safe water supplies and sewerage facilities to 70 per cent of the urban population and 50 per cent of the rural population in each country.<sup>423</sup>

218. One of the major preliminary findings of the Inter-American Investigation of Mortality in Childhood is the role of nutritional deficiencies as contributory causes of death. While nutritional deficiency was the underlying

(Footnote 411 continued)

public health in Asia, there has been no breakthrough in these areas because of the costs involved. United Nations, “Review of the social situation in the ECAFE region” (1965), p. 41. Calorie consumption in the Far East around 1960 was calculated to be only about 89 per cent of requirements, this being the lowest figure for any major region. Sukhatme, “The world's hunger and future needs in food supplies” (1961).

<sup>412</sup> Jacinto, “Health and medical services in the seventies” (1969), pp. 314, 354-356.

<sup>413</sup> Chandrasekhar, *Infant Mortality in India, 1901-1955* . . . (1959), pp. 118-139. It has been estimated that about 85 per cent of deliveries in India take place in homes lacking aseptic conditions. Chandrasekhar, “Infant mortality in Madras City” (1965), p. 102. See also Gordon, Gideon and Wyon, “Midwifery practices in rural Punjab, India” (1965). For a discussion of customs relating to pregnancy and delivery which contribute to high infant and maternal mortality in various parts of the world, see Kozlov, *Dinamika chislennosti narodov* (1969), pp. 224-227. See also Brockington, *World Health* (1958), p. 188.

<sup>414</sup> United Nations, *1967 Report on the World Social Situation* (1969), p. 24.

<sup>415</sup> Barkhuus, “Non-European general and infant mortality . . .” (1955), pp. 358-359, 365.

<sup>416</sup> Smith and Blacker, *Population Characteristics of the Commonwealth Countries* . . . (1963), pp. 39-42.

<sup>417</sup> Nhonoli, “An enquiry into the infant mortality rate in rural areas . . .” (1954), p. 10.

<sup>418</sup> United Nations, *1967 Report on the World Social Situation* (1969), p. 24.

<sup>419</sup> Uralnis, *Rozhdaemost i prodolzhitel'nost zhizni* . . . (1963), p. 124.

<sup>420</sup> Gabaldon, “Leading causes of death in Latin America” (1965). See also Puffer and Griffith, *Patterns of Urban Mortality* (1967), p. 133.

<sup>421</sup> Smith, *Brazil* . . . (1963), pp. 110, 114.

<sup>422</sup> United Nations, *1967 Report on the World Social Situation* (1969), pp. 145-146.

<sup>423</sup> Pan American Health Organization, *Health Conditions in the Americas, 1961-1964* . . . (1966), pp. 115-118.



cause of death in only 10 per cent of the cases among children six months to four years of age, it was a contributory cause in 31 per cent, and a consequence of the underlying cause in 15 per cent of the cases.<sup>424</sup> The fact that infant mortality in Antigua was 2.8 times that in England and Wales around 1960 and nearly sixteen times higher at age one is said to be partly due to relatively poor environmental hygiene, poor diet and malnutrition in the former island.<sup>425</sup>

## I. Prospects for future trends

219. The prolongation of human life is universally viewed as a positive goal, providing an ever-present incentive for direct efforts in the areas of medicine and public health. At the same time, economic and social progress can be expected to exert a favourable, though indirect, effect on mortality. Thus, barring catastrophic and completely unpredictable events such as thermonuclear warfare, unusually severe famines, the recrudescence of great killer diseases or the appearance of new ones, life expectancy is likely to continue its upward trend in both developed and developing countries, although at a varying pace. In the future as in the recent past, the most rapid rates of mortality decline will no doubt occur in the world's developing countries, with the result that, given the younger age structure of their populations, crude death rates in certain regions such as Latin America can be expected soon to fall below those in the more developed regions.

### 1. PROSPECTS IN AREAS OF RELATIVELY HIGH MORTALITY

220. Despite the striking declines in mortality which have occurred in many developing countries since the end of the Second World War, the endemicity of infectious and parasitic diseases throughout large portions of the developing world leaves much room for improvement. The great strides recently recorded have often been made in the absence of significant economic development by the application of procedures borrowed from the industrialized countries and by crash programmes aimed at the eradication of a specific disease, such as the oft-cited anti-malaria campaign in Ceylon. Progress along these lines is expected to continue, with the help of foreign Governments as well as private and international organizations (particularly the World Health Organization).

221. A recent evaluation by the United Nations of the course of mortality trends in developing regions considers an average gain in life expectancy of eight and a half years (from 49.5 to 58.0 years) as likely for 1965-1985, with the rate of improvement varying from region to region.<sup>426</sup>

<sup>424</sup> Puffer and Serrano, "Inter-American investigation of childhood mortality" (1969), pp. 16-17. It was found that two-thirds of the young children who died from measles in Recife, Brazil had a pre-existing nutritional deficiency. *Ibid.*, p. 17. Even in Trinidad and Tobago, where mortality has fallen to quite low levels, a recent nutrition survey revealed severe protein deficiencies among children. Das Gupta, "Mortality patterns in developing countries" (1970).

<sup>425</sup> Uttley, "Age-specific death rates ..." (1965), p. 102.

<sup>426</sup> United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

While the short-run outlook therefore appears to be good, various writers consider that once certain threshold levels are attained, progress will become more difficult. Stolnitz, for example, presents the broad hypothesis that a life expectancy of at least 50 to 55 years can be readily attained where Governments are willing to set such goals, but that improvements beyond these limits will meet with increasing difficulty.<sup>427</sup> According to Vallin, an expectation of life of 60 to 65 years might be achieved in low-income countries without substantial economic progress, but beyond this point increases will be closely related to economic development. Thus, in the absence of sizable economic growth, life expectancy in developing countries may remain on a plateau below the levels now prevailing in the West.<sup>428</sup> An insufficiency of the food supply may be especially important in keeping the potential for mortality reduction from being fully realized.<sup>429</sup>

### 2. PROSPECTS IN AREAS OF RELATIVELY LOW MORTALITY

222. Since the life span in the developed countries is already within sight of man's natural biological limits as they are at present empirically established, further marked extensions are not generally foreseen for these areas in the short run. The same United Nations study cited above projects an increase in expectation of life at birth in the more developed regions of only about two years (from 70.4 to 72.2 years) in the period 1965-1985.<sup>430</sup> Indeed, it has been pointed out that death rates at the very oldest ages may even increase because mortality from a chronic condition has been postponed by medical treatment to a later age. Moreover, new environmental hazards, in the form of air and water pollution, and the possible contamination of food supplies through the use of pesticides and additives, pose a challenge to efforts to increase life expectancy in the older ages.<sup>431</sup>

223. Despite these obstacles to increased longevity, however, there is room for improvement in mortality from certain causes and among certain age groups, within the limits of present-day science and technology.<sup>432</sup> The relatively wide range of infant mortality rates still prevailing among developed countries, and the mortality differentials between certain sub-groups (whether geographic, socio-economic or ethnic) within these countries give evidence of the potential for further mortality reduc-

<sup>427</sup> Stolnitz, "Recent mortality declines ..." (1967), p. 380.

<sup>428</sup> Vallin, "La mortalité dans les pays du Tiers Monde ..." (1968). Although the development necessary to reach a life expectation of 60-65 years is thought to be relatively modest, not approaching the levels of living characteristic of Western countries, in Vallin's opinion many developing countries would nevertheless experience considerable difficulty in attaining it.

<sup>429</sup> See Gordon and Helmer, "Report on a long-range ..." (1966), p. 58.

<sup>430</sup> United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

<sup>431</sup> Spiegelman, "Mortality in the United States ..." (1968), p. 532. According to Légaré, the conditions of modern life, particularly in large cities, may have increasingly adverse effects on persons reaching the later years of their working life. Légaré, "Mortality at age forty-five and over ..." (1967), p. 417.

<sup>432</sup> McKeown envisages the virtual disappearance of deaths before the end of the reproductive period. See his "The next forty years in public health" (1964), pp. 275-276.

tion. This may be achieved through the increased prevention of difficult-to-cure diseases about whose aetiology there is some knowledge (for example, the influence of smoking on respiratory cancer), through earlier detection of certain diseases as a result of improved diagnostic procedures as well as through frequent examination of various "high-risk" groups (overweight persons, for example), and through a continuance of the declining trend in mortality from accidents in the home or at work as a result of better safety measures.<sup>433</sup> Peller has noted that systematic surveys of mortality from cardiovascular diseases in different areas may disclose important information concerning the possible relation of these diseases to such factors as occupation, diet, smoking and drinking habits, ethnic characteristics, altitude or atmospheric conditions.<sup>434</sup> Optimistic assessments have been made of

<sup>433</sup> The outlook for an early reduction in mortality from motor vehicle accidents, which have recently taken an increasing toll in industrialized countries, is less optimistic.

<sup>434</sup> Peller, *Quantitative Research* ... (1967), pp. 298-299.

the prospects for a significant reduction in mortality from heart disease in the near future. Contributing to this progress will be advances in surgery and pharmacology, and possibly most dramatic of all, the development of an artificial heart to replace a diseased one.<sup>435</sup>

224. In contrast to the somewhat modest gains foreseen for the short run is the more speculative, long-range prediction that biological breakthroughs may extend the life span by as much as fifty years before the year 2100. Among the important developments making such an advance possible would be the availability of general immunization against bacterial and viral diseases, and the achievement of chemical control of the aging process.<sup>436</sup>

<sup>435</sup> United States, President's Commission on Heart Disease, Cancer and Stroke, *A National Program to Conquer* ... (1964), vol. 1, pp. 6-7.

<sup>436</sup> Gordon and Helmer, "Report on a long-range ..." (1966), pp. 57-58, 79. See also Somers, "Some basic determinants ..." (1968), p. 17.

# POPULATION DISTRIBUTION, INTERNAL MIGRATION AND URBANIZATION

1. As verified by repeated censuses, human populations are very unevenly distributed in space, and the distributions undergo continuous change. The unevenness of population distribution is increasing in modern times as ever larger percentages of human population are becoming concentrated in small parcels of urban land. Unevenness in the distribution of population settlement can result either from migration or from relative differences in rates of natural increase. For example, the higher rates of natural increase in the developing regions are causing a continuous shift of the world population balance in favour of the developing countries. The early growth of industrial cities was primarily due to migration from the countryside. More recently, however, the role of natural increase in the growth of cities has become an increasingly important factor.

2. Throughout the nineteenth century and at the beginning of the present century, overseas migrations, then of large volume in relation to the populations affected, attracted special attention. As shown in chapter VII, these movements have more recently diminished in scale and in the 1950s and 1960s they affected only a reduced number of countries significantly, many of them comparatively small. International movements among countries within the continents of Africa, Europe and Latin America have remained on a considerable scale. But as regards geographic distances and environmental differences between areas of departure and destination, it is important to note that population movements within large countries are of as wide a scope, if not wider, than many movements between neighbouring countries having separate sovereignty. The radius and directions of geographic displacement have changed, but populations have remained as migratory as before. The environmental contrast is now particularly striking between urban and rural areas. With the increasing scale and tempo of urbanization, much of the geographic mobility of populations is now to be attributed to transfers between rural and urban places of residence. At high levels of urbanization, many of the movements are interurban, or between the central parts of cities and their respective suburbs. Since migration is selective of population groups with particular sex, age and marital status characteristics, or with distinct levels of education and occupational qualification, it also causes changes in the compositions of local populations and manpower, according to these features.

3. The study of population distribution, internal migration and urbanization is highly dependent on the definitions of area units, the definitions of a "migratory" move (for instance, in terms of minimal duration of

residence), and the types of data available. Since the statistical systems of countries differ, much of the study is perforce intranational, with results which do not lend themselves readily to international comparison. Even so, the subject-matter is very complex, involving numerous distinct lines of analysis. Exhaustive study for an entire nation can lead to a multiplicity of results not easily summarized for intellectual comprehension. On the other hand, studies relating to particular areas assume the specific geographic circumstances existing in each area. Since these differ from one area to another, they lead to results difficult to compare among different areas, even if the national statistical system is the same. Nevertheless, many attempts have been made, some of them fairly successful, to derive some generalizations from the numerous available observations. In addition, for purposes of international comparison, attempts have been made to estimate and project national urban and rural populations, distinguishing also urban settlements of different size classes.

4. Though population distribution, internal migration, and urbanization are three different topics, they are obviously interdependent and therefore they are reviewed within the same chapter. Population morphologies can be studied in terms of geographic distribution and levels of urbanization. The dynamics by which these structures are continuously changed consist chiefly in the volume and characteristics of migratory streams. Their study is further conditioned by the review of economic, social, demographic and cultural factors apt to influence migratory movements, and by the fact that some Governments have adopted deliberate policies with a view to modifying the migratory currents and hence also the eventual patterns of population distribution.

5. The present chapter is organized in five sections. Section A deals with population distribution among distinct geographic regions, the geographic, cultural and demographic factors affecting it, and their changing influence in modern times. Section B is concerned with the study of internal migration among different geographic regions, the development of data and methods for such study, and a review of the principal migratory currents that have recently been observed. Section C examines the findings on urban and rural population growth as related to recent rises in levels of urbanization and the environmental change resulting from the distribution of population among localities of diverse sizes. Section D reviews theoretical considerations and empirical findings having regard to the motivation of migration, as further conditioned by the economic organization of space, with consequent accumulation of population in localities of

varied size and function. Finally, national policies designed to influence the distributional patterns of population are discussed in section E.

### A. Distribution of world population

6. The population of the earth is distributed unevenly. According to Clarke, only about 30 per cent of the world's land area is permanently inhabited, the precise percentage depending on the minimum density accepted as a limit of substantial habitation. Over 75 per cent of the world's population live in South and East Asia, Europe and the north-eastern part of North America.<sup>1</sup>

7. A common way of describing the world pattern of population distribution is to identify (a) major areas of concentration, (b) minor areas of concentration, and (c) large relatively empty spaces.<sup>2</sup> Fawcett identified four major areas of population concentration, namely, the Far East, India, Europe, and east-central North America.<sup>3</sup> Wheeler, Kostbade and Thoman defined three main clusters: the largest included part of China, Japan, India, Pakistan, Indonesia, and several other countries; the second major cluster comprised Europe and portions of the USSR; and the third cluster consisted of the eastern part of the United States and adjoining parts of Canada.<sup>4</sup> James recognized two major areas of concentration: (a) south-eastern Asia, where roughly one half of the world's population is crowded into less than one tenth of the earth's habitable area, and (b) Europe, where nearly one fifth of the world's population occupies less than one twentieth of the habitable land area.<sup>5</sup> Minor areas of concentration have been exemplified by Java, the population clusters in south-eastern Australia, the Nile floodplain and delta, the Guinea coast of Africa, south-eastern South America, the clusters of Middle America, and those along the Pacific fringe of the United

States and Canada. In strong contrast with the areas of major and minor population concentrations are the large, relatively unoccupied areas of the world. James noted that most of the earth's surface is uninhabited, while vast areas are settled only with small and widely separated communities.<sup>6</sup> The majority of these relatively unpopulated regions is found in the dry lands, the cold lands, in extensive areas of hot and humid lands with intensively leached zonal soils, and in scattered areas of stony and difficult terrain.<sup>7</sup>

8. Within the major and minor areas of concentration and within the sparsely settled regions, there are local agglomerations in metropolitan centres, cities, towns and villages, and rural districts of relatively dense population as well as localities which are sparsely settled or totally uninhabited. The world-wide picture of population distribution is thus exceedingly complex. While characterized by a considerable degree of stability, it is constantly changing in its details and over a period of time changes of considerable importance take place.<sup>8</sup>

9. A commonly used index of the relationship between population and the area in which it lives is the population density ratio, obtained by dividing the population by the area of the territory.<sup>9</sup> Such crude density ratios have the disadvantage of taking no account of variations in the quality of land, arising from differences in climate, topography, mineral wealth, fertility of the soil, and the like; nor do they take any account of differences in urbanization and industrialization.<sup>10</sup>

10. Table VI.1 shows the uneven distribution of world population by regions in 1970. While the average world density was 27 persons per square kilometre, the range among the twenty-three regions shown in the table is from a low of 2 in Australia and New Zealand to 280 in Japan. Densities well below the world average are shown for Africa, northern America and Latin America, while relatively high densities occur in Asia and Europe. The average densities shown for major regions often conceal rather wide variations within the region. Thus, while Latin America as a whole has a low population density,

<sup>1</sup> Clarke, *Population Geography and the Developing Countries* (1971), p. 31. Pearl estimated that nearly one half of the world's population was contained within 5 per cent of the total land area, and that, in contrast, 57 per cent of the earth's land area contained less than 5 per cent of the world's population. Pearl, *The Natural History* ... (1939), pp. 266-277. The results obtained, of course, vary with the size of the land units in terms of which the comparison is made, i.e., whether entire countries, provinces, districts etc. See Duncan, "The measurement of population distribution" (1957), pp. 27-28. For other discussions of population distribution and its changes over time see, for example, Jones and Darkenwald, *Economic Geography* (1954), chap. 2; Thomlinson, *Population Dynamics* ... (1965), chap. 21; George, *Géographie de la population* (1967), chap. 1; McGaugh, *A Geography of Population and Settlement* (1970), chap. 2; Trewartha, Robinson and Hammond, *Elements of Geography* (1967), pp. 528-529.

<sup>2</sup> Trewartha, Robinson and Hammond, *Elements of Geography* (1967), pp. 532-533; Rudolphi, "Die Verteilung der Menschen ..." (1935), pp. 337-338; Baker, "Population, food supply ..." (1928), p. 353; George, *Introduction à l'étude* ... (1951), pp. 21-32; Fawcett, "The changing distribution ..." (1937); Vidal de la Blache, *Principes de géographie* ... (1922), pp. 19-32; Franke, "Die Bevölkerung der Erde ..." (1949-1950), pp. 233-237; Jones and Darkenwald, *Economic Geography* (1954), pp. 8-14; Trewartha, *A Geography of Population* ... (1969), pp. 80-90.

<sup>3</sup> Fawcett, "The numbers and distribution ..." (1947); also Trewartha, Robinson and Hammond, *Elements of Geography* (1967), p. 532.

<sup>4</sup> Wheeler, Kostbade and Thoman, *Regional Geography of the World* ... (1961), p. 14.

<sup>5</sup> James, *A Geography of Man* (1949), p. 5.

<sup>6</sup> *Ibid.*

<sup>7</sup> Wenschow, *Atlas für Höhere* ... (1950), pp. 48-58. According to Wheeler, Kostbade and Thoman, *Regional Geography of the World* ... (1961), pp. 14-15, the empty and sparsely populated areas, covering three fourths of the earth's surface, may be grouped into four categories: (1) arctic and subarctic; (2) deserts and dry grassland; (3) rugged highland; and (4) areas of tropical rain forest and tropical grassland. Of these "negative areas", the tropical forests and grasslands are said to offer the best opportunities for future population settlement. For another discussion of the nearly uninhabited regions see Jones and Darkenwald, *Economic Geography* (1954), p. 9.

<sup>8</sup> Clarke has pointed out that the earlier geographers often considered patterns of population distribution as static phenomena, but while population distributions always show some inertia, "such is the dynamism of populations that demographic processes in progress at the moment are likely to modify substantially present distributions". Clarke, *Population Geography and the Developing Countries* (1971), p. 1.

<sup>9</sup> United Nations, *Multilingual Demographic Dictionary* ... (1958), p. 18.

<sup>10</sup> United Nations, *Preliminary Report on the World Social Situation* (1952), p. 5. See also Demangeon, "La question du surpeuplement" (1952), p. 41.

TABLE VI.1. POPULATION, AREA AND DENSITY FOR THE WORLD,  
MAJOR AREAS AND REGIONS, 1970

<i>Major areas and regions</i>	<i>Estimated mid-year population (millions)</i>	<i>Area (km<sup>2</sup>) (thousands)</i>	<i>Density (population per square kilometre)</i>
World total .....	3,632	135,781	27
Developing regions .....	2,542	74,468	34
More developed regions .....	1,090	61,312	18
Africa .....	344	30,319	11
Western Africa .....	101	6,142	16
Eastern Africa .....	98	6,338	15
Middle Africa .....	36	6,613	5
Northern Africa .....	87	8,525	10
Southern Africa .....	23	2,701	8
Asia (excluding the USSR) .....	2,056	27,532	75
East Asia .....	930	11,757	79
Mainland region .....	765	11,129	69
Japan .....	103	370	280
Other East Asia .....	61	258	237
South Asia .....	1,126	15,775	71
Middle South Asia .....	762	6,771	113
South-East Asia .....	287	4,498	64
South-West Asia .....	77	4,506	17
Europe (excluding the USSR) .....	462	4,936	94
Western Europe .....	149	995	149
Southern Europe .....	128	1,315	98
Eastern Europe .....	104	990	105
Northern Europe .....	81	1,636	49
Latin America .....	283	20,566	14
Tropical South America .....	151	13,700	11
Middle America (mainland) .....	67	2,496	27
Temperate South America .....	39	4,134	10
Caribbean .....	26	236	109
Northern America .....	228	21,515	11
Oceania .....	19.4	8,511	2
Australia and New Zealand .....	15.4	7,955	2
Melanesia .....	2.8	525	5
Polynesia and Micronesia .....	1.2	30	41
USSR .....	243	22,402	11

SOURCE: Compiled from United Nations, *Demographic Yearbook*, 1970 ... (1971), table 1, p. 105.

Note: Because of rounding, totals are not in all cases the exact sum of the parts. Population totals for the world, developing and more developed regions have been adjusted to take into account discrepancies between regional assumptions of immigration and emigration.

the Caribbean area has a high density. Northern Europe has an average density of 49, but Finland has only 14 and Norway only 12. In western Europe, Belgium and the Netherlands, with average densities of more than 300, greatly exceed the regional average.

11. Average population density ratios for countries likewise reveal nothing of the variations which may exist in different parts of the country. Average density in the United Arab Republic is not very high, but the great majority of the population is settled in the Nile Valley. In fact, the density ratio in the settled parts of the country is over 500 persons per square kilometre. The island of Java in Indonesia supports a large population in relation to its land area, mainly by continuous crop cultivation, while most other islands of the archipelago have low

population densities.<sup>11</sup> Within highly industrialized countries, also, there are often great regional variations in the density of settlement. The high urban concentration along the eastern seaboard of the United States extending from Boston to Washington D.C., for example, results in a density index many times the national average.<sup>12</sup>

12. While high population densities are found both in industrialized and developing countries, in the former they generally result from urban concentration, while in

<sup>11</sup> United Nations, *Preliminary Report on the World Social Situation* (1952), p. 5; Jones and Darkenwald, *Economic Geography* (1954), p. 10.

<sup>12</sup> On density within the United States see, for example, Bogue, *The Population of the United States* (1959), pp. 58-62; Smith and Zopf, *Demography: Principles and Methods* (1970), pp. 56-65.

the latter they more often reflect the pressure of rural population on the land. Low average densities are also found both in industrialized and developing countries, and are generally associated with a low percentage of total land area that is cultivated.<sup>13</sup> A more useful index of the relationship of population to land in rural areas is obtained by considering only that part of the land which is actually cultivated.<sup>14</sup> Many of the developing countries of generally low population density have a concentration of rural population on cultivated land that is as great as the rural concentration found in the most densely populated industrialized countries. For example, around 1950, ratios of rural population per square kilometre of cultivated land were 140 in Brazil, 164 in Mexico and 189 in Honduras.<sup>15</sup>

13. The factors which determine the pattern of population distribution and its changes are as complex and varied as the patterns themselves. In studies on this subject, three main classes of factors, excluding accident and inertia,<sup>16</sup> have been emphasized: (a) geographical factors, including climate, landforms, soils, other physical resources and space relationships; (b) economic and social factors, including the attitudes and aims of the people, their economic activities and techniques, and their form of social organization; and (c) demographic factors, including the differing birth and death rates of the various areas and the currents of migration.<sup>17</sup> Findings as to each of these classes of factors are summarized in the relevant sections below. It is generally recognized that these factors interact in a highly complex way and that their influence upon the distribution of population is brought to bear through a slow process of adaptation.<sup>18</sup>

## 1. GEOGRAPHICAL FACTORS

14. There is general agreement that physical conditions such as the nature and degree of fertility of the soil, the contour of the surface, climatic conditions, and spatial relations affect the world pattern of population distribu-

tion.<sup>19</sup> However, there is wide difference of opinion regarding the way in which the physical elements operate in shaping the distribution of population.

15. Such authors as Huntington and Taylor tended to view the physical elements, particularly climate, as direct, controlling determinants.<sup>20</sup> Most modern geographers hold that the influence of physical factors is modified in varying degrees by the forms of socio-economic and political organization. The physical influence is believed to vary in importance; the pattern of population distribution is viewed as a product of the interplay of both geographic and socio-economic and cultural phenomena.<sup>21</sup> The processes through which these factors act upon the distribution of human populations resemble in some respects the ecological principles that govern the spatial distribution of plant and animal life; but man to a greater extent than other species exercises control over his habitat. Within limits, man determines his pattern of population distribution.<sup>22</sup>

16. The complexity and interactions of the physical influences, together with the great gaps in present knowledge, render it difficult to assess the effects of each of the elements individually upon population distribution,<sup>23</sup> yet certain generalizations which have been essayed are worth attention.

### (a) The influence of climate

17. Many writers have believed that climate is the most important factor underlying the marked contrasts in the

<sup>13</sup> McGaugh, for example, noted that climate in combination with vegetation and soils, forms a set of geographical elements which influence human settlement. McGaugh, *A Geography of Population and Settlement* (1970), p. 3.

<sup>20</sup> Huntington, *Civilization and Climate* (1924), particularly chap. 18; Taylor, *Environment and Race* . . . (1927). Huntington believed that temperature greatly influenced the mental activity and physical vigour of a population. See his *Mainsprings of Civilization* (1945), particularly chaps. 14 and 18; Brooks cites Peake's conclusion that climatic change was responsible for the migrations which laid the foundation of the present population distribution in Europe and western Asia. Brooks, *Climate Through the Ages* . . . (1949), p. 12. In contrast with the views of the geographic determinists, a study group of scientists, formed in the United States in the 1950s to examine evidence concerning the effect of tropical climates on development, concluded that while tropicity could not be considered the exclusive crucial factor in underdevelopment, there are nevertheless special difficulties affecting human habitation in tropical environments. This group urged further research to determine what tropical conditions may impose "a prohibitively heavy burden upon successful human habitation". Lee, *Climate and Economic Development* . . . (1957), pp. 173-174. See also Myrdal, *Asian Drama* . . . vol. 1 (1968), pp. 677-681.

<sup>21</sup> Blumenstock and Thornthwaite, "Climate and the world pattern" (1941); Beaujeu-Garnier, *Trois milliards d'hommes* . . . (1965), p. 42. Lösch noted that climate, soil and man had co-operated to produce the concentration of population in the north-eastern part of the United States. Lösch, *The Economics of Location* (1954).

<sup>22</sup> Allee et al., *Principles of Animal Ecology* (1949); Hawley, *Human Ecology* . . . (1950), particularly chap. 6; Zipf, *Human Behavior* . . . (1949), particularly chap. 9; Stewart, "Empirical mathematical rules concerning . . ." (1947); and his "Demographic gravitation . . ." (1948); Frank, "Ecology and demography" (1959), pp. 672-673; Duncan, "Human ecology and population studies" (1959).

<sup>23</sup> George in "Géographie de la population . . ." (1950), pointed out the need for many more correlative studies in this field.

<sup>13</sup> United Nations, *Preliminary Report on the World Social Situation* (1952), pp. 5-6. A low percentage of cultivated land may be due to poor quality of uncultivated lands, to the presence of deserts, mountains, jungles etc.; to land uses other than cultivation, to primitive agricultural methods, to land-ownership systems which keep land out of production, or simply to sparse population. *Ibid.*, p. 6. Andrus cites as one factor contributing to Burma's low density, the low proportion of the country's area consisting of flat, well-watered or easily irrigated land. Andrus, *Burmese Economic Life* (1947), pp. 24-25.

<sup>14</sup> For more detailed discussion of the relationship of agricultural population to cultivated land, see chapter XII.

<sup>15</sup> United Nations, *Preliminary Report on the World Social Situation* (1952), p. 6.

<sup>16</sup> On the roles of accident and inertia see Dechesne, *La localisation* . . . (1945), chap. 8; Toschi, "Localizzazione . . ." (1946).

<sup>17</sup> Jones and Darkenwald identified three types of factors affecting the distribution of population: (a) climate, location and relief of the land's surface; (b) the distribution of natural resources such as minerals, water, soils, native plants and animals; and (c) man's technological achievements. Jones and Darkenwald, *Economic Geography* (1954), pp. 8-9.

<sup>18</sup> See, for example, Trewartha, Robinson and Hammond, *Elements of Geography* (1967), pp. 528-529.

density of population in different parts of the world. The major clusters of population in south and east Asia, in Europe and in east central North America are located mainly in subtropical and middle-latitude climates. The subarctic and polar climates of high latitudes are very thinly populated, as are the arid and semi-arid climates and most tropical climates.<sup>24</sup> The effects of climate on habitability are both direct and indirect. Blumenstock and Thornthwaite have pointed out that the patterns of climate, of vegetation, and of soils in various parts of the world coincide to a remarkable degree because climate is the fundamental force shaping the other two. Though man may vary his pattern of culture to a certain extent, he cannot go beyond the limits set by climate.<sup>25</sup>

#### (i) Atmospheric temperature

18. The cold regions are, as a group, the regions of lowest population density in the world. The high latitudes of the northern hemisphere contain about 10 per cent of the surface of the continents but have only a few thousandths of the world's population.<sup>26</sup> On the other hand, the greatest areas of population concentration are located in the outer low latitudes (0°-30°) and in the middle latitudes (30°-60°).<sup>27</sup> Scientific investigations have indicated that no area of the world is too cold to prevent human life.<sup>28</sup> The cold temperatures of arctic and subarctic lands, however, make unattractive areas for settlement. It has been pointed out that polar cold temperature may increase susceptibility to respiratory disease.<sup>29</sup> Other specific climatic features of these areas, such as the long winter nights, the low intensity of solar radiation, even in summer with nearly continuous

sunshine, and, possibly, magnetic phenomena may also have undesirable influences on man. More important, the productive capacity of the cold regions is greatly reduced by the shortness of the growing season. Baker estimated that 6.4 million square miles of the earth's surface were too cold for cropping.<sup>30</sup>

19. As in the case of low temperatures, the indirect, rather than the direct effects of high temperatures appear to be more significant in shaping population distribution and density. With regard to direct influences, Winslow and Herrington stated with certainty that extremes of heat and cold are harmful and that susceptibility to intestinal diseases is increased by moderately hot climate.<sup>31</sup> Sulzberger and his colleagues indicated that prickly heat may be caused by high temperatures alone.<sup>32</sup> Lee noted that there appeared to be no permanent deleterious effects of tropical climates on healthy persons, although the prevalence of infectious diseases in those climates affected the efficiency of work performance.<sup>33</sup> Little is known regarding the effects of radiation in low latitudes. The fact, however, that large populations have resided for centuries in areas of maximum and highest average temperatures indicates that high temperature alone does not prevent human habitation.<sup>34</sup>

20. When high temperatures are combined with high humidity, however, a considerable body of evidence indicates that the effects on human life and activity may be deleterious.<sup>35</sup> The failure of large numbers of Europeans to move into areas that are hot and humid has been particularly noted, and the suitability of these climates for settlement by people of European origin remains a controversial question.<sup>36</sup>

21. There is less division of opinion concerning the indirect influences of high temperatures. On the one hand, high temperatures are favourable to high density of population in that they (a) promote rapid growth of vegetation, (b) permit the practice of multiple cropping, (c) allow the production of a greater range of crops than is possible in cooler areas, and (d) reduce requirements for clothing and shelter. On the other hand, high temperatures presumably stimulate the rapid propagation of insects,

<sup>24</sup> Thoman, *The Geography of Economic Activity* (1962), p. 95. McGaugh identified four types of climates that favoured high population density. See his *A Geography of Population and Settlement* (1970), pp. 37-38. For other classifications of climates see, for example, Thornthwaite, "An approach toward a rational classification . . ." (1948); Lee, *Climate and Economic Development . . .* (1957), pp. 14-20; Trewartha, *An Introduction to Climate* (1968); Stamp, *Our Developing World* (1960), chap. 3. The latter author noted (pp. 62-63) that while European and American geographers have adopted the criterion of climate for classifying different regions of the world, Russian geographers use the criterion of soil.

<sup>25</sup> Blumenstock and Thornthwaite, "Climate and the world pattern" (1941), p. 98. Pearson noted that the limitations set by climate chiefly account for the fact that half the earth's land area is inhabited by less than one person per square mile. Pearson, *The Growth and Distribution . . .* (1935), p. 25. See also Semple, *Influences of Geographic Environment* (1911), p. 610; Markham, *Climate and the Energy of Nations* (1947), p. 38; Rudolphi, "Die Verteilung der Menschen . . ." (1935), p. 337; Jones and Darkenwald, *Economic Geography* (1954), chap. 2; and McGaugh, *A Geography of Population and Settlement* (1970), pp. 37-49. For a description of the various climatic regions of Africa see Mountjoy and Embleton, *Africa—A New Geographical Survey* (1967), pp. 50-69; on west Africa, see Church, *West Africa . . .* (1966), chap. 3.

<sup>26</sup> Shaw points out that "few people live on at least 12,000,000 square miles of the earth's surface largely because of the influence of low temperatures". Shaw, *World Economic Geography* (1955), p. 536.

<sup>27</sup> McGaugh, *A Geography of Population and Settlement* (1970), pp. 31-34, 47-48.

<sup>28</sup> Stefansson, "The colonization of northern lands" (1941), p. 207. See also his *The Friendly Arctic . . .* (1943), p. 703; and George, *Introduction à l'étude . . .* (1951), p. 41.

<sup>29</sup> Winslow and Herrington, *Temperature and Human Life* (1949), pp. 254-255.

<sup>30</sup> Baker, "Population, food supply . . ." (1928).

<sup>31</sup> Winslow and Herrington, *Temperature and Human Life* (1949), pp. 254-255.

<sup>32</sup> Sulzberger, Emik and Zimmerman, "Studies on prickly heat" (1946), pp. 53-68.

<sup>33</sup> Lee, *Climate and Economic Development . . .* (1957), p. 99.

<sup>34</sup> Shaw points out that the climate along the Amazon River has been an important factor which limited settlement, but that the climate conditions there are no worse than those in some more densely populated sections of the Congo basin, where settlement is being stimulated by the discovery and exploitation of uranium, copper and other mineral deposits. Shaw, *World Economic Geography* (1955), pp. 539, 544.

<sup>35</sup> Mills, "Climate as a factor in the health . . ." (1932), pp. 573-592; and his "Climatic effects on growth . . ." (1942), p. 12; Dill, *Life, Heat and Altitude . . .* (1938), chap. 4; Trewartha, Robinson and Hammond, *Elements of Geography* (1967), p. 532.

<sup>36</sup> Price, *White Settlers in the Tropics* (1939), pp. 232-238; Gillman, "White colonization . . ." (1942), p. 590; Stone, "Health in tropical climates" (1941), p. 247; Derruau, *Précis de géographie humaine* (1961), pp. 44-45.



fungi and bacteria and, thus, tend to reduce the habitability of such areas. The lack of a seasonal check on the growth of these organisms has been posited as a prime factor in the incidence of disease in the tropics.<sup>37</sup> Diseases of plants and animals, particularly those spread by the tsetse fly, have discouraged settlement in large parts of Africa by rendering areas unsuitable for grazing.<sup>38</sup>

22. A number of writers have attempted to determine the optimum temperature range for human activity.<sup>39</sup> Little evidence exists to support the thesis that temperature alone has a primary influence on the distribution of agricultural population in the low and middle latitudes, though temperature may conceivably have been of greater significance in earlier times. Hence the concept of an optimum temperature may at one time have been more meaningful than it is now.<sup>40</sup> Whether the variable temperatures of the middle latitudes, sometimes considered as optimal, have been important in stimulating industrial development and hence in permitting large aggregations of population, is debatable. Little doubt exists, however, that technological developments have tended to increase the range of temperature régimes under which man can operate effectively.

## (ii) Precipitation

23. Low rainfall sharply limits the habitability of large areas of the earth's land surface; moreover, the rainfall is often not evenly distributed over the year. Baker has estimated that 15 million square miles of the earth's surface are too arid for crops, and James has noted that desert lands which constitute about 18 per cent of the total land area of the world have only about 4 per cent of the world's population.<sup>41</sup> Low precipitation limits the water supply in general and soil moisture in particular and thus imposes a low limit on animal population. Such conditions are not conducive to the development of agriculture. Consequently the primary requisites for development beyond sparse human occupancy are lacking, since without agriculture, the needs for primary service centres and for commerce and industry are negligible.<sup>42</sup>

<sup>37</sup> May, "Map of the world distribution of cholera" (1951); and his "Map of the world distribution of malaria vectors" (1951); Simmons *et al.*, *Global Epidemiology* . . . , vol. 1 (1944), particularly pp. 471-484.

<sup>38</sup> Nash, *Tsetse Flies* . . . (1948), pp. 1-78; Buxton, *Trypanosomiasis in Eastern Africa, 1947* (1948), pp. 1-44; Hance, *The Geography of Modern Africa* (1964), p. 15; Clarke, *Population Geography and the Developing Countries* (1971), p. 103. Shaw considers the implications of the elimination of the tsetse fly for future human settlement in large areas of Africa previously unpopulated or only sparsely populated. Shaw, *World Economic Geography* (1955), p. 553.

<sup>39</sup> For example, Huntington, *Civilization and Climate* (1924), chap. 10; Markham, *Climate and the Energy of Nations* (1947), p. 29; Derruau, *Précis de géographie humaine* (1961), p. 44.

<sup>40</sup> Markham, *Climate and the Energy of Nations* (1947), pp. 40, 76.

<sup>41</sup> Baker, "Population, food supply . . ." (1928), p. 355; James, *A Geography of Man* (1949), p. 39. Worthington has noted that water is scanty in at least three quarters of sub-Saharan Africa. Worthington, *Science in the Development of Africa* . . . (1958), p. 114.

<sup>42</sup> Semple, *Influences of Geographic Environment* (1911), pp. 483 and 504; Broek, "Climate and future settlement" (1941), pp. 232-233.

Complete absence of population is typical of large expanses of the interiors of deserts. Referring to the Sahara, Gautier noted these interior expanses are without any water resources whatever and are "great voids" from a population point of view.<sup>43</sup> Hance observed certain anomalies, however, since the Sahara and Namib deserts and the steppes of East Africa and the Kalahari were very lightly populated, while other areas with long dry seasons have unexpectedly high densities, e.g. parts of northern Nigeria, the Mossi country of Upper Volta, Senegal and Gambia.<sup>44</sup>

24. Population centres may emerge in regions of low precipitation where water is available. However, low precipitation limits the accumulation and availability of subterranean water supplies and only relatively small oases can be supported by water from subterranean sources. The largest oases, exemplified by the lower Nile and Indus, are located along river valleys with tributary headwaters in humid lands. Oases dependent upon "imported" waters permit bands of very densely peopled land which stand in sharp contrast to the great empty areas which surround them. However, James has pointed out that man, with all his efforts to provide water, has succeeded in making only an almost negligible proportion of the desert permanently habitable.<sup>45</sup> The development of agriculture as well as mining and transportation is hindered by scanty water supply, and hence the settlements of people engaged in these activities in arid lands remain small.<sup>46</sup>

25. Moderate precipitation, highly variable in amount from year to year, is typical of extensive subhumid lands. The variability of the rainfall in such areas makes agriculture risky, and the total low annual rainfall limits agricultural output. James has called these lands "distinctly marginal" areas of settlement.<sup>47</sup>

26. In a few areas, excessive rainfall may discourage human settlement, since high precipitation contributes to the excessive leaching of the soil, to erosion, and to unmanageable forest growth.<sup>48</sup> However, high precipitation is not generally regarded as a direct cause of low population density.

<sup>43</sup> Gautier, *Le Sahara* (1923), pp. 89-95. Discussing the Sahara, Church *et al.* noted: "No part of the desert is completely rainless; indeed, some of the higher ranges in the interior get sufficient rain to support considerable vegetation, and might be termed 'altitudinal oases'." See their *Africa and the Islands* (1967), p. 37. See also Mountjoy and Embleton, *Africa—A New Geographical Survey* (1967), p. 62.

<sup>44</sup> Hance, *The Geography of Modern Africa* (1964), p. 52. He also noted the variations in settlement of rainy tropical areas, parts of the West African belt being densely populated, while low densities were found in the rain forest belt of Cameroon, Gabon, and the two Congos.

<sup>45</sup> James, *A Geography of Man* (1949), p. 25. For an opposite, optimistic view of the possibilities of reclaiming and transforming the Sahara for human habitation see Baker, *Sahara Conquest* (1966), p. 180.

<sup>46</sup> Kitson, "Kuwait's distillation plan . . ." (1951), p. 22.

<sup>47</sup> James, *A Geography of Man* (1949), pp. 267-270, 310-314.

<sup>48</sup> Broek, "Climate and future settlement" (1941), pp. 228-232; Beaujeu-Garnier, *Trois milliards d'hommes* . . . (1965), pp. 51-52.

(b) *The influence of landforms*

27. The regions of difficult terrain, like the cold lands and the dry lands, are conspicuous for their low density of population. Generally, this population is likely to be concentrated in small clusters in areas where the landform is hospitable. Even in such a densely populated, mountainous country as Japan the vast bulk of the population is concentrated on the limited peripheral lowlands.<sup>49</sup> The chief deterrents to the peopling of areas of rugged terrain are: (a) the very limited extent of arable land; (b) the difficulty of maintaining existing arable land; (c) the relatively high cost of constructing, maintaining, and operating agricultural equipment and means of transportation; (d) the isolation that is likely to exist; and (e) the adverse effects of altitude on human activities.<sup>50</sup> High mountains, which generally tend to limit population settlement, are estimated to occupy more than one million square miles of the earth's land surface. Not all mountains, however, are sparsely populated. The highland basin of Bolivia, with an average altitude of more than 10,000 feet, has more population than the eastern lowlands. Similarly, the highland basins in Ecuador and Peru are among the more densely populated parts of those countries. Mountains in high latitudes are known to be unfavourable to settlement, not only because of the terrain, but also owing to the cold temperatures. The Scandinavian mountains, or those of north-east Siberia, are instances of sparsely populated high-latitude mountains.<sup>51</sup>

28. With regard to altitude, George estimated that nine tenths of the people of the world live in areas with an elevation of less than 400 metres.<sup>52</sup> Low-lying plains appear to be the most favourable locations for population settlement. The plains areas of the North American and European middle latitudes, for example, are among the more densely populated areas. Some of the plains of the low latitudes also display high population concentration. The Ganges Valley of India is one of the most densely populated plains areas of the world. Some plateaux (that is, plains at higher altitudes) also tend to encourage population concentration because of their relatively low temperatures.<sup>53</sup> In a study of several countries, Semple found that, except in certain tropical and mining regions, the food supply and the density of population decreased with the increase in altitude above a certain level.<sup>54</sup> Very little is known regarding the physiological effects of decreased diffusion and hence of increased intensity of solar radiation at high altitudes, of decreased air pressure, of increased reception of cosmic rays, or of the wide daily range of temperature, characteristic particularly

of tropical highlands.<sup>55</sup> The comparative advantages of plains areas have resulted in a prolonged and continuous out-migration from the highlands in the more advanced regions of the world, a trend which is apparent even in countries with a high population density.<sup>56</sup>

29. Although the most striking evidence of the influence of landforms is to be observed upon the world pattern of population distribution between mountain-lands and plains, landforms are also likely to play a significant role in the distribution of population on a local scale.<sup>57</sup>

(c) *The influence of soils*

30. The attractiveness of a region to settlers may depend partly upon the quality of the soil.<sup>58</sup> The importance of this factor is difficult to assess because differences in the soils of various regions are closely related to differences in climate, vegetation, and landforms.<sup>59</sup> Nevertheless, in localities of nearly uniform climate, landforms and accessibility, variations in the texture and other characteristics of the soil correspond to great local variations in land use and population density. Also, when the earth is considered as a whole, certain broad regions or zones of contrasting soil qualities become evident,<sup>60</sup> and these are related to both the opportunities for settlement and the existing pattern of population distribution. Wolfanger observed that podzolic and lateritic soils—the characteristics of which generally impede intensive cultivation—unfortunately occur in broad belts across the widest dimensions of several continents. The improvement of these soils involves scientific and economic problems of the first order.<sup>61</sup>

31. Most students of soils are agreed that the mature lateritic tropical soils are not suitable for intensive, continuous cultivation of annual crops or even for tree crops and that the possibilities for settlement are limited in those areas where they occur. Such soils require fertilization soon, if not immediately, after the land is cleared, and some experts have noted that they cannot withstand continuous cropping even with the most careful attention.<sup>62</sup> Parsons concluded thus: "Shifting-field

<sup>49</sup> Gillman, "White colonization ..." (1942); Monge, "Life in the Andes ..." (1942); and his *Acclimatization in the Andes ...* (1948), particularly chaps. 3 and 4; Dill, *Life, Heat, and Altitude ...* (1938), chap. 6; Peattie, "Height limits ..." (1931).

<sup>50</sup> Fawcett, "The changing distribution ..." (1937), p. 366.

<sup>51</sup> Smith and Phillips, *North America: its People ...* (1940), pp. 247-248.

<sup>52</sup> For a discussion of various aspects of soil see, for example, Demolon, *Dynamique du sol* (1952), particularly chaps. 1, 2 and 14; Jenny, "Soil as a natural resource" (1959); and Bunting, *The Geography of Soil* (1967). On the influence of soil fertility and rainfall on population distribution in Cameroon, see Clarke, "Population distribution and dynamics in Cameroon" (1970), pp. 353-355.

<sup>53</sup> Blumenstock and Thornthwaite, "Climate and the world pattern" (1941), p. 98.

<sup>54</sup> Kellogg, "Soil and society" (1938), p. 865.

<sup>55</sup> Wolfanger, "World population centers ..." (1935), p. 7.

<sup>56</sup> Wolfanger, "Major world soil groups ..." (1929), p. 103. See also Church *et al.*, *Africa and the Islands* (1967), pp. 45-46; Mountjoy and Embleton, *Africa—A New Geographical Survey* (1967), pp. 77-88; and Dobby, *Southeast Asia* (1966), chap. 5. Gorou estimated that of the 38 million square kilometres of land

(Continued on next page)

<sup>49</sup> Coulter, "A dot map of the distribution ..." (1926).

<sup>50</sup> Semple, *Influences of Geographic Environment* (1911), chap. 15; Ritchie, "Some observations on problems ..." (1950); James, *A Geography of Man* (1949), Group VIII.

<sup>51</sup> Shaw, *World Economic Geography* (1955), pp. 544-545. See also Clarke, *Population Geography and the Developing Countries* (1971), particularly pp. 62-65, 108; Beaujeu-Garnier, *Trois milliards d'hommes ...* (1965), pp. 45-50.

<sup>52</sup> George, *Introduction à l'étude ...* (1951), p. 29.

<sup>53</sup> McGaugh, *A Geography of Population and Settlement* (1970), pp. 34-37.

<sup>54</sup> Semple, *Influences of Geographic Environment* (1911), p. 563.

agriculture (migratory agriculture) can be defended in most instances as the best, perhaps the only, means by which permanent production of annuals can be maintained on the mature lateritic soils of the tropics.”<sup>63</sup> Characteristically, this kind of agriculture, which is widely practised in tropical Africa, is accompanied by sparse population settlement.

32. Fortunately not all soils of the humid tropics are of the mature type. Some areas possess soils developed from volcanic products which are better drained and better supplied with plant nutrients. In other tropical areas soils consisting of deep layers of alluvium deposited in recent times are present with superior tilth and nutrient value. Dense populations occupying these areas of exceptional soils stand in sharp contrast to the thin and scattered populations which inhabit the areas of mature lateritic soils. Rudolphi observed that the areas of the densest settlement in south-east Asia are typically found on the unusually large floodplains, piedmont alluvial plains, and other special soil areas.<sup>64</sup> Alluvial soils are said to support a larger proportion of the world's population than any of the main categories of soil.<sup>65</sup>

33. In the higher middle latitudes the podzol soils girdle the earth and coincide approximately with a belt of coniferous forests. These soils yield annual crops only if lime and fertilizer and, especially, phosphorous are applied.<sup>66</sup> Under careful management podzol soils lend themselves to slow improvement. However, on the balance, these soils, together with the climate, have had the effect of discouraging settlement. Their importance in this connexion is suggested by the contrast between the experience of settlement in the clay belt of Canada and in the neighbouring areas of podzolic soils. In the clay belt, the texture and depth of the soil are somewhat superior to the average, and substantial clusters of population have developed here, whereas agricultural settlement in surrounding areas is almost non-existent.<sup>67</sup>

34. The soils of the world's grassland, particularly in the middle and subtropical latitudes, and those of the broadleaf forests in the middle latitudes generally favour relatively dense settlement. According to Kellogg, “the soils developed under grasses are the most productive for the ordinary crop plants under common systems of farming”.<sup>68</sup> In subhumid and semi-arid grassland regions, vast acreages of high-quality soils and favourable topography exist, but the lack of moisture limits them to a low average productivity over long periods of years. The

soils of middle-latitude areas formerly in broadleaf forests are readily adapted to a wide range of grain and forage plants and thus add to the attractiveness of these areas for human settlement.

#### (d) *The influence of energy and mineral resources*

35. The industrialization and mechanization of the world economy have increased the importance of the location of certain minerals as a factor influencing the distribution of population.<sup>69</sup> The power of a mineral deposit to attract population depends on a number of circumstances, including: (a) the importance of the mineral as a raw material or source of energy for various types of production, and the feasibility of substituting other materials or energy sources; (b) the availability of the mineral at other places, the conditions affecting the cost of its production and efficiency of its utilization at each site and the attractiveness of each site from other points of view as a place of habitation;<sup>70</sup> and (c) the cost of transporting the ore or the mineral in various stages of processing to other places where it may be converted into energy or used as industrial raw material.<sup>71</sup> Those minerals which are of fundamental importance as sources of power, or as materials for a wide range of industrial activities and which are difficult to transport and are found only in a few places under favourable conditions, will have the greatest potential to attract population.<sup>72</sup>

<sup>69</sup> Prior to the industrial revolution, the quality of soils was the chief factor influencing population distribution in Europe. See Pounds and Roome, “Population density in fifteenth century . . .” (1971). For a discussion of the effects of the industrial revolution on population distribution in Europe, see George, *Population et peuplement* (1969), pp. 87-99. Dobby discussed the effect on population distribution in south-east Asia of the discovery of deposits of tin in Malaya and nearby islands, and of petroleum in Sumatra and Borneo. See his *Southeast Asia* (1966), p. 389. In Africa, major developments in the mineral industry, particularly since 1939, have influenced the distribution of population. Mountjoy and Embleton, *Africa—A New Geographical Survey* (1967), p. 149.

<sup>70</sup> In this connexion, it is relevant to consider three classes into which all raw materials and factors of production may be divided: (a) those which, being available everywhere under the same conditions, are place-free; (b) those which, being available under the same conditions only at certain places or under various conditions at all places, are conditionally place-bound; and (c) those which, being present only at one site, are unconditionally place-bound. Except in so far as the place-boundness of raw materials and factors of production can be economically overcome by transportation or other means, the distribution of economic activities tends to be dominated by the location of the more or less place-bound factors and materials. Labour, which is one of the factors of production, is to a considerable extent place-bound; therefore, the distribution of economic activities is partly controlled by demographic factors. The classification into the three categories stated above and its importance in the analysis of the determinants of distribution of economic activities are founded on the theory of substitution of commodities and factors of production. See Isard, “The general theory of location . . .” (1949). Isard indicates that Predöhl was the first writer to systematically apply the substitution principle to location theory. See Predöhl, “Das Standortsproblem . . .” (1925).

<sup>71</sup> For a discussion of the importance of transportation for mineral exploitation in Africa, see Mountjoy and Embleton, *Africa—A New Geographical Survey* (1967), p. 150.

<sup>72</sup> Engländer, “Kritisches und Positives . . .” (1926); Isard, “The general theory of location . . .” (1949), p. 483. On the influence of minerals and energy resources on population distribution, see also Derruau, *Précis de géographie humaine* (1961), pp. 55-57.

(Footnote 62 continued)

in the rainy tropical world only about 6 million are harvested annually, whereas 10 million square kilometres of presently unused land are potentially productive. He attributed the inadequate utilization to insufficiently developed techniques. See his “Soil utilization in the tropical world” (1971), pp. 1790-1791.

<sup>63</sup> Parsons, “Potentialities of tropical soils” (1951), pp. 503-505.

<sup>64</sup> Rudolphi, “Die Verteilung der Menschen . . .” (1935), p. 334. See also Dobby, *Southeast Asia* (1966), chap. 25.

<sup>65</sup> Trewartha, Robinson and Hammond, *Elements of Geography* (1967), p. 482. The authors note that the Orient might be described as having an “alluvial civilization”. *Ibid.*, p. 533.

<sup>66</sup> Kellogg, *The Soils that Support Us . . .* (1941), p. 145.

<sup>67</sup> Currie, *Economic Geography . . .* (1945), pp. 320-323. See also Paterson, *North America . . .* (1970), pp. 21-22.

<sup>68</sup> Kellogg, *The Soils that Support Us . . .* (1941), p. 106.

36. In the case of coal, and to a lesser extent of iron ore, there is a strong attraction of industry and hence of population at the source of the material.<sup>73</sup> The unique position of coal among mineral raw materials as a magnet for industry stems from (a) the tremendous bulk of coal consumed, (b) its relatively low value per unit weight, (c) the use of coal as a reducer of metals, particularly in the iron and steel industry, and (d) the fact that coal is largely dissipated when used. The importance of the iron and steel industry, together with the high consumption of coal in a host of secondary and tertiary industries, enhances the attractiveness of coal-producing areas to industry and population.<sup>74</sup> Although certain trends indicate that coal may become somewhat less significant in the future,<sup>75</sup> the present distribution of industry in such countries as Australia, France, the Federal Republic of Germany, Poland, the Union of Soviet Socialist Republics, the United Kingdom and the United States reveals the prime importance, at present, of the availability of coal as a base for industrialization.<sup>76</sup>

37. Petroleum and natural gas have been relatively unimportant as attractors of industry.<sup>77</sup> This fact is explained chiefly by the ease of transporting them, by the nature of their uses (particularly in transportation and domestic consumption), and by the unattractive location of many of the producing fields. There has been, however, a considerable movement of plants, particularly in the petrochemical industries and those requiring large and cheap supplies of fuel, to certain producing regions such as the western Gulf area of the United States.<sup>78</sup>

38. Among the non-energy minerals, iron ore in some cases exerts an influence similar to that of coal; in other places it is, as are other non-energy minerals, a relatively weak attractor of industry. Cities and towns have grown up near the sources of these minerals but, with the possible exception of the Rand in South Africa<sup>79</sup> and of

certain iron-ore centres such as the Lorraine or Magnitogorsk, none of them is more than a centre of mining or primary industry. The explanations for the sharp contrast between coal and the other minerals include the following facts: (a) some minerals, including most of the ferroalloys, are mined and consumed in very small quantities; (b) some ores, such as copper, which are mined in large tonnages, can be concentrated close to the mine and the product, being of high value in relation to its bulk, can be shipped readily; (c) some ores have a high value per unit of weight and can be transported economically over relatively long distances; (d) some, such as the non-metallic minerals, are so widely distributed that, even though used in bulk, they exercise only a minor influence upon the location of industry or population; (e) some mineral deposits are exhausted at a relatively rapid rate; and (f) in some cases, the mineral occurs in economically and physically unattractive surroundings so that only a mining and primary processing population is attracted.<sup>80</sup>

39. Sources of energy other than minerals, notably water-power sites, also attract population. The importance of water-power sites, however, is much less than that of the basic minerals, for water power is a relatively minor source of energy.<sup>81</sup> Even if the total potential water power in industrialized nations were fully developed, it could not assume prime importance as an attractor of industry. The possibility of transmitting electricity over great distances reduces its significance in this connexion.<sup>82</sup> Nevertheless, the availability of water power on the Alpine slopes has been cited as a partial explanation of the presence of some 4 million industrial workers in northern Italy and another million in Switzerland. These concentrations are considerable, though much less important than the immense industrial population of the coal producing belt which stretches across Europe from the British Isles to Silesia.<sup>83</sup>

40. It has been pointed out that past experience gives no sure basis for predictions regarding the influence which a mineral deposit or non-mineral source of energy may bring to bear upon the distribution of population. The presence of iron ore in Europe, especially in France, has had a "demographic value", but in the United States and the USSR, similar deposits have attracted no similar concentrations of population. The utilization of pitchblende has not thus far created population centres, but may do so in the future.<sup>84</sup>

<sup>73</sup> See, for example, Ackerman, "Population and natural resources" (1959), p. 623; Lösch, *The Economics of Location* (1954), pp. 83, 90; Trewartha, Robinson and Hammond, *Elements of Geography* (1967), p. 537.

<sup>74</sup> See, for example, the discussion in Isard, *Location and Space Economy* . . . (1956), pp. 7-8.

<sup>75</sup> United Nations, *World Iron Ore Resources* . . . (1950), chap. 5; Chardonnet, *Géographie industrielle* . . . , vol. 1 (1962), p. 185 ff.; Schurr et al., *Energy in the American Economy* . . . (1960), pp. 74-85. Schumacher, however, believed that coal was likely to come into greater prominence in the last decades of the present century. See his "Population in relation to the development of energy from coal" (1955), pp. 153, 158. Thoman also noted that in coming decades coal might regain some of its former prominence. Thoman, *The Geography of Economic Activity* (1962), p. 215. Zhavoronkov considered that since coal and petroleum are already close to exhaustion in a number of countries the primary source of power in the future must be atomic energy. See his "Chemistry and the vital resources . . ." (1967), p. 352.

<sup>76</sup> Chardonnet, *Le charbon* . . . (1948), pp. 21-57; George, *Géographie de l'énergie* (1950), pp. 123-131. On the importance of coal see also Lisichkin, "Population growth and power resources" (1967), p. 33.

<sup>77</sup> See Pratt and Good, eds., *World Geography* . . . (1950), pp. 27-42; Fanning, *Our Oil Resources* (1950), pp. 1-6. See also Thom, "Population in relation to the development . . ." (1955), p. 168.

<sup>78</sup> Foscué, "Industrialization of the Texas . . ." (1950), p. 7; Rice, "Economic developments in the south-west . . ." (1951).

<sup>79</sup> Scott, "The Witwatersrand . . ." (1951), pp. 561-563

<sup>80</sup> See, for example, Rudolph, "Chuquicamata twenty years later" (1951); Zierer, "Broken Hill . . ." (1940), pp. 103-108.

<sup>81</sup> Hubbert has noted that it is only within the last half century that water power has attained significance as a supplier of industrial power. Hubbert, "Mineral resources and rates of consumption" (1967), p. 319.

<sup>82</sup> Aubert observed, however, that the transport of electricity over long distances is costly and that new sources of hydroelectric power in sparsely populated regions can be exploited only if industries consuming power are established in the vicinity. Aubert, "L'utilisation de l'énergie hydro-électrique . . ." (1955), p. 10. See also Guyol, "Population and energy resources" (1955), p. 41.

<sup>83</sup> George, *Introduction à l'étude* . . . (1951), p. 136.

<sup>84</sup> George states that historical developments are the decisive causes of the location of population in one area rather than another. These developments stimulate the growth of systems which determine the functional relations between men and their natural environment in a still broader sense. *Ibid.* (1951), pp. 64-66.

(e) *The influence of space relationships*

41. The power of an area to attract and support population may depend also on its location in relation to other areas and to the routes of transportation between areas.<sup>85</sup> It is partly for this reason that the major areas of population concentration are commonly found on the peripheries of the continents. George noted that two thirds of the inhabitants of the temperate zones live less than 500 kilometres from the sea and almost one half of the remainder live less than 1,000 kilometres inland.<sup>86</sup> This fact has been attributed largely to the hostile conditions of the interior of continents, including deserts, steppes, high mountains and dense rain forests.<sup>87</sup> It is evident, however, that the advantages of location of the coastal areas and their immediate hinterlands at the junction of the land and ocean highways increase as world trade expands.<sup>88</sup>

42. In a locality where certain raw materials or factors of production are absent, the distance over which they must be transported if they are to be used there plays an important part in determining the volume and types of economic activities carried on. Likewise, the distance over which the finished products must be transported to markets has a great effect on costs.<sup>89</sup>

43. The importance of space relationships is especially evident in the location of certain types of economic activity at points which are strategic from the standpoint of transportation.<sup>90</sup> The beginnings of what are today areas of dense commercial and industrial population may

have been largely accidental, but their growth and ascendancy over other centres in contiguous areas have been due largely to their favourable geographic positions. For example, metropolitan New York not only has a favourable site as the leading gateway into and out of the North American continent, but is situated as favourably as any centre in its general area for linkage with the trunk-line ocean highway of the North Atlantic. Its location at the outlet of the Hudson-Mohawk corridor gave it a highly preferred position for tapping the rich hinterland during the era of inland waterways. On the strength of this factor, developing overland routes, especially railroads, sought it out as the most desired terminus.<sup>91</sup>

(f) *The composite nature of geographic factors*

44. An infinite number of combinations of physical features is found on the surface of the earth, and the significance to human activity of each factor within each combination is changing at a different rate. Some areas appear to have one dominant characteristic restricting their population growth, such as the cold temperatures of the ice-cap area. On the other hand, there are also areas possessing one single physical factor favourable to population growth, such as mineral wealth in a desert or subpolar area. There are, in addition, other areas where almost all factors appear to be favourable to the support of a high density of population. For example, the alluvial areas of south-east Asia have excellent soils, landforms and climatic conditions; the great plain of western Europe has a striking combination of excellent soils, climate, landforms, mineral resources and spatial position.

2. SOCIAL AND ECONOMIC FACTORS

45. According to the view of most geographers, the distribution of population over the globe is not determined strictly by physical factors; the influence of these factors depends on the ways of life of the people.<sup>92</sup> In James's words, "The significance to man of the physical features of the land is determined by culture ...; and therefore any change in the attitudes, objectives, or technical abilities of a people inhabiting an area requires a re-evaluation of the significance of the land".<sup>93</sup> It is generally agreed that the more complex a society becomes the less directly physical factors influence the distribution of its population. The importance of these factors in modern times is less than it formerly was.<sup>94</sup> Cases in which

standing urban sites are the great seaports which serve as contact points between large networks of inland transport and oceanic navigation". See Usher, "The steam and steel complex ..." (1949), p. 61; also Dean, *The Theory of the Geographic Location* ... (1938), chap. 5.

<sup>85</sup> Smith and Phillips, *North America: its People* ... (1940), pp. 139-154; see also Smith, Phillips and Smith, *Industrial and Commercial Geography* (1955), pp. 568-569.

<sup>86</sup> Derruau, *Précis de géographie humaine* (1961), p. 57.

<sup>87</sup> James, *A Geography of Man* (1949), p. vii.

<sup>88</sup> Pearson, *The Growth and Distribution* ... (1935), p. 13. Clarke pointed out that "Rapid urbanization is ... indicative of the diminishing influence of the physical environment upon the pattern of population distribution". Clarke, *Population Geography and the Developing Countries* (1971), p. 3.

<sup>85</sup> For accounts of the theory of spatial distribution and the contribution made by various writers, see particularly Lösch, *The Economics of Location* (1954); Isard, *Location and Space Economy* ... (1956); and his *Methods of Regional Analysis* ... (1960). See also Ponsard, *Economie et espace* ... (1955); Haggett, *Locational Analysis* ... (1966), part 1; Meyer-Lindemann, *Typologie der Theorien* ... (1951).

<sup>86</sup> George, *Introduction à l'étude* ... (1951), p. 28.

<sup>87</sup> Rudolphi, "Die Verteilung der Menschen ..." (1935), p. 337.

<sup>88</sup> Smith, Phillips and Smith, *Industrial and Commercial Geography* (1955), p. 561-569.

<sup>89</sup> Isard, in particular, has emphasized the importance of transport inputs, which in his earlier writings are referred to as "distance inputs" in view of his concern with the neglect of the distance variable by economic theorists. Isard, *Location and Space Economy* ... (1956), pp. xi, 80. He noted (p. 140) that among the various location factors, such as transport costs, labour rates, power rates etc., "only the transport factor and other transfer factors whose costs are functionally related to distance impart regularity to the spatial setting of activities". Isard's general approach differed from that of Alfred Weber in that Weber emphasized only the minimization of distance input per unit of output whereas Isard emphasized the minimization, through recourse to every economically feasible type of substitution, of the aggregate economic input of factors and distance per unit of output. See Weber's *Über den Standort* ... (1909); or Friedrich, *Alfred Weber's Theory* ... (1929). Weber restricted his analysis to the role of distance by treating the conditions of consumption, resources and labour as given. See also the discussion of Weber's and Isard's views on substitution in Richardson, *Regional Economics* ... (1969), pp. 56-58. For further discussion of the location of economic activities, see section D.

<sup>90</sup> Dechesne, *La localisation* ... (1945), chap. 9; Hoover, *The Location of Economic Activity* (1948), pp. 38 ff., 119 ff.; and his *An Introduction to Regional Economics* (1971), chap. 3; Lösch, *The Economics of Location* (1954), p. 187 ff. In the modern energy economy, Usher finds, industry locates "around primary sources of energy or at urban sites of major accessibility"; and the "out-

only physical influences affect population distribution are becoming scarcer; indeed, their existence in the world of today is doubtful.<sup>95</sup>

46. Geographers differ, however, in the relative emphasis which they place on physical and socio-economic factors. Many would agree with Pearson that the physical factors are all "of first importance";<sup>96</sup> many others would concur with George that no element of the natural environment exercises the determining role; rather the laws of population distribution, if any, are not physico-geographic laws.<sup>97</sup>

47. Among the non-physical factors which have been emphasized as having an important bearing on the distribution of population are the types of economic activities in which the people are engaged, the techniques of production, the form of social organization and the objectives which the society seeks to attain.

(a) *Influence of the types of economic activities*

48. It is obvious that the typical pattern of spatial distribution of an agricultural population is totally different from that of a population engaged primarily in manufacturing, trade, or other types of economic activity such as fishing or mining. Within a given region, as within the world as a whole, the distribution of population may change greatly with the passing of time, because of the changing relative importance of different types of economic activities.<sup>98</sup> The growth of world trade during the last 150 years has tended to increase the concentration of population in those areas which are strategically located with reference to world commodity-highways.<sup>99</sup> The growth of world trade, together with the development of manufacturing and service industries, has altered the pattern of population distribution within most countries of the world, bringing about an increasing degree of concentration and growth of population in certain metropolitan areas with an especially favourable location for these types of economic activity.

49. It has been observed that the areas of greatest population density in the world are those combining a great variety of economic activities.<sup>100</sup> This observation is explained in part by the fact that every kind of economic activity is linked in some degree with other kinds. The links are both economic and technological.<sup>101</sup> In

general, the closest links are found between industries which are close together in the sequence of production processes running from the extractive industries at one end of the scale to distribution at the other end. But the links between any two types of activity are reinforced by links between each of these and other types of activity, so that there develops a cumulative tendency for population to be concentrated in a few localities as the diversification of economic activities proceeds.<sup>102</sup> For example, following the development of certain economic activities within a given centre, the workers engaged in those activities and their dependants who settle in the locality create an increased demand for consumers' goods. This demand attracts industries which are oriented to the production of consumers' goods, together with additional workers for those industries and their dependants. The presence of these individuals may attract still other industries and workers, and so on. This cumulative process may continue until it is checked by rising transportation costs and other inconveniences which mount with the size of the community.

50. The economies of large-scale production are also important among the factors which operate, under the existing conditions of the physical environment, to concentrate a large fraction of population and economic activities in a relatively small part of the area occupied by man.<sup>103</sup>

51. Taking these factors into account, industries may be classified according to their degree of dependence upon particular locations. Four categories may be distinguished: (a) the extractive industries, which must be located where agricultural, mineral, and other forms of extractive activity can be carried on; (b) the "rooted" or "tied" industries, which, because their business is the processing or conversion of the products of extractive industry, must be situated near the extractive industries; (c) the "footloose" industries, which, being free of the heavy costs often associated with the inflow of materials and the outflow of products, are free to locate where labour or power are relatively cheap; (d) the residuary industries, which must be situated near consumers.<sup>104</sup> The first two of these categories may be combined under the heading of "resource-oriented" industries.

<sup>95</sup> George, *Introduction à l'étude* ... (1951), pp. 36, 122.

<sup>96</sup> Pearson, *The Growth and Distribution* ... (1935), p. 13.

<sup>97</sup> George, *Introduction à l'étude* ... (1951), p. 66.

<sup>98</sup> For example, Florence traces regional changes in population distribution in England which were related to the growth and decline of industries localized in different regions. See his *Economics and Sociology of Industry* ... (1964), p. 73.

<sup>99</sup> Dobby, for example, noted the great effect of the expansion of international trade following the industrial revolution on the distribution of population in south-east Asia. See his *Southeast Asia* (1966), pp. 385-386.

<sup>100</sup> See, for example, Rudolphi, "Die Verteilung der Menschen ..." (1935), p. 338; also George, *Géographie de la population* (1967), chap. 3.

<sup>101</sup> On the nature of industrial linkages see Hoover, *The Location of Economic Activity* (1948), chaps. 4-8; and his *An Introduction to Regional Economics* (1971), pp. 215-221; Dechesne, *La localisation* ... (1945), chap. 9; Florence, Fritz and Gilles, "Measures of industrial distribution" (1943); Florence, *Economics and Sociology*

*of Industry* ... (1964), p. 72; Fritz, "Markets and marketing" (1943); Ratzliff, *Urban Land Economics* (1949), especially chaps. 2, 3, 13; Hoyt, "Forces of urban centralization ..." (1941), pp. 843 ff.; Schurr and Marschak, *Economic Aspects of Atomic Power* (1950), pp. 239-246; Daly, "An approximation ..." (1940); Hildebrand and Mace, "The employment multiplier ..." (1950); Barford, *Local Economic Effects* ... (1938), pp. 5-9.

<sup>102</sup> Concerning the manner in which the pattern of location develops in a newly settled country, see Friedrich, *Alfred Weber's Theory* ... (1929), chap. 7; Engländer, "Kritisches und Positives ..." (1926); Ritschel, "Reine und historische Dynamik ..." (1927); Isard, *Location and Space Economy* ... (1956); also Haggett, *Locational Analysis* ... (1966), chap. 2.

<sup>103</sup> See a further discussion in section D below.

<sup>104</sup> Thoman, *The Geography of Economic Activity* (1962), pp. 155-158; Dechesne, *La localisation* ... (1945), chaps. 3-6; United States, National Resources Committee, *The Structure of the American Economy*, vol. 1 (1939), chap. 4 and appendix 16; Florence and Friedson, "Major groups of economic activity" (1943).



### (b) *The influence of technology*

52. The influence of the techniques of production upon the distribution of population is intimately related to that of the types of economic activities, for the development of technology is both a cause and a result of the evolution of various industries. For example, technological advances and the development of manufacturing and commerce have been inextricably entwined in the causation of the growth of urban centres throughout the world.<sup>105</sup>

53. Technology, however, has an important independent influence, for changes in the techniques employed in any type of economic activity may open up new areas which formerly held little possibility of human habitation, or render unattractive the sites which formerly were advantageous. Striking examples are the development of irrigation turning desert areas into fertile farming lands, and the development of means of transportation increasing the capacity of the subpolar regions and other remote areas to support population.<sup>106</sup>

### (c) *The influence of social policy and social organization*

54. Within limits, men can make their own decisions regarding the places which they will inhabit, and the political State may influence the size and internal distribution of the population in the area which it controls. The distribution of population is thus affected by the objectives which the society strives to achieve and by the forms of social action which are taken to achieve those objectives. The distribution of population over the earth has unquestionably been affected to an important degree by the efforts of Governments to control migration across international frontiers. Governments have also tried on many occasions to alter the distribution of population within national boundaries for various purposes: for example, to improve their military strength and security, to tap unused resources in the sparsely populated parts of the country, or to achieve greater self-sufficiency within the economy. In many cases the measures taken to implement these policies have undoubtedly had a significant effect upon the internal distribution of the population.<sup>107</sup>

55. It has been observed that the links among various types of economic activities create obstacles to the relocation of population. If the workers in a given locality are engaged in several industries which are closely linked with one another, the movement of workers engaged in any one of these industries to a new location may be difficult unless workers in the other industries are moved at the same time. Relocation of different industries simultaneously may be difficult even with the active assistance of the Government.<sup>108</sup>

<sup>105</sup> See section D below.

<sup>106</sup> See for example, George, *Introduction à l'étude ...* (1951), pp. 38, 70; Barbour, "The Nile basin ..." (1969), pp. 92-108; Tuan, *Man and Nature* (1971), p. 40.

<sup>107</sup> Dechesne, *La localisation ...* (1945), chap. 14; Hoover, *The Location of Economic Activity* (1948), chaps. 12-13 and part 4. See also section E of the present chapter.

<sup>108</sup> See, for example, Spengler, "Regional differences and the future ..." (1941), pp. 479-481.

56. The measures which may be taken to implement social policies regarding the distribution of population depend in part upon the existing form of social organization. Some geographers have greatly emphasized this factor as a determinant of the pattern of population distribution. Different societies, they have pointed out, may be subject to different principles of population distribution. George, for example, has contrasted these principles as they apply to industrialized, capitalistic societies and to socialist societies. In the former, the population clusters about the sources of energy and industrial raw materials. The highly specialized occupations followed in industrial societies, the dependence on food brought from great distances, and the mechanization of agriculture contribute to the excessive concentration of population in a few vital centres. The planned relocation of population under socialism, according to George, tends to produce a more even distribution.<sup>109</sup>

### 3. DEMOGRAPHIC FACTORS

57. Changes in the distribution of world population take place through the medium of births and deaths in various areas and of migration between areas. The birth and death rates and the currents of migration in different parts of the world may be regarded in the long run largely as being determined by social, economic, cultural and geographic factors. However, for a realistic consideration of the factors that determine the changes of population distribution during short or moderately long periods, it is useful to regard the birth rates, death rates and migratory movements themselves as factors, bearing in mind that they in turn are influenced by other factors.

58. The existing distribution of the population also has to be recognized as a factor of the greatest importance in determining the future population distribution, especially at a time not far distant. The longevity of men and their relative immobility under normal conditions limit the changes which can take place within a few years or decades; only in the course of generations can radical changes be brought about. Moreover, a distribution once established has a powerful influence upon the relative attractiveness of various areas for human habitation, both from economic and other points of view.

#### (a) *Influence of population distribution on the location of economic opportunities*

59. Economic studies of the effects of the existing population distribution upon the location of industries

<sup>109</sup> George, *Introduction à l'étude ...* (1951), pp. 127-140, 142-143. However, he points out that there is still a tendency toward concentration of population under socialism and that more than one quarter of the population of the USSR is found in the large industrial regions comprising Moscow, the Urals and the Ukraine. George, *Géographie de la population* (1967), p. 64. Others have noted that under socialism the planned reallocation of population and productive activities should result in a more uniform area distribution of people than could result under capitalism. Balzak, Vasyutin and Feigin, eds., *Economic Geography ...* (1949), pp. 109-110, 130-132, 167-171, 172-182, 187-196. On p. xl of this work Stalin was quoted as writing: "The geographic environment is incontrovertibly one of the unchanging and indispensable conditions of the development of society. ... But its influence is not the determining influence ... since society changes and develops incomparably faster than does the geographic environment."



have been rather few and for the most part they have dealt with the topic only in general terms. The results imply that these effects occur for two reasons. First, since the spatial distribution of consuming power is in part determined by the distribution of population, and since a large fraction of economic activity is consumer-oriented, a given distribution of population, whatever its origin, will immediately dominate the distribution of consumer-oriented economic activities.<sup>110</sup> Secondly, the distribution of the population in relation to resources may affect the geographical variations of wage rates, so that the cost of various types of labour inputs will be lower in some areas than in others. The areas where wages are relatively low, and where (consequently) profit opportunities appear in certain industries where wages are a primary element of production costs, will attract such industries unless the labour-cost advantage is counterbalanced by disadvantages.<sup>111</sup>

60. For reasons which have already been stated, an area selected for the location of certain economic activities may acquire additional qualities which make it attractive to still other industries. If this is the case, a cumulative process may get under way whereby the area in question may become transformed into a centre of industry. It may happen, therefore, that the presence of population in a certain area will be instrumental in attracting other economic activities which stimulate the area's further industrial development.<sup>112</sup>

<sup>110</sup> Cities which owe their origin to the initial assembly of consumers in search of pleasant climates, or composed largely of military and/or government personnel, are instances in which the initial location of population exercised a very great influence. The urban history of Europe and Asia provides many examples. Thoman has pointed out that most of the present and former European capitals have thriving diversified manufacturing industries that are, or once were, largely oriented toward markets. Thoman, *The Geography of Economic Activity* (1962), pp. 156-157. For an account of the manner in which location of certain economic activities is affected by the attractiveness of a district as a place of residence, see Winsemius, "Wanderungen und Verbrauch ..." (1940). In so far as the attractiveness of a community may be affected by changes in its size, these changes may check or foster further growth. Various authors have considered the question of desirable size of cities. See, for example, Evans, "The pure theory of city size ..." (1972); Von Böventer, "Urban hierarchies ..." (1971); Stanford Research Institute *et al.*, "Costs of urban infrastructure ..." (1969); Gottman, "Urban sprawl ..." (1967), pp. 10-12; Northam, "Population size, relative location ..." (1969); Duncan, "Optimum size of cities" (1951); Perevedentsev, "Goroda i gody" (1969); and his "Kakoi gorod vygoden?" (1967); Khorev, "Kakoi gorod nuzhen?" (1969); and his *Gorodskie poseleniia SSSR* ... (1968), particularly pp. 95-138; Roterus, "Effects of population growth ..." (1946); Clark, "The economic functions of a city ..." (1945); and Thorndike, *144 Smaller Cities* (1940), particularly chaps. 2 and 4.

<sup>111</sup> See, for example, Dean, *The Theory of the Geographic Location* ... (1938), pp. 28-29; Ohlin, *Interregional and International Trade* (1967), chap. 11; Isard, *Location and Space Economy* ... (1956), chap. 6. Lewis in "The industrialization ..." (1950) discussed the principle of comparative advantage in considering the industrial prospects of the West Indies. Derruau, *Précis de géographie humaine* (1961), pp. 375-376, describes the migration of the cotton textile industry from New England to the South in the United States, partly owing to the cheaper labour supply in the latter region. See also Sickie, *Planning for the South* ... (1943), chap. 4.

<sup>112</sup> See, for example, Derruau, *Précis de géographie humaine* (1961), p. 377. See also section D below. The rate of growth of the

61. The initial population distribution has an especially important bearing on the processes of industrialization of economically underdeveloped countries. The average density and the degree of concentration or dispersion of population in such countries affect the types of industrial development which can most readily be achieved in the early stages, since these demographic factors are relevant to the supplies of labour that can be assembled in potential manufacturing sites and to the sizes of the markets for the manufactured products.

(b) *Processes of population redistribution in relation to economic opportunities*

62. Variations of natural increase rates are related to economic conditions, but the relationship at least in the short run is not necessarily such as to bring about high rates of natural increase in areas where economic opportunities are plentiful, or low rates where opportunities are scarce. On the contrary, relatively large excesses of births over deaths are commonly found in areas of comparatively poor economic opportunities. The relationships of migration to economic conditions, on the other hand, are generally such as to bring about migratory increases of population in areas of relatively great opportunities, and migratory losses in areas of scanty opportunities. As shown in chapter VII and in section D of the present chapter, migrants move, as a rule, towards areas where they expect to be able to command higher earnings than they can get in their home communities. Thus migration acts as a mechanism for partial adjustment of population distribution to the location of economic opportunities. It is further indicated that the number of migrants moving between any two points tends to vary inversely with the distance between them. The effect of the distance factor is conditioned by the distribution of economic opportunity in space. How far the representative migrant moves is said to depend upon such conditions as his knowledge of job opportunities, the location of communities in a stage of industrial development similar to that of his home community, the pattern of spatial distribution of opportunities, and so on.

63. The spatial mobility of population within countries has greatly increased in modern times. Consequently, other conditions being given, the distribution of population exercises less influence than formerly upon the spatial distribution of economic activities at the intranational level. It is at the international level that the influence of the distribution of the population upon that of economic activities is greatest, for the international mobility of labour is much lower than its intranational mobility. The international wage structure is affected accordingly, and this effect in turn influences the international distribution of economic activities.

64. An increase in trade between areas may serve in lieu of migration as a mechanism in bringing about an

expanding centres will be conditioned by the amount of net migration to or from abroad. For example, as Thomas has shown, if there is net emigration abroad, the rate of growth of urban centres within the country will be lower, *ceteris paribus*, than if there is no such emigration. Thomas, *Social and Economic Aspects of Swedish* ... (1941), pp. 88-92, 166 ff., 365 ff. For a discussion of this view and related problems see Skaug, *Memorandum on Fluctuations in Migration* ... (1937), especially pp. 185-194.

adjustment between the distribution of population and economic activities. The feasibility of this alternative depends on the possibility of increasing economic opportunities in the areas of relative surplus of labour, through investment of capital or development of labour-intensive industries which enable these areas, in effect, to export their excess labour in the form of goods. To the extent that it is feasible, this alternative to migration is especially attractive at the international level, in view of the economic, social and political difficulties commonly involved in international migration.

#### 4. CHANGES IN FACTORS AFFECTING THE DISTRIBUTION OF POPULATION IN MODERN TIMES

65. During modern times the factors affecting population distribution have been undergoing several major types of changes which have interacted to alter considerably both the relative numbers of people in various regions of the world and the distribution of population within countries. First, technological advances and changes in the industrial structure of the world economy have freed a large proportion of the people from their former dependency upon the land and other place-bound natural resources. Secondly, the changes in technology and in consumers' wants have re-enforced the tendency for economic opportunities and population to be concentrated in certain localities, particularly in the great metropolitan agglomerations. Thirdly, the desires of the people and the policies of Governments with reference to the growth and distribution of national populations have been shifting; and there has recently been an increased degree of governmental control, especially in the countries with planned economies. Fourthly, the pattern of geographical variations in birth and death rates has been changing; the rates of natural increase have fallen in highly industrialized countries and have been rising in economically less developed countries and in many countries the urban and rural rates are no longer very different. In the first countries to industrialize, the effects of intranational differences in rates of natural increase was greatly modified by migration within countries, particularly by migration from rural to urban areas, bringing about a rapid population growth in the cities of many countries in spite of low urban rates of natural increase. In the developing countries today, where urban rates of natural increase tend to approximate rural rates, the relative contribution of internal migration to urbanization is generally less significant. International migration, since the end of the massive movements that characterized the *laissez-faire* period, has had greatly reduced influence as a factor of change in the relative sizes of population in most countries.

66. The power of land and other natural resources to determine the distribution of population has diminished with the progress of industrialization. Man is no longer dependent upon the organic products of land to the extent that he was formerly.<sup>113</sup> Similarly, in the case of mineral

resources, although the Industrial Revolution initially increased their population-pulling power and although they continue to be of fundamental importance in modern economies, they no longer govern the location of population to the former extent. The proportion of the labour force engaged in agricultural and mining activities is today smaller than formerly. An increasingly large proportion of the equipment utilized today is man-made and can therefore be produced and located wherever man decides. In consequence of these changes, the proportion of the labour force of industrialized countries, whose location is relatively independent of land and natural resources, may well be two or three times what it was in the beginning of the Industrial Revolution.<sup>114</sup>

67. Among the circumstances contributing to the increasing concentration of population on a few sites, four in particular may be mentioned. First, improvements in transportation have diminished the cost of moving raw materials and sources of energy to manufacturing centres.<sup>115</sup> Secondly, technological change has increased economies of scale, agglomeration etc., which make for the spatial concentration of economic activities.<sup>116</sup> Thirdly, the proportion of the national income expended for services and manufactures not heavily dependent on place-bound resources has steadily increased as *per capita* income has risen.<sup>117</sup> Fourthly, the mobility of labour within countries has increased.<sup>118</sup> These four changes, together with those described in the preceding paragraph, have greatly diminished man's dependency upon land and natural resources and have extended his range of choice in economic activities, at least when he acts collectively.

<sup>114</sup> For example, in the United States in 1935 not more than 40 per cent of the labour force was directly or indirectly oriented to natural resources. A century and a half ago this fraction must have been twice as high. Spengler, "Regional differences and the future . . ." (1941), pp. 480-481; see also pp. 478-481 for a discussion of the possibilities of modifying equipment.

<sup>115</sup> Hoover, *The Location of Economic Activity* (1948), chap. 5, especially pp. 84-89. Ullman, "Regional development . . ." (1964), p. 159. Alonso noted that in the long run transportation tends to become cheaper and more efficient, with the result that industries become more foot-loose and less transport-oriented. Alonso, "Location theory" (1964), pp. 100-101. For estimates of the effects of air transport, see Isard and Isard, "Economic implications . . ." (1945). For an account of the effects of transport improvements upon the scope of the European and the world economy, see Prokopovitz, *L'industrialisation des pays . . .* (1946), chap. 3 and pp. 33-42, 116-118, 215-219.

<sup>116</sup> Ullman, "Regional development . . ." (1964), p. 158. Steindl, *Small and Big Business . . .* (1945); Florence, *The Logic of Industrial Organization* (1933), chap. 1, and his *Investment, Location, and Size of Plant* (1948). Florence found that concentration within particular areas is characteristic of industries with relatively low transport costs and (partly because of this) large plants, while dispersal among raw material or market areas is characteristic of industries with relatively high transport costs and (partly because of this) small plants. He found also that, even though the plants composing an industry may be relatively small, the industry tends to be concentrated if economies for individual plants are produced by their juxtaposition.

<sup>117</sup> On the changes in consumption as reflected in the occupational composition of the labour force, see, for example, Clark, *The Conditions of Economic Progress* (1960).

<sup>118</sup> Lee offered several explanations for the secular increase of migration rates, among them the increasing diversity of areas, increasing diversity of people, and improving technology which reduces obstacles to migration. Lee, "A theory of migration" (1966), pp. 53-54.

<sup>113</sup> A century ago, as Mather observed, of all the things men used, nearly 80 per cent were "derived from the plant and animal kingdoms, with only about 20 per cent from the mineral kingdom". Mather, *Enough and to Spare . . .* (1944), pp. 55-56.

These changes, however, have entailed or have been accompanied by changes in production necessitating a high degree of concentration of population at the sites chosen.

## B. Internal migration

68. Two of the three components of population change—fertility and mortality—are treated in preceding chapters, and the third component—migration—in so far as its international aspects are concerned, is treated in chapter VII. Internal migration, which has no direct effect on a country's total population size and growth, but is intimately related to population distribution within a country, and particularly to the process of urbanization, is discussed in the present chapter.

### 1. DEFINITIONS

69. There is no one universally accepted definition of migration. Noting that "the concept of migration is applicable only in the case of relatively settled populations", the United Nations *Multilingual Demographic Dictionary* defines it as a form of spatial mobility between one geographical unit and another involving a permanent change of residence.<sup>119</sup> Internal migration in this sense is residential mobility from one unit to another within the same country. Such a definition excludes not only the wanderings of nomadic populations, but also seasonal migration and the movement back and forth of persons with more than one residence. In principle, visitors, tourists and commuters are excluded because no change of residence ordinarily takes place. In practice, many borderline cases occur where it is not always possible clearly to distinguish migratory from non-migratory movement. The mover himself is not always sure of his intentions and, even when he is in fact changing his residence, may nourish the hope of some day returning to his place of origin. The working or operational definition that the analyst has to use generally depends on the kind of data at his disposal. When the principal source of data is the population census, migration is conveniently defined as a change in the usual place of residence from one administrative unit to another.<sup>120</sup>

70. A demographic definition<sup>121</sup> of internal migration in terms of change of residence across boundaries of administrative areas has various advantages and disadvantages. Among the disadvantages are the risk of non-comparability over time due to changes in the boundaries of the areas and the distortion introduced into measures of migration because of great differences in size and shape among these areal units.<sup>122</sup> An important

advantage of these units is that much useful information is usually available on the characteristics of the places of origin and destination which permit a better analysis of the factors associated with the migratory movements.

### 2. PRINCIPAL SOURCES OF DATA

71. Although various government institutions, for purposes unrelated to the study of population movements, keep records of changes of residence which can be used, in the absence of more adequate data, to infer the volume and direction of migratory streams,<sup>123</sup> the three main sources of information on internal migration are censuses, sample surveys and population registers. Population registers, however, are maintained at present in only a few countries and published data on internal migration from this kind of source are largely confined to the volume of in-migration and out-migration for component areas.<sup>124</sup>

72. Until recently, almost all migration research has been concentrated on the analysis of census data. There is currently a tendency, however, to supplement these sources by collecting data in special sample surveys devoted to the study of migration.<sup>125</sup> These have so far been carried out primarily in connexion with migration to large metropolitan areas. The basic procedure involves holding interviews with a representative sample of metropolitan residents, with a list of special questions being asked of persons found to be in-migrants to the metropolitan area. Through this approach it is possible to go beyond the usual migration information on volume, direction, etc. and to test a large number of demographic and socio-economic hypotheses related to migratory behaviour.<sup>126</sup>

73. Most studies of internal migration have as their main objective the measurement of the volume and per-

<sup>119</sup> Changes of legal residence noted for voting records or in connexion with school transfers or social insurance and rationing programmes have been used as an index of internal migration. Such sources may include movements other than migration or they may exclude movements which should be counted as migration. See United Nations, *Multilingual Demographic Dictionary* ... (1958), p. 47.

<sup>124</sup> United Nations, *Manual VI. Methods of Measuring Internal Migration* (1970), pp. 3-4. For examples of studies using population register data, see Meerdink, "Internal migration in Amsterdam" (1962); Wendel, *A Migration Schema* ... (1953); Goldstein, "The extent of repeated migration ..." (1964), pp. 1121-1131; Hama, "Kokunai jinko ido ..." (1961), chap. 4; Kono, "Evaluation of the Japanese population register data ..." (1971).

<sup>125</sup> The distinction between census and sample survey data on migration is that the census operation is generally confined to a very limited number of questions on migration, whereas a specialized sample survey can delve into the antecedents of each migratory movement. Migration histories obtained in a 1959-1960 sample survey in England and Wales have been analysed by Friedlander and Roshier. See their "A study of internal migration ..." (1966), part 2. For the United States, see Taeuber, Haenszel and Sirken, "Residence histories ..." (1961); Taeuber, Chiazze and Haenszel, *Migration in the United States* ... (1968). On advantages and disadvantages of survey data, see Shryock, Siegel *et al.*, *The Methods and Materials of Demography*, vol. 2 (1971), p. 620.

<sup>126</sup> A number of these surveys have recently been carried out in Latin American cities; see, for instance, United Nations, Centro Latinoamericano de Demografía, *Encuesta sobre inmigración* ... (1964); United Nations, "Demographic aspects of urbanization ..." (1961); Peru, Dirección Nacional de Estadística y Censos, *Encuesta de inmigración de Lima metropolitana* (1966).

<sup>119</sup> United Nations, *Multilingual Demographic Dictionary* ... (1958), p. 46.

<sup>120</sup> See, for example, United Nations, *Manual VI. Methods of Measuring Internal Migration* (1970), p. 1. Also, Shryock, *Population Mobility* ... (1964), p. 8.

<sup>121</sup> Called "census definition" by De Jong, *Appalachian Fertility Decline* ... (1968), p. 57.

<sup>122</sup> See, for example, United Nations, *Manual VI. Methods of Measuring Internal Migration* (1970), p. 1; Thomlinson, "Methodological needs in migration research" (1962), p. 60.

haps some of the characteristics of migratory movements during a specified interval or period of time.<sup>127</sup> When the volume and direction of the movements have been estimated from census data, the knowledge of the characteristics of the migrants can be combined with data on the characteristics of the place of migration origin and migration destination, in order to analyse the determining factors underlying the movements.

### 3. METHODS OF MIGRATION MEASUREMENT

74. The techniques most frequently used for measuring or estimating migration are conveniently classified as either "direct" or "indirect".<sup>128</sup> The direct methods are those which have recourse to data indicating the movements of the migrants themselves—those who change residence across migration-defining boundaries, whereas the indirect methods involve estimates inferred from the difference between the observed change in population between two dates and the change due to natural increase.<sup>129</sup>

75. The direct method most accessible in many countries involves comparing data on place of birth with current place of residence in order to obtain a measure of life-time migration, that is, of the number of persons who have migrated since their birth from one area to another. This method permits measuring the streams of migration in each direction between any two areas and, of course, the net migration between the areas. Furthermore, the total in-migration and out-migration as well as the net migration for any area can be obtained; in principle, the census characteristics of the migrants in any given migration stream can also be identified. Among the limitations of this method are the following: the time period is indeterminate, depending on the years lived by each individual; it reveals only the net movement of each person so that migrants who returned to their place of birth are excluded, as are the intervening movements of persons who had not moved directly from place of birth to current residence; it includes only the movements of migrants who survive to the end of the period and have not left the country; and it excludes the internal movements of persons born outside the country.

76. A refinement of this method serves to measure the migration during the interval between two censuses as the difference between the movements measured by each of

the two censuses.<sup>130</sup> As Elizaga has pointed out,<sup>131</sup> estimates obtained in this way underestimate the magnitude of the migration in question because of the inclusion in the earlier and not in the latter census of lifetime migrants who died during the intercensal period. This limitation is overcome to some extent when intercensal survival rates are used as a corrective factor.<sup>132</sup>

77. Other direct methods frequently used are those that depend on the insertion in the census schedule of a question as to (a) place of residence at a specified prior date, or (b) duration of present residence. Either of these methods has advantages and drawbacks. The first method permits the estimation of gross and net migration during a precisely identified time interval, but does not reveal the intervening movements of persons with more than one move during the interval and misses migrants who have died in the interval.<sup>133</sup> The second, or duration-of-residence method identifies the year of migration of all in-migrants residing in each area of enumeration, but provides no information on area of origin. When duration of residence data are used in conjunction with birthplace data, in-migrants can also be classified into migrant cohorts according to place of birth.<sup>134</sup>

78. The indirect methods of measuring migration are employed ordinarily where it is not possible to determine migration so directly. Basically, two indirect methods can be distinguished: the vital statistics method and the survival ratios method.<sup>135</sup> Both yield estimates of net migration obtained residually as that part of the observed change in population between two dates that is not attributable to natural increase.

79. The vital statistics method estimates intercensal net migration by adding registered deaths and subtracting registered births from intercensal population change. When age-specific net migration is being estimated, it suffices to use death data only except for those age cohorts born during the intercensal period. As compared with the survival ratios method, this has the merit of being "potentially exact".<sup>136</sup> An important limitation is that often the necessary data are not available or not

<sup>130</sup> For examples of the use of this method, see Elizaga, "Internal migrations ..." (1965), p. 146; Shryock, *Population Mobility* ... (1964), pp. 20-21; and Ominde, "Some aspects of population ..." (1968).

<sup>131</sup> Elizaga, "Internal migrations ..." (1965), p. 146.

<sup>132</sup> For a discussion of various alternative procedures for accomplishing this adjustment, see United Nations, *Manual VI. Methods of Measuring Internal Migration* (1970), pp. 5-12. See also Eldridge and Kim, *The Estimation of Intercensal Migration* ... (1968).

<sup>133</sup> For examples of the use of this method, see Elizaga, "Assessment of migration data ..." (1965), pp. 79-81, 97-104; and Jaffe, *Handbook of Statistical Methods* ... (1951), pp. 180-184.

<sup>134</sup> See Zachariah, "Bombay migration study ..." (1966), pp. 378-392, for a methodological evaluation of the reliability and validity of duration-of-residence data and for an example of their use in combination with place-of-birth data.

<sup>135</sup> For an application of these methods to data for the United States and comparison of results, see Eldridge, *Net Intercensal Migration for States and Geographic Division* ... (1965), pp. 82-99.

<sup>136</sup> Lee and Lee, "Internal migration statistics ..." (1960), p. 692. See also Siegel and Hamilton, "Some considerations in the use of the residual method ..." (1952); Stone, "Evaluating the relative accuracy ..." (1967); Hamilton, "The vital statistics method ..." (1967).

<sup>127</sup> Relatively few migration studies have used a longitudinal method of analysis in which the residential histories of individuals provide a basis for studying migration. See Taeuber, "Cohort migration" (1966). For an example of the longitudinal analysis of migration data from Swedish population register data, see Wendel, *A Migration Schema* ... (1953).

<sup>128</sup> For a detailed description of these direct and indirect methods of internal migration measurement from census data, see, for example, Shryock, Siegel *et al.*, *The Methods and Materials of Demography*, vol. 2 (1971), pp. 625-637; Elizaga, "Assessment of migration data ..." (1965); Shryock, *Population Mobility* ... (1964); Jaffe, *Handbook of Statistical Methods* ... (1951), chap. 6; and Bogue, "Internal migration" (1959), pp. 491-499.

<sup>129</sup> United Nations, *Multilingual Demographic Dictionary* ... (1958), p. 47.

sufficiently accurate. The survival ratios method uses age-specific intercensal survival ratios so as to eliminate the number of intercensal deaths in each age cohort. Estimated net migration is the difference between the observed size of each cohort at the end of the intercensal period and its expected size if only mortality had acted upon it.<sup>137</sup> The most appropriate method to use in any particular instance depends mostly on the nature and the quality of the available data. Since these vary considerably from one country to another, it has not proved feasible to formulate simple prescriptions fitting all circumstances. Other things being equal, the direct methods are generally preferred over the indirect methods.

#### 4. PRINCIPAL INTERNAL MIGRATIONS OF MODERN TIMES

##### (a) *Major migration movements*

80. There are many forms of internal migration and their nature has varied over time and in different cultures.<sup>138</sup> Some of these forms of movement are overlapping. For instance, migration from one region of a country to another may be from a rural to an urban area, from one rural area to another etc. Furthermore, most of the research done in this area has been of an *ad hoc* nature, oriented to specific problems, and producing results that are not comparable with those of other studies. It is not feasible, therefore, to present a systematic discussion of all types of internal migration, nor even of the principal types in all countries of the world. The movements summarized here refer mostly to the larger countries or to studies of international scope on migration within several countries of the same region. Examples of studies in some smaller countries are also provided.

81. One feature of the current situation is the diminishing importance of one kind of internal movement, frontier settlement migration, that reached its largest scope in several parts of the world during the nineteenth century.<sup>139</sup> By contrast, the rural-to-urban movement has been accelerating in almost all countries of the developing regions, while continuing more or less unabated in the more advanced countries. In these latter countries, the spread of urbanization is usually marked by the growth of urban and suburban fringes and of small rural non-

farm residential communities, much of it due to a large-city exodus.<sup>140</sup>

82. The settlement of Europeans in the Americas entailed some of the greatest migrations between regions of the same country during modern times, particularly the transcontinental migration within the United States.<sup>141</sup> During the nineteenth century, the prevailing direction of migration was from the east to the west. This was the era of settlement of the vast new lands beyond the Mississippi River. The westward movement in the United States continued during the twentieth century, but following the occupation of virgin lands, the character of this movement was greatly changed. Only California continued to receive a large, uninterrupted stream of migrants. Migration into the other western states slackened after 1910 and only partially recovered its momentum during the Depression and war years of the 1930s and 1940s. The movement from east to west was crossed by a new movement from south to north, stimulated by the growing need for industrial and commercial workers in the northern cities.<sup>142</sup> Interregional movements, previously motivated by quests for land in rural areas, increasingly took on the character of migration from rural areas and small towns to big cities.

83. The growth of cities in the United States reached very large dimensions after about 1880. The rapid growth has continued into the present century, but the rate of growth has declined gradually. During the economically depressed 1930s, the rate of urban growth barely exceeded the increase in rural population (7.9 per cent as compared with 6.4 per cent),<sup>143</sup> but a high tempo of urbanization was resumed after about 1940.

84. Migration from rural areas has played an important part in the growth of cities in the United States. During the period 1900-1920 the total increase in the urban population was 24 million, 9 million of which is estimated to have been contributed by migrants from farms and villages.<sup>144</sup> The United States Bureau of Agricultural Economics estimated that during the decade 1920-1930, the net loss in the farm population through migration amounted to 6 million persons. In the depressed decade

<sup>140</sup> Horstmann, "Rural-urban migration . . ." (1967), pp. 496-498; Bogue, *Principles of Demography* (1969), pp. 766-767.

<sup>137</sup> Although the survival ratios are most often applied to the cohorts in the first of the two censuses (forward surviving), reverse surviving or an average of deaths obtained by forward and by reverse surviving are also resorted to. Either of these procedures involves at least some small error in the estimate of net migration because of failure to account exactly for the deaths of migrants. In the case of forward surviving, for example, the estimate of net migration excludes both in-migrants and out-migrants not surviving to the end of the intercensal period. Lee and Lee, "Internal migration statistics . . ." (1960), p. 692; United Nations, *Manual VI. Methods of Measuring Internal Migration* (1970), pp. 25-26. See also Zachariah, "A note on the census survival ratio . . ." (1962). For an example of the application of the survival ratio method, see Zachariah, *A Historical Study of Internal Migration in the Indian Sub-Continent . . .* (1964).

<sup>138</sup> See section D for a brief discussion of migration typologies.

<sup>139</sup> At the 1965 World Population Conference it was observed that almost everywhere in the world this frontier phase of population distribution had already ended or was drawing to a close. Bogue, "Internal migration with special reference . . ." (1966), p. 162, and Zachariah, "Internal migration . . ." (1966), p. 165.

<sup>141</sup> Three major studies of migration history in the United States are Goodrich *et al.*, *Migration and Economic Opportunity* (1936); Shryock, *Population Mobility . . .* (1964); and Kuznets and Thomas, eds., *Population Redistribution and Economic Growth . . .* (1957, 1960 and 1964). The last study has been updated and summarized by Thomas, "Internal migration in the United States . . ." (1967). For a brief summary of the main patterns of population redistribution in the United States, see Taeuber, "Population dynamics and population pressures . . ." (1970), pp. 65-67. For the decade 1950 to 1960 see Bowles and Tarver, *Net Migration of the Population . . .* (1965-1966). For estimates from 1800 to 1870, see Lebergott, "Migration within the U.S. . . ." (1970). Two recently issued monographs based on statistics from the 1961 and earlier censuses in Canada have examined the main trends and characteristics of internal migration in that country. See Stone, *Migration in Canada . . .* (1969); and George, *Internal Migration in Canada . . .* (1970).

<sup>142</sup> For a history of Negro emigration from the South in the United States, see Hamilton, "The Negro leaves the south" (1964).

<sup>143</sup> Hauser and Taeuber, "The changing population . . ." (1945), p. 17.

<sup>144</sup> Gillette, *Rural Sociology* (1928), p. 94.

of the 1930s the net movement from farms was about 3.7 million.<sup>145</sup> After the depression decade, net migration from farms returned to previous high levels. It amounted to 11.4 million in the 1940s and 10.1 million in the 1950s, equivalent to net average annual emigration rates of 4.4 per cent and 5.5 per cent respectively.<sup>146</sup> The continuing rural exodus was associated not only with migration to urban areas but also with residential transfers away from city centres to urban fringe and rural non-farm areas.<sup>147</sup>

85. The flow of people from the European to the Asian part of Russia, which likewise continued over numerous decades, is similar to the American westward "frontier" movement. At the end of the nineteenth century the agricultural colonization of Asian Russia took on greater proportions than ever before. Much of this new settlement was in the forest-steppe regions and along the Trans-Siberian Railway.<sup>148</sup> It is estimated that more than 5 million peasants migrated to Siberia during the thirty-year period preceding the First World War.<sup>149</sup> Included among the migrants were Russians, Ukrainians, Byelorussians, Tartars and other peoples.<sup>150</sup> At the same time another population movement took place within the European part of the Soviet Union towards the south-east region of the Ukraine. During the nineteenth and early twentieth centuries, the migration to the south absorbed some 12 to 13 million persons.<sup>151</sup>

86. Planned migration in the USSR began in the 1920s. Between 1926 and 1939, 3 or 4 million people moved from the most heavily populated areas of the central districts of the European part of the Soviet Union to the Urals region, Siberia, and the far eastern region.<sup>152</sup> The number of these migrants amounted to approximately one fifth of the natural increase in the country's population.<sup>153</sup> Between 1926 and 1967 the proportion of the Soviet

population residing beyond the Urals (Siberia, central Asia and the far east) rose from 8 per cent to 15.5 per cent.<sup>154</sup> Migration to selected settlements in the far north has been encouraged by various incentives. The proportion of Soviet population in the far north increased from 1 per cent in 1926 to 2.5 per cent in 1967.<sup>155</sup>

87. During the last intercensal period (1959-1970), the geography of population increase differed substantially from that of the preceding twenty years when population growth in the Urals, Siberia and the far east had been substantially greater than the average for the Soviet Union as a whole. Despite the fact that natural increase in Siberia was higher than the all-Union average, Siberia's share in the country's population has declined, and the population outflow from Siberia is increasing.<sup>156</sup> In the nine years following the 1959 census, the excess of outflows over arrivals came to 595,000 people in the Urals and 390,000 in western Siberia. Eastern Siberia and the far east had a positive migration balance of 90,000 people, mainly in Magadan Province and the Yakut Autonomous Soviet Socialist Republic, but in certain years the migration balance was negative here also.<sup>157</sup> The recent outflow from Siberia is attributed to the fact that the comforts of living in this area are inferior to other areas of the country.<sup>158</sup> Housing and public services are less adequate than elsewhere and the climatic conditions are difficult. Moreover, it has been determined that, except in the far north, the average level of real wages is lower in Siberia than elsewhere.<sup>159</sup> Thus an anomalous situation has arisen in the Soviet Union where recent out-migration has been mainly from rural areas which already have labour shortages rather than from rural areas where labour surpluses exist.<sup>160</sup>

88. Rapid growth of cities has also been an outstanding feature of the demographic development of the Soviet Union, a consequence chiefly of the migration from rural areas.<sup>161</sup> Internal migration within the European part of the USSR has been largely a movement to cities;

<sup>145</sup> United States Bureau of Agricultural Economics, *Farm Population Estimates, United States* ... (1946), p. 5; Bernert, *Volume and Composition of Net Migration from the Rural-Farm* ... (1944), p. 1.

<sup>146</sup> Beale, "Rural depopulation in the United States ..." (1964), pp. 265-266.

<sup>147</sup> Bogue, *Principles of Demography* (1969), p. 766; and his "Population growth in the United States" (1963), pp. 90-91.

<sup>148</sup> Kozlov, "Migratsii naseleniia" (1964), p. 68; Kulischer, *Europe on the Move* ... (1948), p. 210. According to Lorimer in *The Population of the Soviet Union* ... (1946), pp. 44-45, the mobility of the Russian population in the eighteenth and early nineteenth centuries was high compared to that of most European countries.

<sup>149</sup> Sonin, "Voprosy pereseleniia ..." (1940), p. 83; and his "Resettlement of population ..." (1940), p. 78. See also Barnes, "Eastward migration within the Soviet Union" (1934); Lorimer, *The Population of the Soviet Union* ... (1946), pp. 47-48. Kulischer mentioned an estimate of 4 million peasants crossing the Urals during the nine years preceding the First World War: Kulischer, *Europe on the Move* ... (1948), p. 110.

<sup>150</sup> Kozlov, "Migratsii naseleniia" (1964), p. 68.

<sup>151</sup> Pokshishevsky, "Migratsii naseleniia v SSSR" (1969); Kuziela, "Die Charakteristik der Bevölkerungsbewegung ..." (1936), p. 139.

<sup>152</sup> Sonin, "Voprosy pereseleniia ..." (1940), p. 84; Pokshishevsky, "Migratsii naseleniia v SSSR" (1969); Lorimer, *The Population of the Soviet Union* ... (1946), p. 164; Kozlov, "Migratsii naseleniia" (1964), p. 78; USSR, Akademiia Nauk SSSR, Institut Etnografii imeni N. N. Miklukho-Maklaya, *Naselenie zemnogo shara* ... (1965), p. 28.

<sup>153</sup> Pokshishevsky, "Migratsii naseleniia v SSSR" (1969).

<sup>154</sup> *Ibid.* For detailed information concerning migration and settlement in Siberia during recent decades see the following: Perevedentsev, *Migratsiia naseleniia i trudovye problemy Sibiri* (1966); his *Sovremennaiia migratsiia naseleniia Zapadnoi Sibiri* (1965); and USSR, Akademiia Nauk SSSR, Sibirskoe Otdelenie, Institut Geografii Sibiri i Dal'nego Vostoka, *Geografiia naseleniia Vostochnoi Sibiri* (1962).

<sup>155</sup> Pokshishevsky, "Migratsii naseleniia v SSSR" (1969).

<sup>156</sup> Perevedentsev, "Migratsiia naseleniia ..." (1970).

<sup>157</sup> Pokshishevsky, "Migratsii naseleniia v SSSR" (1969).

<sup>158</sup> *Ibid.*; Perevedentsev, "Migratsiia naseleniia ..." (1970).

<sup>159</sup> Pokshishevsky, "Migratsii naseleniia v SSSR" (1969). Some recent Soviet research has led to the conclusion that, in areas where modernized living facilities are not provided, the higher the pay privileges, the sooner the settlers leave the eastern regions for their home towns. The reason is that a person can achieve his savings goal all the sooner. Selyunin, "Trud nash nasushchnyi" (1967). Climate also does not appear to be a deciding factor. In the Arctic city of Norilsk, for example, it is said that no labour shortage exists and few people wish to leave this comfortably built city which is said to have no equal in the Arctic. *Ibid.*

<sup>160</sup> Pokshishevsky, "Migratsii naseleniia v SSSR" (1969), and Perevedentsev, "Migratsiia naseleniia ..." (1970).

<sup>161</sup> For a discussion of recent rural-to-urban migration in the Soviet Union and its causes, see Valentei and Sorokina, *Naselenie, trudovye resursy SSSR* ... (1971), pp. 210-216.



similarly the movement from the European to the Asian part, which was mostly agricultural during the Czarist régime, has become predominantly industrial and urban since the Revolution.<sup>162</sup> The total growth of the urban population in the Soviet Union between the 1926 and 1939 censuses was 29.8 million, of which 18.5 million, or 62 per cent was accounted for by migration from rural to urban areas.<sup>163</sup> The percentage contribution of migration to total urban growth was almost the same between the 1939 and 1959 censuses.<sup>164</sup> This migration from rural to urban areas took many different directions. During the 1926 to 1939 period the main movement was to the largest of the older industrial centres. Another heavy flow took place towards the northern and more particularly the eastern areas of the country. The most extensive emigration was observed in the densely populated districts of the Ukraine, in both the black-earth and non-black-earth zones. Some of the planned migration of rural population was directed towards the sparsely populated outlying districts in the European north and the far east where the rural population actually increased. The migratory flow between 1939 and 1959 sometimes brought rural residents to towns in the same region and sometimes to towns in nearby regions or in other parts of the country. During this period also, despite a general decline of the rural population, there were several areas in which increases were reported. In the Republics of central Asia this was due to natural increase rather than to in-migration. In sparsely populated eastern regions, where virgin and fallow lands have been developed, there was an increase of the rural population attributable to migration. The rapid growth of some of the largest Soviet cities has made it necessary to take steps, such as a ban on the construction of new enterprises and control of further in-migration, to restrict their continued expansion.<sup>165</sup>

89. During the last 150 years at least, a considerable migration from rural districts to urban areas has taken place in all European countries. The movement assumed importance at different times in various countries depending upon their stage of industrialization. In England, the movement was already pronounced in the early decades of the nineteenth century. By 1931 only one fifth of the total population remained in rural areas. The possibilities for further large-scale rural-to-urban migration, therefore, did not exist, and other types of migratory movements became predominant.<sup>166</sup> Studying internal migration in England and Wales over a century, Friedlander and Roshier found distinctive patterns in two broad periods. Between 1851 and 1911, migration was building up in the industrial centres, but the period from 1911 to 1951 was marked by a trend towards

dispersal of population from these centres owing to the decline of the coal industry and the search for better living conditions.<sup>167</sup> In Germany and the Scandinavian countries, large-scale cityward movement began in the 1870s. A similar pattern holds for France and the other countries that now comprise the European Economic Community. Once the national urban economies were able to absorb most of the surplus rural population in these countries, emigration overseas lost much of its previous importance.<sup>168</sup>

90. Beijer reviewed the literature on internal migration from rural to urban areas in twelve countries of Western Europe in the period 1945 to 1961 and found out-migration from backward rural districts in every case. The volume was small in Sweden where such districts are very few and sparsely populated. In Belgium, Luxembourg, Switzerland, the Netherlands and Denmark, an influx of foreign workers was needed to supplement the national drift of labour surplus from the countryside because the national rural population was already relatively small. Although such rural districts were more numerous in Austria, the Federal Republic of Germany and France, the outflow from them to urban industries also had to be supplemented by an influx of foreign manpower. In Norway and Finland, the volume of rural emigration roughly matched the expanding demand for urban manpower. In Italy, finally, the surplus manpower from rural backward regions reached such proportions that hundreds of thousands of these persons engaged themselves for work in Switzerland, France and the Federal Republic of Germany.<sup>169</sup>

91. In most countries of the European Economic Community, rural out-migration around 1960 was being matched by either declining or stable population in the cores of the large urban municipalities. In Belgium, the Federal Republic of Germany, France and the Netherlands, the urban and suburban fringes, special residential communities and, in some cases, industrialized rural localities were the principal net gainers through migration. In Italy, on the other hand, the prevailing rural-urban migration was superimposed upon the regional emigration from southern, middle and eastern north Italy mainly to the Roman agglomeration and to the Turin-Milan-Genoa industrial triangle which has become a major

<sup>167</sup> Friedlander and Roshier, "A study of internal migration . . ." (1966), pp. 265-266. Thomas found, however, that the outflow from the areas containing basic industries was stemmed in the post-war period when Britain had to greatly increase her volume of exports. See his "The changing pattern of internal migration . . ." (1955), p. 662.

<sup>168</sup> Horstmann, "Rural-urban migration . . ." (1967), p. 496; Ungern-Sternberg and Schubnell, *Grundriss der Bevölkerungswissenschaft* (1950), pp. 512-513; Meyer, "German internal migration statistics . . ." (1938), p. 357; Thomas, *Social and Economic Aspects of Swedish . . .* (1941), pp. 26-28; Warming, *Danmarks Erhvervs-og . . .* (1938), pp. 126-128; Kirk, *Europe's Population . . .* (1946), pp. 131-140; Landry, *Traité de démographie* (1949), pp. 477-479.

<sup>169</sup> Beijer, *Rural Migrants in Urban Setting . . .* (1963), p. 321. For an analysis of the flow of migration (both internal and across international boundaries) towards highly industrialized centres of Western Europe, see Wander, "Wanderungen in Westeuropäischen . . ." (1966).

<sup>162</sup> Kozlov, "Migratsii naseleniia" (1964); Lorimer, *The Population of the Soviet Union . . .* (1946), pp. 48, 171-172.

<sup>163</sup> Uralis, *Rost naseleniia v SSSR* (1966), p. 34.

<sup>164</sup> After 1959, however, the relationship between the migration and natural increase components of urban growth changed considerably. See the discussion in section C below.

<sup>165</sup> Daragan, "Economic development and internal migration" (1967); Konstantinov, "Rural-urban migration as a factor . . ." (1967).

<sup>166</sup> Cairncross, "Trends in internal migration . . ." (1939), pp. 21-25; MacDougall, "Inter-war population changes . . ." (1940).



centre of attraction since the decrease in overseas emigration earlier in the present century.<sup>170</sup>

92. In Japan, internal migration has involved principally an inflow of population into the most highly industrialized areas. The seven prefectures comprising these areas show an almost constant net inflow of population according to censuses taken between 1920 and 1960. In almost all the remaining thirty-nine prefectures there has been a net out-migration.<sup>171</sup> During the period from 1955 to 1960, twenty-six out of forty-six prefectures underwent absolute population decreases as a result of a net out-migration in excess of natural increase.<sup>172</sup> The census returns for 1965 showed a continuation of the trend towards concentration of population in metropolitan areas. Between 1960 and 1964, nearly two thirds of the total gross migration across prefectural boundaries consisted of migration into the Tokyo, Osaka and Nagoya metropolitan areas; migration from metropolitan to non-metropolitan areas, as well as between non-metropolitan areas, accounted for the remainder.<sup>173</sup> More recently, however, in-migration to the metropolitan areas seems to be reaching a saturation point. At the same time, out-migration from metropolitan to non-metropolitan areas has been gaining some importance.<sup>174</sup> Consequently, net out-migration from those non-metropolitan areas has been shrinking substantially.<sup>175</sup>

93. Data on recent trends in internal migration are less adequate for countries in the developing regions and this deficiency is even more marked with respect to movements in the past. Ho, working with highly fragmentary sources, has described the principal interregional migrations in China up to the beginning of the second half of the present century.<sup>176</sup> Especially notable has been the movement of Chinese into Manchuria which accompanied the industrial and agricultural development of that part of China since the end of the nineteenth century.<sup>177</sup>

94. In recent decades, rural-urban internal migration has become the dominant migration form and a phenomenon of great significance in all the developing regions,

<sup>170</sup> Horstmann, "Rural-urban migration ..." (1967). See also his "Die Land/Stadt-Wanderung ..." (1966). Various studies have dealt with the regional patterns of migration within Italy, among them De Vergottini, "Migrazioni interne in Italia ..." (1969); and his "Sulla gravitazione della popolazione italiana ..." (1963); Federici, "Considerazioni sulle migrazioni interne ..." (1963); Migliorini, "Migrazioni interne e spostamenti territoriali ..." (1962).

<sup>171</sup> Taeuber, *The Population of Japan* (1958), pp. 124-125; Tachi, Hama and Okazaki, *Mirai no Nihon Jinko* (1970), pp. 193-194.

<sup>172</sup> Tachi, ed., *Nihon no Jinko Ido* (1961), p. 1; Ueda, "Internal migration affecting age composition ..." (1967), p. 538.

<sup>173</sup> Kono, "Recent trends of internal migration ..." (1967).

<sup>174</sup> Tachi, Hama and Okazaki, *Mirai no Nihon Jinko* (1970), pp. 198-199; Kuroda, "Jinko ido no tenkan kasetsu" (1970), p. 22. In the period 1955-1959, migrations from metropolitan to non-metropolitan prefectures accounted for about 15 per cent of the total gross migrations but the proportion increased up to almost 20 per cent during the period 1965-1970. See Tachi, Hama and Okazaki, *Mirai no Nihon Jinko* (1970), p. 198.

<sup>175</sup> Kuroda, *Continuity and Transformation ...* (1970), p. 11.

<sup>176</sup> Ho, *Studies on the Population of China ...* (1959), pp. xii and 136-168.

<sup>177</sup> "Manchuria as a demographic frontier", *Population Index* (1945), p. 265.

although to a greater extent in Latin America than in the others.<sup>178</sup>

95. It has been estimated that in Latin America during the decade from 1950 to 1960 there was a net flow of approximately 14.6 million people from rural areas to towns and cities.<sup>179</sup> The magnitude of both the outflow from the countryside and the inflow into the urban areas is seen in the fact that the 14.6 million net migration represents slightly over 15 per cent and 24 per cent, respectively, of the estimated total rural and urban populations at the beginning of the decade. In Brazil alone, the net movement from country to city during the 1950s was around 7 million people, or one out of every ten persons.<sup>180</sup> According to Schultz, in Colombia more than one third of the rural population under age 40 in 1951 had migrated from these areas by 1964.<sup>181</sup> Elizaga's estimates of annual intercensal net in-migration rates into the urban areas of seven Latin American countries show that in five of these (Chile, Panama, Nicaragua, Colombia and Venezuela) "the annual rates are above 1.5 per cent", and in the other two (Costa Rica and El Salvador) the rates were only slightly below 1 per cent.<sup>182</sup>

96. Interregional migration has been of considerable importance in Brazil. Historically, the impoverished north-east has been the region of heavy out-migration. Whereas it contained 47 per cent of Brazil's population in 1872, by 1960 the figure had declined to 32 per cent.<sup>183</sup> The flow of migration from the north-east and from the States of Minas Gerais and Bahia was southward, particularly to the State of São Paulo and to Rio de Janeiro. In the 1950s the new coffee districts of Paraná, the central region where the new capital of Brasilia is located, north central Maranhão and southern Mato Grosso all gained population as a result of internal migration.<sup>184</sup> The most important migration flow in

<sup>178</sup> In Africa there is evidence, not very well documented, of a wide variety of other movements. In addition to nomadic pastoralists in some areas, there is seasonal and also short-term migration (for periods up to two years) for work in mines and in agriculture as well as in towns. Prothero, "Migration in tropical Africa" (1968), pp. 251-252. In South-East Asia, movements, sometimes of considerable proportions, to settle new lands or to exploit new resources have been reported. United Nations, *The Population of South-East Asia ...* (1958), p. 55. In Latin America generally, shifting cultivators and migrant pioneers are reported to "represent a rather small proportion of the rural population of the region". United Nations, Economic Commission for Latin America, "Rural settlement patterns and social change ..." (1965), pp. 7-8. None the less, data from Brazil's 1950 census on state of birth and state of residence indicated net migration involving a rural exodus to new areas of land settlement. Diégues, "Internal migration in Brazil" (1967).

<sup>179</sup> Ducoff, "The role of migration in the demographic ..." (1965).

<sup>180</sup> Smith, "The role of internal migration ..." (1967).

<sup>181</sup> Schultz, "Rural-urban migration in Colombia" (1971), p. 163.

<sup>182</sup> Elizaga, "Internal migrations ..." (1965), pp. 147-148.

<sup>183</sup> Daly, "The population question in Northeast Brazil ..." (1970), p. 538.

<sup>184</sup> Smith, "The role of internal migration ..." (1967); see also Neiva, "The population of Brazil" (1966), pp. 52-54; Chardon, "Changes in the geographic distribution ..." (1966), pp. 158-162; Smith, *Brazil ...* (1963), pp. 40-50; Diégues, "Internal migration in Brazil" (1967).

Mexico has been that towards the Federal District, that is to say, Mexico City. Another area of substantial immigration is the State of Baja California Norte where a highly mechanized intensive agriculture has been developed, its produce destined in part for export to the United States.<sup>185</sup>

97. It has generally been considered that migration rates in India are low in comparison with those of most Western European countries and the United States. This was Davis's finding based on an analysis of place-of-birth statistics from the 1931 census,<sup>186</sup> and it is, on the whole, supported by Zachariah's comprehensive study of interstate migration in India between 1901 and 1931. The principal areas which gained population through migration during this period were the States of Assam and Bengal in the east and Bombay, Mysore and Travancore-Cochin in the south-west.<sup>187</sup> There were important shifts in the predominant patterns of interstate migration during the 1940s, but in the 1950s the west and east zones again registered the principal gains.<sup>188</sup>

98. When movements other than those which occur across state boundaries are considered, the volume of migration in India appears much higher. Studying lifetime migration streams based on 1961 census results, Bose showed that while only about 3 per cent of the population were enumerated in a state other than the one in which they were born, about 30 per cent were enumerated in a place different from that of their birth. Short-distance migration, a large part of it consisting of marriage migration of women, is the predominant type of internal migration in India; moreover, most migration was shown to take place from rural to rural areas. Only among interstate male migrants did the volume of rural-to-urban migration exceed that which occurred among rural places.<sup>189</sup> Kumar's analysis of interstate migration streams during 1951-1961 revealed that the rural-to-urban component was in most cases only 30-35 per cent of the total.<sup>190</sup>

99. If the absorptive capacity of the urban population is taken into consideration, the volume of rural-to-urban migration in India looms larger. Bogue and Zachariah noted that the estimated net rural-to-urban migration of somewhat under 9 million in India during 1941 to 1951 is equivalent to a net out-migration of only 3 per cent of the 1941 rural population, but to "a rate of net in-migration to cities equivalent to 20 per cent of the 1941 urban population". Their analysis of the characteristics

of rural-to-urban migration during this period indicated it to be a widespread phenomenon which had already lost its "pioneering" characteristics; with migration channels firmly established, the nation then seemed "all set to enter a phase of unprecedented urbanization".<sup>191</sup> However, it has been estimated that net rural-urban migration during 1951-1961 amounted to only 5.2 million, a considerable drop from the volume of the previous decade.<sup>192</sup> While this apparent slowing of the pace of urbanization has not yet been adequately explained, it has been suggested that the more rapid rate of natural increase in urban areas in the 1950s, as compared with earlier periods—owing to falling mortality—may have reduced the scope for rural-to-urban migration in the absence of a sufficient expansion of urban employment opportunities.<sup>193</sup>

100. There is evidence that the phenomenon of return migration has reached substantial proportions in India, being fostered by the close ties which the urban migrant typically retains with his village of origin. This rapid turnover migration deprives India's cities of, in Mitra's words, "a true industrial proletariat who have staked their lives in the city and severed their roots in the village".<sup>194</sup>

101. Relative to the size of their populations, the volume of rural-to-urban migration appears also to be small in Ceylon and Pakistan. Trends in the urban population at different census dates suggest an acceleration in the rate of rural-to-urban migration in Pakistan during 1951-1961, while in Ceylon there seems to have been a slight reduction in the tempo of urban growth.<sup>195</sup> While much attention has been given in Indonesia to the possibilities of encouraging migration from densely populated Java to the outer islands, actual movements have been rather modest in volume, amounting to about 7 per cent of Java's annual population increase in the period before the Second World War and to only about 3 per cent in the peak post-war years.<sup>196</sup> In the Philippines according to one study, aside from the migration to metropolitan Manila, rural-urban migration during the 1950s lagged behind expectations, while movements of agricultural population to frontier lands, particularly to Mindanao, were impressive.<sup>197</sup>

102. The description of migratory movements in Africa is complicated by "the heterogeneity of its patterns which vary in relative importance between different

<sup>191</sup> Bogue and Zachariah, "Urbanization and migration in India" (1962), pp. 31 and 45.

<sup>192</sup> Zachariah and Ambannavar, "Population redistribution in India ..." (1967), p. 103.

<sup>193</sup> See the discussion and sources in section D below.

<sup>194</sup> Mitra, "Internal migration and urbanization ..." (1967), p. 610; and his "Problems of internal migration ..." (1968), p. 6. On the importance of return migration see also Bose, "Migration streams in India" (1967), pp. 604-605; Rele, "Trends and significance of internal migration ..." (1969), p. 505.

<sup>195</sup> Bose, "Internal migration in India ..." (1967), pp. 483-485. The rates of urban growth were lower in Ceylon than in either India or Pakistan. See also Vamathevan, "Some aspects of internal migration ..." (1967); Afzal, "Migration to urban areas in Pakistan" (1967).

<sup>196</sup> Heeren, "Internal migration in Indonesia" (1967), p. 595.

<sup>197</sup> Simkins, "Migration as a response to population pressure ..." (1970), pp. 263-264.

<sup>185</sup> Tabah and Cosio, "Mesure de la migration interne ..." (1970), pp. 334-335; Pedrero Nieto, "Corrientes migratorias internas ..." (1972).

<sup>186</sup> Whereas 22.5 per cent of the native population in the United States in 1940 lived outside the state in which they were born, only 3.6 per cent of the Indian population in 1931 lived outside their state or province of birth. Davis, *The Population of India ...* (1951), p. 107.

<sup>187</sup> Zachariah, *A Historical Study of Internal Migration in the Indian Sub-Continent ...* (1964), pp. 259-260.

<sup>188</sup> Rele, "Trends and significance of internal migration ..." (1969), p. 502.

<sup>189</sup> Bose, "Migration streams in India" (1967), pp. 597-602.

<sup>190</sup> Kumar, "The pattern of internal migration ..." (1967), particularly p. 628.

regions and in the same region at different times".<sup>198</sup> Most studies that have been made are monographic in nature and too circumscribed to allow ready generalizations.<sup>199</sup> One study of interprovincial migration in Kenya, using 1962 census data on province of birth and of residence, found the movements to be not only from rural to urban areas but also from the less developed to the more developed parts of rural Kenya. "The demand for labour in the modern farms that developed ..." and "... the urbanization associated with this economic revolution tended to intensify the attraction of these areas ...".<sup>200</sup> Another study, based on sample survey data, of migration into Lagos Federal Territory, the capital of Nigeria, revealed that over 80 per cent of the heads of all households were migrants although only 51 per cent of all household members were migrants.<sup>201</sup>

103. Prothero, in a broad and admittedly qualitative sketch of the various types of population movements in Tropical Africa, found movements associated with rural-urban migration to be an important feature in the mobility that has developed since the countries became independent. While people have been moving at increasing rates from rural areas to the rapidly expanding urban areas, the over-all proportion of urban population is still low. Considerable regional variations are noted.<sup>202</sup> In Ghana, Caldwell found that while rural-to-urban migration seems to have been a feature of urban growth for at least half a century, it had greatly accelerated in the 1960s. Moreover, long-term rural-to-urban migration—in which family members accompany or follow the migrant—was rising in importance relative to seasonal migration to the towns of individuals who spend part of the year working in agriculture.<sup>203</sup>

#### (b) Migration differentials

104. In the study of differential migration, migrants are usually compared with persons remaining at the place of origin or with persons native to or living in the place of destination; occasionally, however, they are compared with all non-migrants.<sup>204</sup>

105. Information on migration differentials is of interest for various reasons and research on the subject reflects this diversity of objectives. The characteristics that are studied and the base population with which they are compared often vary depending on the objectives under study. Some studies, for example, are concerned

with the consequences of migration for the population at the place of origin or at the place of destination.<sup>205</sup> Another group of studies is concerned with problems relating to the adjustment and assimilation of migrants at their place of destination.<sup>206</sup> Other scholars, interested in the migration process itself, have either been searching for universally valid differentials<sup>207</sup> or, at least, to "develop principles of selectivity" relating certain types of selectivity to major types of migration.<sup>208</sup> A variant of this approach is found in a theory once widely held that migration is positively selective with respect to personal qualities that are "based at least partly on hereditary predisposition".<sup>209</sup> Differential migration represents for others a quantitative approach either towards the formulation of migration theory or at least towards an understanding of the factors affecting migration.<sup>210</sup> Nevertheless, the majority of migration studies are purely descriptive: they attempt mainly to measure the volume of migration and to identify the migrants according to those characteristics for which information is readily available; for reasons of convenience the comparison, if any, is usually made with the population at the place of destination.

106. Owing to these different purposes in measuring migration differentials, the findings that are reported in the literature are lacking in comparability. Perhaps, for this reason, no comprehensive effort has been made recently<sup>211</sup> to review systematically the thousands of studies with data on migration differentials in order to generalize about each differential characteristic under varying conditions—geographic, historical, cultural and

<sup>205</sup> In the former case, the place of origin provides the base population; in the latter case, the place of destination. Demographers are often interested in sex and age differentials in order to study the effect of migration on the sex-age structure at the place of origin, the place of destination, or both; the significance of changes in sex-age structure for crude death rates, birth rates, economic activity rates, school attendance rates etc., has been noted in other chapters. Various other characteristics of migrants, such as marital status, level of education, level of fertility, occupation and ethnic composition, are of interest to different specialists.

<sup>206</sup> See, for example, Germani, "Migration and acculturation" (1964), pp. 163-166, 176 ff.

<sup>207</sup> In this class falls one of Ravenstein's laws (see section D) that "females appear to dominate among short-journey migrants". Ravenstein, "The laws of migration" (1885, 1889). Among the series of hypotheses about the characteristics of migrants formulated by Lee is one that migrants tend to be bimodally selected with respect to qualifications (some ranking high and others low in terms of occupational or educational skills). Lee, "A theory of migration" (1966), pp. 48, 56-57.

<sup>208</sup> Bogue, "Internal migration" (1959), p. 505.

<sup>209</sup> Hofstee, *Some Remarks on Selective Migration* (1952), pp. 1-2. Hofstee reviews and evaluates many of the studies done on selective migration prior to the Second World War in the Netherlands and in the United States. The principal characteristics used in these studies were brain measurements, intelligence tests and social achievements. A summary of some of his findings is given later in this section.

<sup>210</sup> According to this view, migration is part of the process of adjustment to basic social and economic changes that are taking place. The migrants are the persons most exposed to the effect of these changes and their differential characteristics should reflect this differential exposure. Bogue, "Internal migration" (1959), p. 505.

<sup>211</sup> Not since the 1938 study by Thomas, ed., *Research Memorandum on Migration Differentials* (1938).

<sup>198</sup> Lorimer, Brass and Van de Walle, "Demography" (1965), p. 297.

<sup>199</sup> Brass *et al.*, *The Demography of Tropical Africa* (1968), p. 8.

<sup>200</sup> Ominde, "Some aspects of population ..." (1968).

<sup>201</sup> Ejiogu, "African rural-urban migrants ..." (1968).

<sup>202</sup> Prothero, "Migration in tropical Africa" (1968), pp. 250-252. See also his "Socio-economic aspects of rural/urban migration in Africa ..." (1965).

<sup>203</sup> Caldwell, *African Rural-Urban Migration ...* (1969), pp. 201-203, 210.

<sup>204</sup> Often the terms "selective migration" and "differential migration" are used interchangeably. See, for example, Bogue, "Internal migration" (1959), p. 497. More frequently, however, the term selective migration is reserved for comparisons with non-migrants at the place of origin from among whom the migrants were "selected".

other. Indeed, it has also been suggested that selectivity is in part a function of the phase of migratory movements. According to this view, migration is more highly selective at the initial or pioneer phase of a movement and becomes more representative of the general population at the place of origin when the migration becomes a mass movement.<sup>212</sup>

#### (i) Age

107. Without much doubt, the most universally valid of all migration differentials is the age differential, and there are few exceptions to the rule that migration is selective of persons in young, adult working ages.<sup>213</sup> Migrants are generally concentrated in an age range from 15 or 20 to about 30 or 35 years. In the Soviet Union, the ages of particular concentration during the period 1939 to 1958 were those between 18 and 35,<sup>214</sup> and in the United States from 1964 to 1965, the peak was between the ages 20 and 29.<sup>215</sup> In Hungary and the German Democratic Republic, the modal internal migration age range in 1962 was 20 to 24 and 18 to 20 respectively.<sup>216</sup> In Japan, two thirds of the inter-prefecture migrants during the year prior to the 1960 census were in the ages 15 to 29.<sup>217</sup> In the United Arab Republic, mobility reaches a peak at ages 20-24, remains high at ages 25-29

<sup>212</sup> The distinction between the pioneer and mass or social phases of a migratory movement is found in Mortara, "Factors affecting rural-urban migration ..." (1967), p. 512; and Petersen, *Population* (1961), p. 608. Browning and Feindt have applied it specifically to differential migration in their study of migrants into Monterrey, Mexico, and found "that migrants have become increasingly less selective over time". See their "Selectivity of migrants to a metropolis ..." (1969), p. 355. Somewhat similarly, Germani has suggested that the rate of out-migration from rural areas will be inversely associated with selectivity and directly related with the degree of disintegration of the traditional order; a high rate of out-migration, for instance, would indicate advanced disintegration and the selectivity of the migration would then be rather low. Germani, "Migration and acculturation" (1961), pp. 169-170.

<sup>213</sup> Tabah and Cosio, "Mesure de la migration interne ..." (1970), p. 339; Kuroda, "Internal migration ..." (1967), p. 507; Bogue, "Internal migration" (1959), p. 504. But there are some types of migration where this is not the case. In the United States, for instance, there is a migration of retired aged persons to climatically favoured areas, such as Florida or Arizona. A comparison of age structures in central cities with those in suburban areas which have been annexed to them indicates that city-to-suburb migration draws largely on mature adults and their children, as can be inferred from data in Miller and Varon, *Population in 1960* ... (1961).

<sup>214</sup> Daragan, "Economic development and internal migration" (1967), p. 491.

<sup>215</sup> Bogue, *Principles of Demography* (1969), p. 761. During the decades from 1870 to 1950, around 45 or 50 per cent of interstate migrants were between the ages 20 to 34 (age at end of decade). Thomas, "Internal migration in the United States ..." (1967), p. 535.

<sup>216</sup> Thirring, "Internal migration in Hungary ..." (1967), p. 531. In a study of migrants to German cities in the 1930s, it was found that the highest migration rates for males occurred between ages 20 and 25 and for females at about age 20. Heberle and Meyer, *Die Grossstädte* ... (1937), pp. 22-25.

<sup>217</sup> Ueda, "Internal migration affecting age composition ..." (1967), p. 538. A considerable amount of migration of young persons in Japan results from the fact that most colleges and universities are located in metropolitan centres, and students who migrate there frequently remain after their graduation. See, for example, Ueda, "Kokunai jinko ido ni kansuru ..." (1967), p. 76.

and then falls sharply.<sup>218</sup> Among migrants into Bombay, India, during the intercensal period 1951-1961, about 43 per cent were between the ages 20 and 35.<sup>219</sup> A sample survey in Lagos, Nigeria, showed in-migrants to be especially concentrated at the ages 15 to 34,<sup>220</sup> and in Ghana it was found that initial migrations to the towns are generally made between 15 and 25 years of age.<sup>221</sup> Female in-migration rates in Guayaquil, Ecuador, Panama City, Panama and Greater Santiago, Chile, were often higher at the ages 10 to 14 than at 30 to 34 years of age.<sup>222</sup> In the urban areas of Mexico, migration rates were found to be highest for males at ages 20 to 29, and for females at ages 15 to 29.<sup>223</sup> According to Tabah and Cosio, in France, the United States and other industrialized countries, the migration rate is also relatively high at very young ages; in less developed countries this phenomenon is much less apparent, if at all.<sup>224</sup> Despite the well-nigh universal concentration of migrants in the young working ages there is some evidence that in countries where retirement from work is associated with a change of residence, specific streams of certain types of migration may be heavily weighted with persons in the older ages.<sup>225</sup>

#### (ii) Sex

108. The validity of Ravenstein's generalization that "females appear to dominate among short-journey migrants"<sup>226</sup> appears to depend in part upon how the notion "short-journey" is defined. Some scholars have reformulated the differential to state that females preponderate in well-established, secure migratory movements and males in those streams that have a pioneering or innovating character.<sup>227</sup> This formulation is more in agreement with data showing that in most of Asia and Africa (where urbanization is still in an early stage), urban migration is primarily a movement of males, whereas generally in Latin America, Europe, North America and Oceania (except in cities which are centres of heavy industry), a heavier migration of women to cities is found.<sup>228</sup> The phenomenon is evidently complex

<sup>218</sup> Zachariah, "Sex-age pattern of population mobility ..." (1971), p. 2839.

<sup>219</sup> Zachariah, "Bombay migration study ..." (1966), p. 382.

<sup>220</sup> Ejiogu, "African rural-urban migrants ..." (1968), p. 324.

<sup>221</sup> Caldwell, "Determinants of rural-urban migration ..." (1968), p. 368.

<sup>222</sup> Elizaga, "Internal migrations ..." (1965), p. 159.

<sup>223</sup> Tabah and Cosio, "Mesure de la migration interne ..." (1970), p. 339. On the age distribution of migrants to urban areas in Mexico, see also Cabrera, "Selectividad por edad y por sexo ..." (1970).

<sup>224</sup> Tabah and Cosio, "Mesure de la migration interne ..." (1970), p. 339. Stone also notes a higher migration rate at very young ages compared to the teen ages in Canada, and explains it in terms of the influence that the stage reached in the individual or family life cycle exerts on decisions to migrate. See his *Migration in Canada* ... (1969), pp. 73-74.

<sup>225</sup> Eldridge, "Primary, secondary, and return migration ..." (1965), p. 455.

<sup>226</sup> Ravenstein, "The laws of migration" (1885, 1889). See also Lee, "A theory of migration" (1966), pp. 47-48.

<sup>227</sup> Bogue, *Principles of Demography* (1969), p. 765; Kuroda, "Internal migration ..." (1967), p. 507.

<sup>228</sup> United Nations, *Report on the World Social Situation* ... (1957), pp. 118, 120.

and related to differential employment opportunities by sex and a number of other considerations as well.<sup>229</sup> In the Soviet Union, the migrant population includes somewhat fewer women than men in the country as a whole, although the ratio varies in different economic and administrative regions.<sup>230</sup> In Poland, "men constitute the major portion of emigration from villages to towns".<sup>231</sup> In the United States, male interstate migration rates used to exceed those of females, but the two sets of rates had converged by 1950.<sup>232</sup> Trends in Canada between 1901 and 1961 also show a narrowing differential over time, and the ratio of males to females among migrants was positively associated with the distance of the move.<sup>233</sup> In the Netherlands and in the Federal Republic of Germany, females are reported as predominating in migration out of rural municipalities and males in migration out of large towns.<sup>234</sup> In France, sex ratios by age from the 1946 census for rural communes and for cities of 100,000 or more population clearly show that rural-urban migration is selective of females.<sup>235</sup> In Latin America, one study showed net in-migration rates in urban areas to be higher for females in seven countries;<sup>236</sup> another study, finding a higher proportion of women of reproductive age in urban areas than in rural areas in all Latin American censuses since the Second World War, attributed this to the predominance of females in rural-to-urban migration.<sup>237</sup> Males predominated in migration into Lagos, Nigeria.<sup>238</sup> In India for the period 1941 to 1951, Bogue and Zachariah report the surprising finding that, although male in-migrants exceeded females in the cities of Bombay, Madras, Delhi and Calcutta, the difference was substantial only in Bombay.<sup>239</sup> How this finding can be reconciled with the considerably higher urban than rural sex ratio in India<sup>240</sup> is not clear. In summary, it may be said that varying patterns of sex-selective migration are found; these variations appear to be associated with economic aspects of the social structure in conjunction with the socio-cultural position of women in society.

<sup>229</sup> International Labour Office, *Why Labour Leaves the Land* ... (1960), pp. 164-165.

<sup>230</sup> Daragan, "Economic development and internal migration" (1967), p. 491.

<sup>231</sup> Borowski, "New forms and factors ..." (1967), p. 550.

<sup>232</sup> Thomas, "Internal migration in the United States ..." (1967), p. 535.

<sup>233</sup> George, *Internal Migration in Canada* ... (1970), p. 187.

<sup>234</sup> Horstmann, "Rural-urban migration ..." (1967), pp. 497-498.

<sup>235</sup> Goreux, "Les migrations agricoles en France ..." (1956), pp. 329-330. Tugault found that while mobility was not as high for women as for men in the early part of the nineteenth century this pattern was later reversed. See his "La mobilité géographique en France ..." (1970), p. 1029.

<sup>236</sup> Elizaga, "Internal migrations ..." (1965), p. 160.

<sup>237</sup> Carleton, "Fertility trends and differentials ..." (1965), pp. 18-20.

<sup>238</sup> Ejiohu, "African rural-urban migrants ..." (1968), p. 324.

<sup>239</sup> Bogue and Zachariah, "Urbanization and migration in India" (1962), p. 42.

<sup>240</sup> In 1961, the urban masculinity ratio in India was 13 per cent higher than the corresponding rural ratio. Computed from data in United Nations, *Demographic Yearbook, 1970* ... (1971), table 5.

### (iii) Marital status

109. Much less information is available on migration differentials by marital status than by sex and age, and most discussions of the former are less systematic in their coverage. A stumbling-block in this connexion is the problem of inferring marital status at the time of migration from available information on status at the time of enumeration. In the case of marriage migration, such as in India<sup>241</sup> and in pre-industrial Japan,<sup>242</sup> this distinction is not very important as long as marriage usually occurs around the time of migration. In at least some of the instances of preponderantly male migration to cities in Africa and Asia, many of the unaccompanied men are in fact married and either remit money home to their family or else return with their savings at the end of their migration period.<sup>243</sup> In Latin America a flow of young, unmarried females seeking domestic employment in the cities has been observed.<sup>244</sup> In the United States an analysis of 1960 census data disclosed, rather surprisingly, a higher proportion of migrants among married persons than among single persons.<sup>245</sup>

### (iv) Fertility

110. Two sets of considerations can affect the relation between migration and fertility. Since migration, or geographical mobility, occurs in many instances as a response to differential economic opportunities and therefore is a form of social mobility,<sup>246</sup> it might be expected that migratory streams of this kind (especially rural to urban), would be highly selective of persons of lower than average fertility at the place of origin. Secondly, however, the question is raised whether rural-to-urban migrants, taking into consideration their origin in a place where fertility is above average<sup>247</sup> and their briefer exposure to the conditions of urban life in modern industrial society,<sup>248</sup> will have higher or lower fertility than urban natives. Undoubtedly, on account of inadequate data, there has been very little research into the first point regarding the fertility selectivity of migrants with respect to place of origin. Most of the research has been on

<sup>241</sup> Bose, "Internal migration in India ..." (1967), p. 485; Davis, *The Population of India* ... (1951), pp. 111-114.

<sup>242</sup> Taeuber, *The Population of Japan* (1958), p. 139. Even in recent years persons migrating for marriage have constituted an important proportion of all migrants into large cities (about 10 per cent in Tokyo and 14 per cent in Kawasaki, according to surveys). Tokyo Metropolitan Government, *Tokyo-to Ido Jinko Tokei* ... (1963); Kuroda, "Jinko ido no doko ..." (1972), p. 5.

<sup>243</sup> United Nations, *Report on the World Social Situation* ... (1957), p. 121; International Labour Office, *Why Labour Leaves the Land* ... (1960), p. 164 ff.; Bose, "Internal migration in India ..." (1967), pp. 485-486.

<sup>244</sup> United Nations, *Report on the World Social Situation* ... (1957), pp. 174-181; Elizaga, "A study of migration to Greater Santiago ..." (1966), p. 364.

<sup>245</sup> Bogue, *Principles of Demography* (1969), pp. 767-768. However, the interpretation of the data is uncertain since marital status referred to status at the end of a five-year migration period.

<sup>246</sup> See chapter IV, section D, for a discussion of social mobility as one of the factors in the transitional decline of fertility.

<sup>247</sup> See chapter IV, section F, for a discussion of urban-rural fertility differentials.

<sup>248</sup> See chapter IV, section D, for a discussion of urbanization as a factor in the transitional decline of fertility.

comparisons of migrant and native fertility at the place of destination and has been concerned principally with the United States and various countries of Latin America. The results to date are inconclusive. A study of migrants during the period 1935 to 1940 in the United States showed that the migrants, as compared with natives resident in a given region, generally had lower fertility except in the North Central States where most of the migrants had come from high-fertility areas in the South.<sup>249</sup> Separate studies by Kiser and Goldberg, using different data from the 1930s, arrived at opposite conclusions in comparing the fertility of rural and rural-farm migrants into cities with that of native urbanites. In Latin America, studies of in-migrants into Monterrey, Mexico, and into Santiago, Chile, found no significant differential fertility between migrants and native residents. On the other hand, various studies in Argentina, Brazil and Puerto Rico have found migrants to have lower fertility than non-migrants.<sup>250</sup>

#### (v) Education

111. Aside from sex and age, education is the characteristic on which information concerning differential migration is most readily available. Education is used as an index of socio-economic status and also as a measure of population quality, whether as a reflection of investment in human capital or of genetic differences. Rather diverse findings are reported in the literature. In-migrants into Bombay<sup>251</sup> and into Calcutta<sup>252</sup> in India have less education than non-migrants at the place of destination, but more education than the population of the states from which they are drawn. A similar result, comparing the educational level of in-migrants into Santiago, Chile, with people living in the rest of the country is found by Herrick who explains this on the ground that somewhat educated migrants are alert to changing employment opportunities, but originate in areas where educational opportunities are more limited.<sup>253</sup> According to the 1960 census results, migrants into the Federal District of Mexico were much inferior in education to the natives of the district.<sup>254</sup> In a survey conducted in Ghana, Caldwell compared migrants with non-migrant rural residents and found a strong positive relationship between duration of schooling and the propensity to migrate from rural areas to the towns.<sup>255</sup> Education also appeared to be an important factor in mobility in Canada and the United Kingdom. Canadian data show that among the

25-34 years age group, persons classified as migrants during 1956-1961 had higher levels of educational attainment than did those classified as non-migrants, and this was true in urban, rural non-farm and rural farm areas.<sup>256</sup> A survey in England and Wales in 1959-1960 showed that persons with at least a grammar school education were twice as mobile as those without such an education.<sup>257</sup> On the other hand, net out-migrants in the period 1940 to 1950 from rural farm areas in the United States as a whole and in North Carolina tend towards the two extremes, with net migration highest for both high and low educational levels.<sup>258</sup> In a critical review of many migration studies in the Netherlands and in the United States, Hofstee found that migration as such is not necessarily selective with respect to intelligence and education. Such a selection does generally characterize rural-urban migration, but not migration within the countryside. Hofstee notes exceptions to this principle of selection among migrants to cities also and concludes that migration is determined primarily by the spatial distribution of opportunities. The character of migration to a certain place is seen as depending on the specific opportunities it offers, whether, for example, labour force demand is principally for highly qualified personnel or for unskilled labourers.<sup>259</sup>

#### C. The distribution and growth of urban and rural population

112. Human settlement has until recently been mostly rural. It is true that a number of famous cities existed even in ancient times,<sup>260</sup> and have been of decisive significance in the innovation of human culture and civilization. But, as places of human residence and employment, cities did not absorb a large proportion of the population until the nineteenth century, and even then only in selected areas of the world. Thus, the division of human population into categories of urban and rural residence did not acquire demographic significance until modern times.

113. As discussed below, it is estimated that not more than 3 per cent of the world's population could have been considered urban in 1800, and it is uncertain whether there was even one city having a million inhabitants at that time. The emergence of cities as quantitatively important points of population accumulation can be regarded as a major event of the nineteenth century. Thus it was that Adna Weber, writing in 1899 concerning the growth of cities, observed in the opening sentence of his study: "That the most remarkable social phenomenon of the present century is the concentration of population in cities is a common observation . . ."<sup>261</sup>

<sup>249</sup> Kiser, "Fertility rates by residence . . ." (1959), pp. 280-281.

<sup>250</sup> For brief reviews of these and other studies on this subject, see Macisco, Bouvier and Weller, "The effect of labour force participation . . ." (1970), and Myers and Morris, "Migration and fertility in Puerto Rico" (1966), pp. 85-86. A detailed listing of bibliographic materials on the fertility-migration relationship for all regions of the world can be found in Macisco, Bouvier and Renzi, "Migration status, education and fertility . . ." (1969), pp. 183-184.

<sup>251</sup> Zachariah, "Bombay migration study . . ." (1966), p. 383.

<sup>252</sup> Kuroda, "Internal migration . . ." (1967), p. 507; Bogue and Zachariah, "Urbanization and migration in India" (1962), p. 51.

<sup>253</sup> Herrick, *Urban Migration* . . . (1965), pp. 77-80.

<sup>254</sup> Browning, "Urbanization and modernization in Latin America . . ." (1967), p. 91.

<sup>255</sup> Caldwell, "Determinants of rural-urban migration . . ." (1968), pp. 369-370; and his *African Rural-Urban Migration* . . . (1969), pp. 60-69, 85.

<sup>256</sup> Stone, *Migration in Canada* . . . (1969), pp. 83-84.

<sup>257</sup> Friedlander and Roshier, "A study of internal migration . . ." (1966), p. 51.

<sup>258</sup> Hamilton, "Educational selectivity of rural-urban migration . . ." (1958), pp. 114-117.

<sup>259</sup> Hofstee, *Some Remarks on Selective Migration* (1952), pp. 4-13.

<sup>260</sup> Some of these are described in chapter II, section A.

<sup>261</sup> Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), p. 1.



114. The emergence of urbanized nations in which a clear majority of the population resides in cities will undoubtedly be recognized in future history as one of the most remarkable events of the present century. At the beginning of this century only one nation, Great Britain, could be regarded as an urbanized society in the sense that more than one half of its inhabitants resided in cities.<sup>262</sup> By mid-century there were at least eighteen such nations, and by 1965 there were at least thirty.<sup>263</sup> But the majority of nations are still predominantly rural.

115. The criteria by which urban and rural localities are distinguished vary from country to country and in the course of time. Traditionally, rural residence has been associated with agricultural employment. Although rural areas may contain relatively concentrated settlement patterns in some countries, it has frequently been insisted that such population clusters must not be regarded as urban if the residents are primarily engaged in agriculture. Thus, Weber wrote that "A German *Dorf* or village containing, say 300 peasants, is just as properly called rural as an American township containing 300 farmers living half a mile apart".<sup>264</sup> In India today some localities with more than 5,000 inhabitants may appear as rural "over-grown villages".<sup>265</sup> According to the 1961 urban definition used in the Census of India, places of 5,000 or more inhabitants may be excluded from the urban category if more than one fourth of the inhabitants are engaged in agriculture.<sup>266</sup>

116. The notion that type of employment (agricultural versus non-agricultural) is a key distinction between rural and urban localities is recognized in urban definitions of a number of countries. More typically, the distinction between urban and rural localities rests on a quantitative criterion of number of inhabitants. In many countries, the cutting point between urban and rural localities may lie between 2,000 and 5,000 inhabitants, though there are also many exceptions. In Denmark, for example, all places with 200 or more inhabitants are classified as urban.<sup>267</sup> In some countries, the distinction between urban and rural localities rests on a mixture of the size of place and economic activity criteria. In a 1955-1957 survey in the Democratic Republic of the Congo, for example, urban localities are defined as follows: "Agglomerations of 2,000 or more inhabitants where the predominant economic activity is of a non-agricultural type and mixed agglomerations ... which are urban because of their type of economic activity, but rural in

size".<sup>268</sup> Still other criteria such as density, administrative status or the presence of selected services or facilities are mentioned in other urban definitions.<sup>269</sup>

# 1. THE DISTRIBUTION OF URBAN AND RURAL POPULATION IN 1965

117. The "urban" and "rural" population estimates presented in tables VI.2 and VI.3 were compiled by the United Nations from national sources, using the official definition of "urban" population in each country.<sup>270</sup> Although the urban definitions vary greatly from one country to another, it is believed that often the differences in definition may reflect differences in the characteristic features of urban and rural settlement considered most relevant in individual countries.

118. From table VI.2 it can be seen that a clear majority of the population in the presently developing regions resides in rural areas, while a clear majority of the population in the presently more developed regions resides in urban areas. One evident conclusion from such statistics is that urbanization is somehow an important aspect of economic development. More precisely, it is the shift in employment, from almost exclusively agricultural to predominantly non-agricultural activities, that constitutes development of productive capacity. In such highly urbanized countries as the United Kingdom and the United States, the proportion of the economically active population engaged in agriculture had fallen to 5 and 8 per cent, respectively, according to censuses taken around 1960.<sup>271</sup>

119. There is no exact correspondence between the shift of labour force from agricultural to industrial pursuits and the shift of population residence from rural to urban areas. In developing countries, especially, many migrants who abandon agricultural pursuits and move to the cities may find little opportunity to obtain industrial employment there. While many of them accumulate in service activities characterized by much underemployment

<sup>268</sup> United Nations, *Growth of the World's Urban ...* (1969), p. 84.

<sup>269</sup> Problems of international comparability with respect to urban definitions are discussed in *ibid.*, pp. 7-10. It has sometimes been argued that agglomerations of population should be classified as urban on quantitative demographic criteria alone, without regard to urban features or occupations, since the same qualitative features are not applicable to all cities at all times. Thus, Eldridge observes that "Ancient Rome was none the less a city in spite of the fact that it was without electricity. Modern Calcutta is none the less a city in spite of the fact that a large number of its people live in dwellings that do not have running water. The rural agglomerations of Italy are none the less agglomerations, though the majority of their inhabitants are in agricultural occupations." See her "Urban theory and concepts ..." (1955), p. 585.

<sup>270</sup> United Nations, *Monthly Bulletin of Statistics, November 1971* (1971), table B.I. Another set of estimates of urban and rural population for individual countries in 1950, 1960 and 1970 has been prepared independently at the Institute of International Studies, University of California, under the direction of Kingsley Davis. See Davis, *World Urbanization 1950-1970*, vol. 1 ... (1969), pp. 54-82. In addition to urban and rural totals, this source provides totals by size of city for each country (pp. 83-111) as well as population estimates for individual cities of 100,000 or more inhabitants (pp. 161-233).

<sup>271</sup> See chapter IX, section D.

<sup>262</sup> Davis, "The origin and growth of urbanization ..." (1955), p. 433.

<sup>263</sup> Estimates of the United Nations. Percentages of urban population in individual countries for 1965 appear in United Nations, *Monthly Bulletin of Statistics, November 1971* (1971), table B.II.

<sup>264</sup> Weber, *The Growth of Cities in the Nineteenth Century ...* (1899; 1963 ed.), p. 10.

<sup>265</sup> Bose, *Urbanization in India ...* (1970), p. 104. It was observed in connexion with the 1931 Census of India that some localities defined as urban towns in that census were almost entirely similar to rural villages "except in the provision ... of an infrequent lamp-post". *Ibid.*, p. 106.

<sup>266</sup> A comprehensive list of recent urban definitions used in many countries is provided in United Nations, *Growth of the World's Urban ...* (1969), pp. 81-84.

<sup>267</sup> *Ibid.*



TABLE VI.2. URBAN AND RURAL POPULATION IN MAJOR AREAS AND REGIONS  
OF THE WORLD: 1965

(Millions)

Major areas and regions	Urban population	Rural population	Percentage urban
World total .....	1,161	2,128	35
Developing regions .....	527	1,725	23
More developed regions .....	634	404	61
Africa .....	60	243	20
Western Africa .....	16	74	18
Eastern Africa .....	7	79	8
Middle Africa .....	4	28	14
Northern Africa .....	24	50	32
Southern Africa .....	9	11	44
Asia (excluding the USSR) .....	411	1,422	22
East Asia .....	221	631	26
Mainland region .....	152	547	22
Japan <sup>a</sup> .....	47	51	48
Other East Asia .....	21	32	40
South Asia .....	190	791	19
Middle South Asia .....	119	546	18
South-East Asia .....	48	201	19
South-West Asia .....	23	44	34
Europe (excluding the USSR) .....	272	173	61
Western Europe .....	103	41	72
Southern Europe .....	59	64	48
Eastern Europe .....	51	49	51
Northern Europe .....	59	20	75
Latin America .....	129	117	52
Tropical South America .....	66	64	51
Middle America (mainland) .....	27	30	48
Temperate South America .....	26	10	73
Caribbean .....	9	14	39
Northern America .....	154	60	72
Oceania .....	11.7	5.9	67
Australia and New Zealand .....	11.4	2.6	82
Melanesia .....	0.1	2.4	3
Polynesia and Micronesia .....	0.2	0.9	18
USSR .....	123	107	53

SOURCE: United Nations, *Monthly Bulletin of Statistics*, November 1971 (1971), tables B.I and B.II.

<sup>a</sup> Urban population defined as that of "densely inhabited districts", according to the census.

and low productivity, others remain unemployed.<sup>272</sup> Moreover, in later stages of development the rural areas themselves become less agricultural. A larger proportion of the rural population becomes engaged in commerce and local industries related to agriculture rather than farming as such. In addition, some persons employed in cities prefer to maintain rural residences once suitable transportation facilities can be provided for commuters. There is also a tendency for certain space-consuming urban employment to be exported to rural locations.

120. By 1965, approximately 35 per cent of the world's 3,300 million inhabitants resided in urban areas. Two major areas—Africa and Asia—are only about 20 per cent urban, while all of the other major areas are more than half urban.

121. Although the level of urbanization in Asia is low, its share of the world's urban population is nevertheless higher than that of any other area because its total population is so large. Asia alone claims slightly more than half of the total world population; its 411 million urban inhabitants constitute over one third of the world's urban population; and its 1,422 million rural inhabitants are roughly two thirds of the world's rural population (see table VI.3). It is significant to note in this connexion that Asia's two most populous countries, China and India, contain between them roughly two thirds of its total population, its urban population, and its rural population as well. Moreover, each of these two nations individually contains more total population and more rural population than any of the major areas, outside of Asia.

<sup>272</sup> *Ibid.*

TABLE VI.3. PERCENTAGE DISTRIBUTION OF THE WORLD'S URBAN AND RURAL POPULATION AMONG MAJOR AREAS AND REGIONS

Major areas and regions	Urban population	Rural population
World total	100.0	100.0
Developing regions	45.4	81.1
More developed regions	54.6	18.9
Africa	5.2	11.4
Western Africa	1.4	3.5
Eastern Africa	0.6	3.7
Middle Africa	0.3	1.3
Northern Africa	2.1	2.3
Southern Africa	0.8	0.5
Asia (excluding the USSR)	35.4	66.8
East Asia	19.0	29.7
Mainland region	13.1	25.7
Japan <sup>a</sup>	4.0	2.4
Other East Asia	1.8	1.5
South Asia	16.4	37.2
Middle South Asia	10.2	25.7
South-East Asia	4.1	9.4
South-West Asia	2.0	2.1
Europe (excluding the USSR)	23.4	8.1
Western Europe	8.9	1.9
Southern Europe	5.1	3.0
Eastern Europe	4.4	2.3
Northern Europe	5.1	0.9
Latin America	11.1	5.5
Tropical South America	5.7	3.0
Middle America (mainland)	2.3	1.4
Temperate South America	2.2	0.5
Caribbean	0.8	0.7
Northern America	13.3	2.8
Oceania	1.0	0.3
Australia and New Zealand	1.0	0.1
Melanesia	0.0	0.1
Polynesia and Micronesia	0.0	0.0
USSR	10.6	5.0

SOURCE: computed from data in table VI.2.

<sup>a</sup> Urban population defined as that of "densely inhabited districts", according to the census.

122. The level of urbanization in both China and India is roughly the same: China is estimated to be about 21 per cent urban and India about 19 per cent. The remaining third of Asia's population is distributed over a large number of countries. While the average level of urbanization in these countries is not far from that of China or India, still there is some range of variation. For example, Indonesia is about 16 per cent urban; Thailand 14 per cent; Pakistan 13 per cent; and Afghanistan only 7 per cent. A number of other countries of the group, many of them in South-West Asia, are well over 30 per cent urban (Iraq is 44 per cent urban; Syria 40 per cent; Lebanon 36 per cent; Jordan 44 per cent; and Israel is 78 per cent urban).<sup>273</sup>

123. It is interesting to note that Asia's presently large share of the world's urban population (roughly

one third in 1965) is actually less than it was in historic times. Murphey has observed that "Until about 1750 or 1800, it seems likely that Asia . . . contained more cities and more city-dwellers than the rest of the world combined".<sup>274</sup> He estimates that if current rates of population growth and urbanization continue, Asia may regain her earlier share of the world's urban population by the end of the present century. Because Asia in 1965 begins with a comparatively low level of urbanization, there is enormous potential for expansion of Asian cities during the present century. In many other areas of the world where the level of urbanization is already high, the urban growth rates may taper off as the rural population becomes reduced and no longer provides so many migrants.

124. Africa, with the largest territory of any of the major areas, is second to Asia in its share of the world's rural population (about 11 per cent), but the absolute size of Asia's rural population (1,422 million) is more than five and one-half times that of Africa (243 million). The size of Africa's urban population is not large—only 60 million or 5 per cent of the world's total urban population. For Africa as a whole, the percentage urban is roughly 20 per cent. In certain countries of Africa, especially in Eastern Africa, the percentage is extremely low (for example, only 6-9 per cent in Ethiopia, Kenya, Uganda and the United Republic of Tanzania). A few African countries are as much as 30 per cent or more urban: Morocco (30 per cent), Algeria (38 per cent), United Arab Republic (40 per cent), and South Africa (49 per cent).

125. Latin America and the Soviet Union stand at intermediate levels of urbanization. In both areas slightly over half of the population is urban. The two areas occupy almost the same amount of land surface and contain populations of approximately the same size. Their urban and rural populations are also quantitatively similar: each contains approximately 11 per cent of the world's urban population and approximately 5 to 6 per cent of its rural population.

126. Half of Latin America's population is contained in its two most populous countries—Brazil and Mexico. Brazil is 51 per cent urban and Mexico is 53 per cent urban. Argentina, the third largest country, represents a major departure from the average pattern of the area, being fully three-fourths urban. Uruguay and Chile are also highly urbanized, with about 75 and 69 per cent urban, respectively.

127. Within the Soviet Union, the distribution of population and cities is somewhat uneven. In 1962, over two-thirds of the urban population was clustered in the European portion of the country which occupies a relatively small part of the territory of the USSR. The remainder of the urban population was located in the eastern areas which include a much larger territory (the Urals, western Siberia, eastern Siberia, the far east, central Asia and Kazakhstan). Interestingly, the percentage urban is roughly the same in both the western and the eastern areas.<sup>275</sup>

<sup>273</sup> United Nations, *Monthly Bulletin of Statistics*, November 1971 (1971), table B.II. The figures quoted are those for 1965.

<sup>274</sup> Murphey, "Urbanization in Asia" (1969), p. 58.

<sup>275</sup> Kovalev *et al.*, eds., *Goroda Mira* (1965), pp. 15-17.

128. Europe has a clear majority of urban population—61 per cent. Although its land surface is small when compared with the major areas discussed thus far, it is second only to Asia with respect to total population and urban population. The urban population of Europe is as large as the combined urban populations of Latin America and the Soviet Union; and four and one-half times as large as the urban population of Africa.

129. Most of the countries of Europe have a rather significantly higher or lower level of urbanization than the average for Europe as a whole. On the one hand, countries of southern and eastern Europe have typically about one half of their populations in urban areas. On the other hand, the average level of urbanization in the countries of northern and western Europe is about three-quarters.

130. The remaining areas comprise some of the world's most highly urbanized nations: Australia (83 per cent urban); New Zealand (77 per cent urban); the United States (72 per cent urban) and Canada (73 per cent urban). The urbanization level is also high in Japan, its percentage depending on how "urban" localities are defined.

131. The pattern of population settlement within the presently most urbanized areas is extremely uneven. In 1965 almost half (48 per cent) of Japan's total population resided within the "Tokaido megalopolis" which is a coalescence of Japan's three largest metropolitan areas (Tokyo, Osaka and Nagoya) containing only 19 per cent of the land area in Japan.<sup>276</sup> In 1965, the Tokaido megalopolis contained close to 50 million inhabitants.<sup>277</sup> In 1960, 100 million inhabitants of the United States—56 per cent of the nation—were concentrated in eleven urban regions containing only 7 per cent of the land area in the United States.<sup>278</sup> The largest megalopolis in the United States—the Atlantic Seaboard area which extends from Boston through New York, Philadelphia, and Baltimore to Washington—probably contained roughly 40 million inhabitants at the same date.<sup>279</sup>

## 2. THE GROWTH OF URBAN AND RURAL POPULATION IN MODERN TIMES

132. Recorded history begins with the rise of cities and most of history has been shaped by events occurring in cities. Nevertheless, it remains certain that until modern times urban localities contained only a small minority of the world's population.<sup>280</sup> There were obvious limitations

<sup>276</sup> Kono, "Recent trends of internal migration ..." (1968), p. 586.

<sup>277</sup> The demography of the megalopolis in Japan has been analysed by Tachi, "Nihon ni okeru megalopolis ..." (1965).

<sup>278</sup> Pickard, "Future growth of major U.S. urban regions" (1967), pp. 2-10.

<sup>279</sup> The term "megalopolis" was popularized by Gottmann. See his *Megalopolis: the Urbanized Northeastern Seaboard ...* (1961). Gottmann argues that the megalopolis of the United States represents a "contemporary projection" of future urbanization trends in other industrialized countries. See his "Mégalopolis: région-laboratoire de l'urbanisation moderne" (1962).

<sup>280</sup> According to one author, even in well-organized empires the urban population probably never exceeded 5 per cent of the total. Russell, "Late ancient and medieval population" (1958).

to city growth since urban populations depended on the production of a sizeable agricultural surplus, its efficient transportation, and those military, sacerdotal or administrative arrangements without which the regular distribution of the necessities of life could not have been ensured for the urban inhabitants.<sup>281</sup> Since wealth accumulated in cities, they were often under threat of attack and had to be fortified with walls and gates and their legal residents had to be distinguished by special rights and obligations. The development of an enriched urbane way of life required increasing expenditures, mostly at the expense of the rural population. Exhaustive taxation of peasants and rising administrative costs of increasingly parasitic cities eventually sapped their foundations and rendered them prone to military conquest causing them to decline and sometimes to vanish altogether.

133. In extensive empires of western antiquity, as also in various periods in China, India and Persia, principal cities attained several hundred thousand inhabitants, and sometimes perhaps even one million, though the estimates are very debatable.<sup>282</sup> Disintegration of the western part of the Roman Empire brought in its wake large losses in urban population. Even late in the Middle Ages, European cities, though numerous, were much smaller, typically in the tens of thousands, than had been those of antiquity. Imperial disorganization in China, India, south-east Asia and Persia may at times have had similar effects. It is certain that in the Sung period China was considerably more urbanized than Europe, and it is possible that at the end of the eighteenth or at the beginning of the nineteenth century the world's biggest city was Edo (now Tokyo) in Japan.<sup>283</sup>

134. It is thus quite likely that even up to the eighteenth century Europe was at a distinctly lower level of urbanization than were certain parts of Asia. Despite these smaller beginnings, the modern cycle of massive urbanization has originated in Europe, in a development that can be traced back to the rise of small, but numerous, towns in the later Middle Ages. The previously narrow limits on urban growth were lifted, leading eventually to cities of historically unsurpassed size, and to urbanization levels comprising majorities of the population in an increasing number of nations. One is led to question why such massive urban developments failed to occur at earlier times elsewhere. The answer, perhaps, may have to be sought in terms of the cities' principal functions, many of which, in history, were parasitic, preying upon the resources of the agrarian economy while offering little in return. In Europe, since the later Middle Ages, the function of

<sup>281</sup> See also the discussion of factors affecting the growth of cities in section D.

<sup>282</sup> Among possible estimates are the following: 350,000 inhabitants in Babylon in the sixth century B.C.; 500,000 in Pataliputra (now Patna, in India) in the fourth century B.C.; 700,000 in Alexandria (Egypt) in the first century B.C.; 1,100,000 in Rome in the second century of the present era; 750,000 in Baghdad in the ninth century; and 1,500,000 in Angkor (Khmer Empire) in the tenth or eleventh century. Schneider, *Babylon is Everywhere ...* (1963), pp. 138, 301.

<sup>283</sup> See the further discussion below.

TABLE VI.4. TRENDS IN URBAN POPULATION, 1800-1950

Year	Places with 5,000 or more inhabitants		Places with 20,000 or more inhabitants		Places with 100,000 or more inhabitants	
	Population (millions)	Percentage of total population	Population (millions)	Percentage of total population	Population (millions)	Percentage of total population
1800 .....	27.2	3.0	21.7	2.4	15.6	1.7
1850 .....	74.9	6.4	50.4	4.3	27.5	2.3
1900 .....	218.7	13.6	147.9	9.2	88.6	5.5
1950 .....	716.7	29.8	502.2	20.9	313.7	13.1

SOURCE: Estimates of Kingsley Davis and Hilda Hertz cited in Hauser, "World and Asian urbanization ..." (1957), p. 56.

TABLE VI.5. TRENDS IN POPULATION OF CITIES OF 100,000 OR MORE INHABITANTS, BY REGION, 1800-1950  
(Millions)

Region	1800	1850	1900	1950
World .....	15.6	27.5	88.6	313.7
Asia .....	9.8	12.2	19.4	105.6
Europe .....	4.8	12.1	42.1	83.1
USSR .....	0.57	1.1	5.9	35.1
Africa .....	0.30	0.25	1.3	10.2
America .....	0.13	1.8	18.6	74.6
Oceania .....	—	—	1.3	5.1

SOURCE: Estimates of Kingsley Davis and Hilda Hertz cited in Hauser, "World and Asian urbanization ..." (1957), p. 58. Corrected for apparent clerical errors.

TABLE VI.6. POPULATION OF AGGLOMERATIONS OF 20,000 OR MORE INHABITANTS, FOR MAJOR AREAS OF THE WORLD, 1920-1960

Major areas	1920	1930	1940	1950	1960
<i>Numbers in millions</i>					
World total .....	266.4	338.2	431.5	533.0	760.3
Developing regions .....	68.7	91.1	127.6	189.8	310.7
More developed regions .....	197.7	247.1	303.9	343.2	449.6
Africa .....	6.9	9.7	13.8	21.5	36.5
East Asia .....	39.8	53.9	73.7	94.1	147.1
South Asia .....	26.9	34.5	50.6	77.1	117.5
Europe .....	112.9	131.8	149.8	159.5	187.9
Latin America .....	12.9	18.1	25.5	40.7	69.7
Northern America .....	47.9	62.4	66.6	84.3	115.3
Oceania .....	3.1	3.8	4.5	5.8	8.3
USSR .....	16.0	24.0	47.0	50.0	78.0
<i>Percentage of total population</i>					
World total .....	14.3	16.3	18.8	21.2	25.4
Developing regions .....	5.8	7.0	8.7	11.4	15.4
More developed regions .....	29.4	32.6	37.0	40.0	46.0
Africa .....	4.8	5.9	7.2	9.7	13.4
East Asia .....	7.2	9.1	11.6	13.8	18.5
South Asia .....	5.7	6.5	8.3	11.1	13.7
Europe .....	34.7	37.2	39.5	40.7	44.2
Latin America .....	14.4	16.8	19.6	25.1	32.8
Northern America .....	41.4	46.5	46.2	50.8	58.0
Oceania .....	36.5	38.0	40.9	45.7	52.9
USSR .....	10.3	13.4	24.1	27.8	36.4

SOURCE: Compiled from United Nations, *Growth of the World's Urban ...* (1969), table 8.

cities became predominantly commercial,<sup>284</sup> resulting in a wider distribution of benefits including gains in the rural sectors leading to increased agricultural productivity and also a broadened basis of purchasing power, hence an ever-growing potential for eventual urban growth.<sup>285</sup> The rise of competing nation states in Europe consolidated wider markets and facilitated the equipment of fleets, conquest of overseas colonies, and emergence of the mercantilist phase of modern imperialism. This added further impetus to city growth, especially sea-ports and river ports where large cargoes were warehoused, transferred from one means of transportation to another, and again redistributed. Large commercial capital was thereby generated which, in turn, provided the resources for investments in manufacturing processes as the Industrial Revolution went under way. Urban and rural developments then became mutually reinforcing, resulting in a vast transfer of labour force from agriculture to urban occupations.

135. Since definitions of urban localities vary among countries and change in the course of time, studies of time trends are usually conducted in terms of cities or towns having at least some minimal size. Davis and Hertz, for example, estimated the populations in localities of 5,000 or more inhabitants, 20,000 or more inhabitants, and 100,000 or more inhabitants at various dates between 1800 and 1950. Their estimates, which are assembled in table VI.4, indicate that unprecedented levels of urbanization emerged in the nineteenth century. The population in localities of at least 5,000 inhabitants is shown to have comprised about 3 per cent of the world's population in 1800 and about 30 per cent in 1950, the percentage more than doubling in each half century. A similar pattern of growth is seen in the estimates of population in localities of 20,000 or more inhabitants. Numbering about 22 million in 1800, or 2.4 per cent of the total population, by 1950 it had reached over 500 million, constituting about

21 per cent of the total population. During the same century and a half, the population in cities of 100,000 or more inhabitants grew from less than 16 million to over 300 million, or from less than 2 per cent to 13 per cent of the total population.

136. The acceleration in the rate of growth of the world's urban population is shown by the fact that, whereas the population living in localities of 20,000 or more inhabitants increased by nearly one and a third times between 1800 and 1850, it grew by nearly two times between 1850 and 1900 and by nearly two and a half times between 1900 and 1950.

137. Long-term trends in urban population in different regions of the world were estimated by Davis and Hertz on the basis of large-city population, namely that in cities of 100,000 or more inhabitants.<sup>286</sup> These data, presented in table VI.5, show the wide divergence of urbanization trends in different parts of the world during the nineteenth and twentieth centuries. The phase of massive urbanization attained its largest momentum first in Europe, then in areas of European settlement, and only more recently elsewhere. The large-city population of Europe increased by one and a half times between 1800 and 1850 and by nearly two and a half times between 1850 and 1900, but its growth then slackened, merely doubling in the first half of the twentieth century. While there were less than two million persons living in cities of 100,000 or more inhabitants in the Americas in 1850, this number expanded rapidly during the next century. Asia's large-city population grew very slowly during the nineteenth century, but sharply accelerated in the twentieth century; between 1900 and 1950 it increased by about four and a half times. The big-city population of Africa, which was extremely small until the twentieth century, also showed a great acceleration between 1900 and 1950. On the whole, the large-city populations of Europe and the Americas combined grew more rapidly than those of the rest of the world during the nineteenth century, but more slowly since 1900.

138. Trends in the urban population during the twentieth century have been examined in a United Nations study, which also reviewed trends in the small-town and rural population.<sup>287</sup> In this analysis, the urban population was defined as that in agglomerations of 20,000 or more inhabitants, the rural and small-town population making up the remainder. As seen in table VI.6, the agglomerated population in the world as a whole grew from an estimated 266 million in 1920 to 760 million in 1960, rising from 14 to 25 per cent of total population. The decennial figures show a marked acceleration during 1950-1960 not only in the rate of growth of the population of urban agglomerations, but also in the rate of urbanization, measured in terms of the percentage of total population

<sup>284</sup> The dominantly commercial role of European cities was stressed by Hoyt, "Forces of urban centralization . . ." (1941), pp. 843-852. As Davis put it, in other areas or at different times "the city was still attempting to supplement its economic weakness with military strength, to command its sustenance rather than to buy it honestly. In western Europe, starting at the zero point, the development of cities not only reached the stage that the ancient world had achieved but kept going after that. It kept going on the basis of improvements in agriculture and transport, the opening of new lands and new trade routes, and, above all, the rise in productive activity. . . ." Davis, "The origin and growth of urbanization . . ." (1955), pp. 432-433.

<sup>285</sup> The part played by agricultural improvements, sometimes called the Agricultural Revolution, has been emphasized by Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), p. 165. He notes that "The results of the enclosures starting in England at about 1760 were the extension of arable cultivation to inferior and waste lands, the destruction of the antiquated common-field system, whereby one third of the land lay fallow each year, the consolidation of small farms into large and the consequent introduction of the principle of rotation of crops, of roots and artificial grasses, and other improved methods. The common-field system, according to Arthur Young, yielded 17-18 bushels of wheat per acre, the new system of large farms 26; the fleece of sheep pastured on common fields weighed only 3½ pounds as compared with 9 pounds on enclosures." He also noted that the average weight of animals at the Smithfield Market had risen during the eighteenth century as follows: cows, 370 lb. in 1710 and 800 lb. in 1795; calves, 50 lb. and 148 lb.; sheep, 28 lb. and 80 lb.; and lambs, 18 lb. and 50 lb.

<sup>286</sup> Estimates cited in Hauser, "World and Asian urbanization . . ." (1957), p. 58. Other estimates for 1800 appear in Woytinsky and Woytinsky, *World Population and Production* . . . (1953), table 54; they do not differ greatly from the estimates provided by Davis and Hertz, except that the total for Asia (6.1 million) is noticeably lower. See also Hoyt, "The growth of cities from 1800 to 1960 . . ." (1963).

<sup>287</sup> United Nations, *Growth of the World's Urban* . . . (1969), table 8.

TABLE VI.7. TRENDS IN POPULATION OF CITIES OF 100,000 OR MORE INHABITANTS IN THE WORLD, DEVELOPING AND MORE DEVELOPED REGIONS, 1920-1960

(Millions)

	1920	1930	1940	1950	1960
World .....	169.8	223.3	288.8	362.7	536.1
Developing regions .....	32.2	46.0	71.1	116.9	207.2
More developed regions .....	137.6	177.3	217.7	245.8	328.9

SOURCE: Compiled from United Nations, *Growth of the World's Urban ...* (1969), table 50. It should be noted that these estimates relate in so far as possible to population agglomerations irrespective of administrative city boundaries and differ from the concepts used by Davis and Hertz.

TABLE VI.8. AVERAGE ANNUAL RATES OF GROWTH OF URBAN POPULATION, 1920-1960

	Agglomerations of 20,000 or more inhabitants		Cities of 100,000 or more inhabitants	
	1920-1960	1950-1960	1920-1960	1950-1960
World .....	2.6	3.6	2.9	3.9
Developing regions .....	3.7	4.9	4.7	5.7
More developed regions .....	2.1	2.7	2.2	2.9

SOURCE: Computed from data in United Nations, *Growth of the World's Urban ...* (1969), tables 8 and 50.

TABLE VI.9. POPULATION IN RURAL AREAS AND SMALL TOWNS, FOR MAJOR AREAS OF THE WORLD, 1920-1960

Major areas	1920	1930	1940	1950	1960
World total .....	1,593.6	1,730.4	1,863.6	1,982.5	2,230.5
Developing regions .....	1,118.6	1,219.6	1,346.9	1,467.9	1,703.4
More developed regions .....	475.0	510.8	516.7	514.6	526.9
Africa .....	136.0	154.1	177.7	200.0	236.4
East Asia .....	513.6	537.3	560.7	590.2	647.0
South Asia .....	442.9	494.5	559.5	619.6	740.4
Europe .....	212.0	222.1	229.1	232.3	236.8
Latin America .....	76.6	89.4	104.4	121.7	142.7
Northern America .....	67.8	71.8	77.7	81.8	83.4
Oceania .....	5.4	6.2	6.5	6.9	7.4
USSR .....	139.3	155.0	148.0	130.0	136.4

SOURCE: United Nations, *Growth of the World's Urban ...* (1969), table 8.

that lived in such agglomerations. Between 1950 and 1960 the agglomerated population as a percentage of world total population increased from 21 to 25, a larger increase than that observed in previous decades.

139. As discussed earlier, the pace of urbanization had slackened in Europe but accelerated in the less developed regions in the twentieth century. However, the stepped-up pace in world urbanization noted above for the 1950-1960 period, compared with immediately preceding decades, affected both the developed and the developing regions, though it was more significant in the latter. Thus, in the developing regions the percentage of population in agglomerations of 20,000 or more inhabitants, which had been only about 6 per cent in 1920 and 11 per cent in 1950, had risen to 15 per cent by 1960. The more developed regions, on the other hand, increased their urban percentages from 29 per cent in 1920 to 40 and 46 per cent in

1950 and 1960, respectively (table VI.6). Urbanization is seen to have advanced most conspicuously in the USSR and Latin America.<sup>288</sup>

140. Rapid growth was also observed in the large-city population during this period (table VI.7). During the 1950-1960 decade the average annual rate of increase in the population of cities of 100,000 or more inhabitants had advanced to 5.7 per cent in the developing regions, and 2.9 per cent in the more developed regions (table VI.8). The increasing concentration of urban population in large cities, particularly in the developing regions, is seen in the fact that growth rates of the large-city population exceeded those of the agglomerated population as a whole throughout the period.

<sup>288</sup> For a more detailed analysis of recent urbanization trends in Latin America, see Durand and Peláez, "Patterns of urbanization in Latin America" (1965).

141. As shown in table VI.9, during 1920-1960 the rural and small-town population of the more developed regions increased by only about 10 per cent, and since small towns probably grew more rapidly, it can be assumed that the more strictly rural populations actually decreased. But in the less developed regions, despite the rapid growth of the population in agglomerations of 20,000 or more inhabitants, which has already been noted, the rural and small-town population increased by one half in the forty years; undoubtedly the increase in strictly rural population (excluding small towns) was also very substantial.<sup>289</sup> Moreover, the figures show that as a result of the accelerated growth of total population, the annual growth rate of rural and small-town population in the developing regions was higher in 1950-1960 (1.5 per cent) than it had been throughout the period (1.1 per cent during 1920-1960).<sup>290</sup>

142. In summary, it may be noted that the modern cycle of urban growth began in Europe, roughly coincident with the onset of the Industrial Revolution, that it spread from there to other regions which are presently economically developed, and finally and even more massively, to the presently less developed regions. It does not follow, however, that the earlier conditions in Europe have been reproduced elsewhere. A review of conditions attending urbanization is presented in section D below.

#### (a) Urban localities

143. The increasing scale of large urban settlements has been a striking feature of urban population growth in all parts of the world in the twentieth century. It has been estimated that around 1800 there were 750 cities with 5,000 or more inhabitants, 200 with 20,000 or more inhabitants, and only forty-five with 100,000 or more.<sup>291</sup> By contrast, the world's forty-fifth largest city in 1970 might have had about 2,600,000 inhabitants.<sup>292</sup> There were probably at the most one or two cities of 1,000,000 or more inhabitants in 1800 and possibly none.<sup>293</sup>

<sup>289</sup> For more recent dates the United Nations has estimated urban and rural populations so far as possible in conformity with recent definitions of these two categories in each country. The results show that between 1960 and 1970 the rural population in Europe and other more developed regions decreased, while that in the developing regions increased by 1.8 per cent per annum on average. United Nations, *Monthly Bulletin of Statistics*, November 1971 (1971), table B.I.

<sup>290</sup> Rates computed from data in table VI.9.

<sup>291</sup> Estimates by Davis and Hertz, cited in Hauser, "World and Asian urbanization ..." (1957), p. 57.

<sup>292</sup> Davis, *World Urbanization 1950-1970*, vol. 1 ... (1969), p. 239.

<sup>293</sup> See lists of cities provided in Woytinsky and Woytinsky, *World Population and Production* ... (1953), pp. 120-122, and also Weber, *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), p. 450. London had not yet achieved a million inhabitants. It is possible that one or two cities in China then approached, or even surpassed, a million population. If the accounts of Marco Polo can be trusted, Kinsai (on the site of present Hangchow in China) may have reached three million inhabitants in the thirteenth century. According to one estimate, the population of Edo (now Tokyo) may have exceeded one million by 1721 and may have generally remained above a million at many dates during the early part of the nineteenth century. Manchester, "Tokyo" (1964), p. 274. See also Tsuchiya, *An Economic History of Japan* (1937), p. 195; Hoyt and Pickard, "The world's million-population

Although it is believed that some cities of 1 million or more inhabitants could possibly have existed in various pre-industrial cultures, e.g. in China during the Sung Dynasty, if not also Rome and Constantinople, there is a strong probability that many of the population estimates of ancient cities were exaggerated.<sup>294</sup> Even by the end of the nineteenth century, the cities of 100,000 or more were still considered as of exceptional size. Weber, writing in 1899, defined the "great city" as one having 100,000 or more inhabitants.<sup>295</sup> By the end of the nineteenth century there were only about eleven cities of one million or more inhabitants,<sup>296</sup> London still being the largest.

144. Prior to the nineteenth century, the city of 100,000 or more inhabitants was relatively rare. At the beginning of the sixteenth century Europe had perhaps six or seven such cities. Three hundred years later, at the end of the eighteenth century there were still only twenty-two.<sup>297</sup> It was only during the nineteenth century that cities of 100,000 or more began to proliferate, particularly in Europe. By 1850, there were forty-two in Europe and by 1895 there were 120.<sup>298</sup> The proliferation of cities of 100,000 or more in Russia and the United States occurred mainly in the latter part of the nineteenth century. In 1863, there were only three cities in Russia with more than 100,000 inhabitants.<sup>299</sup> By 1897 the number of such cities had risen to seventeen.<sup>300</sup> In 1850, there were only six cities in the United States with more than 100,000 inhabitants. By 1900 the number of such cities had reached thirty-eight.<sup>301</sup> According to Davis's estimates, there were almost 1,600 cities with more than 100,000 inhabitants in the world in 1970.<sup>302</sup>

145. Over the past century and a half, remarkable shifts have occurred in the distribution of the world's big-city population among the major geographical areas. Table VI.10 shows that in 1800 Asia and Europe together may have contained almost 95 per cent of the population of the world's forty-five cities of 100,000 or more inhabitants. Asia's share at that time was twice as large as Europe's share. By 1900, the situation was reversed—Europe had about twice as much as Asia, and there had

metropolises" (1969), p. 198. Some authors believe that Edo was exceeded in size by Peking but little specific information is generally available to indicate the population of Peking during the past two centuries.

<sup>294</sup> See, for example, studies reviewed in Sjoberg, *The Preindustrial City* ... (1960), pp. 80-84, especially Russell, "Late ancient and medieval population" (1958), pp. 37-101.

<sup>295</sup> Weber, *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), pp. 446-451.

<sup>296</sup> Eleven cities of 1,000,000 or more inhabitants in 1900 are listed in Woytinsky and Woytinsky, *World Population and Production* ... (1953), pp. 120-122.

<sup>297</sup> Weber, *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), p. 449.

<sup>298</sup> Meuriot, *Des agglomérations urbaines* ... (1898) as cited in Weber, *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), p. 449.

<sup>299</sup> Uralan, *Rost naseleniia v SSSR* (1966), p. 25.

<sup>300</sup> *Ibid.*, p. 26.

<sup>301</sup> United States Bureau of the Census, *U.S. Census of Population: 1960*, vol. 1, part A (1961), pp. 1-68.

<sup>302</sup> Computed from Davis, *World Urbanization 1950-1970*, vol. 1 ... (1969), table B.



TABLE VI.10. PERCENTAGE DISTRIBUTION OF POPULATION IN CITIES OF 100,000 OR MORE INHABITANTS BY MAJOR AREAS, 1800-1960

Major areas	Estimates of Davis and Hertz			Estimates of United Nations	
	1800	1900	1950	1950	1960
World .....	100.0	100.0	100.0	100.0	100.0
Africa .....	1.9	1.5	3.2	3.5	4.4
Asia .....	62.8	21.9	33.7	29.9	33.8
Europe .....	30.8	47.5	26.5	29.3	23.4
Latin America .....	0.8	21.0	23.8	{ 7.7	9.0
Northern America .....				{ 20.0	18.6
Oceania .....	—	1.4	1.6	1.4	1.3
USSR .....	3.7	6.7	11.2	8.3	9.5

SOURCES: Davis and Hertz estimates as cited in Hauser, "World and Asian urbanization ..." (1957), p. 58. Figures corrected for apparent clerical errors. United Nations estimates computed from *Growth of the World's Urban ...* (1969), table 50. The United Nations figures are based on estimates which relate in so far as possible to population agglomerations irrespective of administrative city boundaries.

TABLE VI.11. NUMBER OF MILLION AND MULTI-MILLION CITIES, 1800-1970

Number of inhabitants	1800	1850	1900	1950	1970
1 million or more .....	1	3	11	75	162
2 million or more .....	—	1	3	26	58
4 million or more .....	—	—	1	12	22
8 million or more .....	—	—	—	2	9
16 million or more .....	—	—	—	—	1

SOURCES: Estimates for 1800, 1850 and 1900 compiled from cities listed in Woytinsky and Woytinsky, *World Population and Production ...* (1953), pp. 120-123. It is assumed, in addition, that either Peking or Tokyo could have exceeded 1 million population in 1800 and 1850 (see discussion in foot-note 293 earlier in this section). Figures for 1950 and 1970 are based on recent estimates of the United Nations.

been a significant growth in the share of this population in the Americas, of which the greater part was in the United States. Whereas the early urban growth in Asia had been mainly a function of total population size which was always greater than Europe's, Europe's big-city population had overtaken that of Asia through a process of population rearrangement and concentration in cities associated with industrial development. By the middle of the twentieth century, however, it appears that Asia had again overtaken Europe. The North American share of big-city population has remained important throughout the present century. According to projections by Hoyt, Asia may again claim the majority of the world's population in cities of 100,000 or more inhabitants by the end of the present century, as it did in earlier times.<sup>303</sup>

146. The number of cities with 1 million or more inhabitants has grown very large during the course of the present century. (The increasing number of million and multi-million cities is traced in table VI.11.) During the first half of the present century the number of cities of one million population or larger increased from eleven to seventy-five, and by 1970 there may have been about 162 such cities. Meanwhile, the number of cities at least double that size (with 2 million or more inhabitants) increased from three in 1900 to twenty-six by mid-century and perhaps fifty-eight by 1970. One agglomeration (New York), which already had more than 8 million

inhabitants by 1920, came to exceed 16 million by 1970. Meanwhile, eight more agglomerations have reached populations of 8 million or more inhabitants. It must be admitted that the size comparison of large agglomerations can only be tentative since in each case the outer boundary is quite debatable.<sup>304</sup>

147. Thus, the most unique feature of contemporary urbanization appears to be the proliferation of settlements of unprecedented size. This happened earliest in the more developed regions. As shown in table VI.12, in those regions the population of cities of 1 million or more inhabitants, already represented 44 per cent of the population in places of 100,000 or more inhabitants in 1920, whereas the corresponding percentage for the developing regions was 22. Between 1920 and 1960 this proportion increased much more rapidly in the developing regions than in the more developed, thus narrowing the gap between them.

148. According to the estimates of Woytinsky and Woytinsky, there were eleven cities with a population of at least 1 million in 1900, six of which were in Europe. Europe's share of the total population in cities of this size was close to 50 per cent.<sup>305</sup> Estimates for 1970 show

<sup>304</sup> The numbers for 1970 cited here are derived from United Nations estimates. For other estimates see Davis, *World Urbanization 1950-1970*, vol. 1 ... (1969).

<sup>305</sup> Woytinsky and Woytinsky, *World Population and Production ...* (1953), pp. 120-122.

<sup>303</sup> Hoyt, *World Urbanization ...* (1962), p. 68.

TABLE VI.12. POPULATION IN AGGLOMERATIONS OF 1 MILLION OR MORE AS A PERCENTAGE OF POPULATION IN AGGLOMERATIONS OF 100,000 OR MORE, FOR THE WORLD, DEVELOPING AND MORE DEVELOPED REGIONS, 1920 AND 1960

	1920	1960
World .....	39.9	48.2
Developing regions .....	22.1	44.8
More developed regions .....	44.0	50.4

SOURCE: Computed from data in United Nations, *Growth of the World's Urban ...* (1969), pp. 107-113, 118.

TABLE VI.13. PERCENTAGE DISTRIBUTION OF POPULATION IN CITIES OF 1 MILLION OR MORE INHABITANTS BY MAJOR AREA, 1900 AND 1970

Major area	1900	1970
World .....	100.0	100.0
Africa .....	—	3.7
Asia .....	17.6	39.4
Europe .....	48.5	20.7
Latin America .....	—	12.7
Northern America .....	28.8	17.1
Oceania .....	—	1.2
USSR .....	5.1	5.1

SOURCES: Data for 1900 computed from data in Woytinsky and Woytinsky, *World Population and Production ...* (1953), pp. 120-122. 1970 data are United Nations estimates.

that Europe's share of the world's population in cities of a million or more inhabitants had fallen to about one-fifth, while Asia's share was about twice as large (table VI.13).<sup>306</sup>

#### (b) Size of rural localities

149. Little attention has been given by demographers to the size of rural localities, although there is some quantity of scattered information on the subject in geographic literature and atlases. Whatever mention of rural settlement patterns occurs in demographic literature has been generally in terms of over-all rural density ratios, which tell little about the nature of the population settlement pattern. Areas with the same over-all average density may differ greatly in the character of their settlement patterns: they may contain large areas of uninhabitable territory; they may be characterized by settlement in large villages with 10,000 or more inhabitants; they may be covered with thousands of small, almost invisible villages; they may contain mostly dispersed settlement in isolated family homesteads; they may contain primarily large estates and plantations; or they may contain any mixture of all these settlement patterns.

150. Actual settlement forms in different countries, or parts of countries, are so diverse that to summarize and compare them is exceedingly difficult and has seldom been attempted.<sup>307</sup> These patterns are, however, of

<sup>306</sup> These figures, which are estimates of the United Nations, do not differ greatly from estimates derived from Davis, *World Urbanization 1950-1970*, vol. 1 ... (1969).

<sup>307</sup> See, however, the discussion later in this section of the recent effort of Johnson, *The Organization of Space ...* (1970), to compare settlement hierarchies.

considerable importance, since the developmental needs and potentialities of the rural habitat are dictated to a considerable extent by the sizes of settlements and distances between them, in relation to other conditions such as the over-all population density and the means of transport. It is also possible to devise deliberate policies designed to modify the settlement patterns in ways more favourable for economic and social development.

151. Generally speaking, rural settlement patterns can be broadly classified as dispersed or clustered.<sup>308</sup> Dispersed settlement is characteristic of areas in which farms are operated by single family-owners who live on the farm itself. Clustered rural settlement takes the form of more or less sizeable villages. Farmers reside in the villages and commute daily to farm lands located elsewhere.

152. There are advantages and disadvantages in each type of settlement pattern. The dispersed pattern has the advantage that farm residences are not spatially separated from the place of work. The farmer is able to pay careful attention to the maintenance of buildings, stores, fences, livestock and implements on a full-time basis. On the other hand, it has the disadvantage of isolation. Social and economic services are more easily provided to clustered village settlements, where there is also the opportunity for daily human interaction and the emergence of social functions and roles. However, the commuting distance to fields can become excessive in areas where modern transportation facilities are not available.

#### (i) Dispersed settlement

153. A dispersed settlement pattern where the population engaged in agriculture resides on isolated farms operated by single families is predominant in the rural areas of Canada and the United States.<sup>309</sup> In the United States in 1960 over 80 per cent of the rural population (defined as population outside places of 2,500 or more inhabitants) resided in open country. Moreover, the data listed by decades back to 1890 indicate that this pattern has not undergone any fundamental change.<sup>310</sup> With the sharp drop in the number of farms and farm population in recent years, the organization of commercial and public facilities for farm residents has become increasingly difficult.<sup>311</sup>

<sup>308</sup> Numerous examples of both clustered and dispersed agricultural settlement have been listed by Demangeon. The relative clustering or dispersion of agricultural population may be influenced by many factors including topography and the distribution of water resources, ethnic traditions, the systems of land tenure, fragmentation or consolidation of individual land holdings, needs for protection, and types of agricultural technology. See Demangeon, "L'habitat rural" (1952) and his "La géographie de l'habitat rural" (1952). Various configurations of village settlement since neolithic times are described and illustrated in Hilberseimer, *The Nature of Cities* (1955), pp. 16-21.

<sup>309</sup> The Canadian pattern is described in Camu, Weeks and Sametz, *Economic Geography of Canada* (1964), pp. 166-168. For statistics and discussion of the rural settlement pattern in the United States, see United States Bureau of the Census, *People of Rural America* (1968).

<sup>310</sup> United States Bureau of the Census, *People of Rural America* (1968), p. 22.

<sup>311</sup> Among the most serious problems is the organization of medical facilities in rural areas of steadily decreasing population density. In the most thinly populated counties of the United States there is now only one doctor for every 2,145 residents. See *Wall Street*

(Continued on next page)

154. Scattered settlement is also prevalent in Sweden, and the settlement density is very low in many parts. For these reasons many small localities of several hundred inhabitants may have to perform the same functions as larger urban places in more densely populated countries. Thus, small centres of 500-1,000 inhabitants are not regarded as rural in Sweden even though they would normally be considered as such in most countries.<sup>312</sup>

## (ii) Clustered village settlement

155. While examples of the dispersed pattern of rural settlement can be found in most areas of the world, the clustered village pattern is more prevalent both presently and historically. The settlement pattern in much of Eastern Europe consists of small villages.<sup>313</sup> In the Soviet Union the origin of small villages dates back to the feudal epoch, when they served as fortresses, garrisons, regional centres and other non-industrial communities.<sup>314</sup> There are about 700,000 rural communities, of which 70 per cent have fewer than 100 inhabitants each. There are about eight villages per collective farm, on the average.<sup>315</sup> This fragmentation is said to be in large part the reason for the small scale of agricultural production; it impedes the mechanization of agriculture and the improvement of culture and services for the rural population,<sup>316</sup> and concentration of rural population in larger settlements is planned.<sup>317</sup>

156. In much of southern Italy the rural population is said to be over-concentrated relative to available means of transportation to fields. Peasants live in hill-top villages of 5,000, 10,000 or even larger populations which are not within easy reach of the fields.<sup>318</sup> Although a highly clustered pattern of rural settlement may sometimes be disadvantageous from the point of view of agricultural efficiency, such a settlement pattern may be very convenient if it is desired to introduce industrial and service

employments into rural areas. In Hungary, for example, the existence of mammoth villages of 10,000 inhabitants or more made it possible for industrialization to be undertaken in the Great Hungarian Plain with rather low social investment.<sup>319</sup> The majority of Hungary's villages, however, have fewer than 5,000 inhabitants.<sup>320</sup> By far the larger part of Japan's six million farm households live in unincorporated hamlets or villages (*buraku*) ranging from a few score up to a thousand or more inhabitants.<sup>321</sup>

157. In Latin America a substantial proportion of the rural population resides in small population clusters. Many of these are so small that they are sometimes described as "dispersed settlements". The Economic Commission for Latin America defines the "dispersed" rural population as consisting of settlements of less than twenty people.<sup>322</sup> The next largest type of settlement is the *caserío* or hamlet. This is a loosely nucleated cluster of not more than 200 people. In every country of the region except Bolivia, Cuba, Haiti and Mexico, an important part of the rural population lives and works on large privately owned estates or *haciendas*. In physical patterns and in population size, the *haciendas* differ widely among themselves. There is usually a central nucleus with a mansion, administrative buildings, storerooms, often a chapel and a school, and the majority of resident families are likely to be grouped around it in a *villorrio* or *case-río*.<sup>323</sup>

158. Most Africans probably live in agglomerations of some kind rather than in dispersed, individual family huts and houses, though every gradation of "rural" settlement may be found from the large agrotowns of Yorubaland, the *ksour* (fortified villages) of Saharan Morocco, encampments of nomadic herdsmen, and groupings of huts in hamlets and villages, to the remarkably dispersed *shambas* of Rwanda and Burundi.<sup>324</sup>

159. In the Sudan, the nucleated village type of settlement is most common. Houses are clustered together according to a rather irregular pattern. The concentrated settlement pattern is to be explained in part by the generally sparse distribution of water supplies, but more especially by the need for security in the thinly populated countryside where until recently nomads had ranged uncontrolled.<sup>325</sup> Rural isolation of a special kind is

(Footnote 311 continued)

*Journal*, 27 October 1971, p. 1. For further discussion of size of place structure in rural United States, see Fuguitt and Field, "Some population characteristics of villages ..." (1972), and also Fuguitt, "The places left behind ..." (1971).

<sup>312</sup> Svenska Sällskapet för Antropologi och Geografi, *Atlas Över Sverige* (1953), p. 49.

<sup>313</sup> For example, on Poland, see Benko, "Rural planning in Poland" (1966); on Czechoslovakia, see Committee for the World Atlas of Agriculture, ed., *World Atlas of Agriculture*, vol. 1 ... (1969), p. 80.

<sup>314</sup> Valentei and Khorev, "Problemy gorodov" (1967).

<sup>315</sup> Semin, "Puti preodoleniia razlichi ..." (1970), pp. 2-3. While 93 per cent of rural settlements in 1961 had less than 500 inhabitants, there were nevertheless 675 communities of 5,000 or more inhabitants classified as rural. Kovalev, "Problemy sovetskoi geografii ..." (1964), p. 132. Some of these contain more than 12,000 inhabitants. Lappo, "Geograficheskoe izuchenie naseleennykh punktov ..." (1964), p. 245.

<sup>316</sup> Semin, "Puti preodoleniia razlichi ..." (1970), pp. 2-3.

<sup>317</sup> Stern, "Puti razvitiia zhiloi zastroiki sela" (1970), p. 94.

<sup>318</sup> In the Middle Ages these hill-towns provided defence against invaders. Moreover, lowland areas were for a time infested with malaria. Since the reasons for hill-top settlement no longer exist, land reform projects in southern Italy include provisions for resettlement of the lowlands in villages smaller than the hill-top towns. Dickinson, *The Population Problem in Southern Italy* (1955); Carlyle, *The Awakening of Southern Italy* (1962); and Barzanti, *The Underdeveloped Areas ...* (1965), pp. 27-58, 219-233, 401-402.

<sup>319</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1954 ...* (1955), p. 169.

<sup>320</sup> Pécsi and Sáralfi, *The Geography of Hungary* (1964), pp. 168-173.

<sup>321</sup> Trewartha, *Japan: a Geography* (1965), pp. 145-149. See also Dempster, *Japan Advances ...* (1967), pp. 160-164.

<sup>322</sup> Eyheralde, "Rural resettlement in agricultural villages ..." (1969), p. 117.

<sup>323</sup> United Nations, Economic Commission for Latin America, "Rural settlement patterns and social change ..." (1965), p. 3. This source contains a detailed description of the rural settlement pattern in Latin America.

<sup>324</sup> Hance, *Population, Migration, and Urbanization ...* (1970), pp. 224-229. The author has assembled some scattered statistics from national censuses on the size and number of rural settlements in various African countries.

<sup>325</sup> Barbour, *The Republic of the Sudan ...* (1961), pp. 98-100. For a description of rural settlement and resettlement in East African countries, see Prothero, ed., *A Geography of Africa ...* (1969), pp. 243-263.

characteristic of some areas in Africa, such as Sierra Leone, where farmers live in small tribal villages which are tightly insulated from one another by forests and walls, even though they may be spatially not very far apart.<sup>326</sup>

### (iii) Scattered land parcels

160. It has often been common in village agriculture for a single farmer to divide his efforts between several scattered parcels of land.<sup>327</sup> The fragmentation of individual holdings has often resulted from inheritance institutions and sometimes from a custom that each farmer should be allocated portions of both good and poor land. The disadvantage is that much time is lost in carrying tools from one plot to another.<sup>328</sup>

161. Scattered land parcels have long been traditional in Japan,<sup>329</sup> and only during recent decades has the consolidation of land parcels started to occur in selected areas. Before the collective organization of farms was begun in China, most farms consisted of scattered strips and patches, often half a mile apart, among which the farmer had to divide his attention and to transport his plough.<sup>330</sup> In India the holding of a peasant may be in several pieces and the distance between one piece and another may be more than 1.5 kilometres. Attempts have been made in some parts of the country to bring about the consolidation of holdings. These efforts have not been conspicuously successful because of Hindu inheritance law which requires the distribution of land among all sons.<sup>331</sup>

### (iv) Transportation

162. In planning for separation of farm residences from farmlands, it is obviously important to consider what means of transportation are available for commuting from residences to the fields. In France, where the persistence of small villages and excessive fragmentation of holdings in many areas impede modernization, there is now hope that some consolidation can be accomplished, thanks to the development of modern transportation. Some planners have envisaged that the entire rural population (both farm and non-farm) might live in centres of 2,000-5,000 inhabitants from which the cultivators would

travel to their farms, all located within a radius of 15 kilometres.<sup>332</sup> By way of contrast, in Latin America the means of transportation available to the peasant is still mostly the horse and cart, although the use of the bicycle has become rather popular in the past few years. On the assumption that the commuting trip should consume no more than thirty minutes each way, it has been estimated that where ox-cart transportation is used, the maximum permissible distance between the farmer and his field can only be about three kilometres; with bicycles the distance could be about 7.5 kilometres; and with motor vehicles the distance could be as great as twenty kilometres.<sup>333</sup>

### (v) Collective organization of rural settlements

163. Various kinds of collective organization of agricultural work and habitation have been attempted in a number of countries, among them China, Israel, the USSR,<sup>334</sup> and various countries of Eastern Europe. In Hungary, for example, as a result of the growth in co-operative farming, isolated farmsteads are rapidly disappearing and their former inhabitants migrate to villages and towns.<sup>335</sup> In the Soviet Union, the farm population in the larger collective settlements is becoming increasingly to be housed in multi-storey apartment buildings,<sup>336</sup> although the single-family house is still predominant, as it is in the co-operative farms of most Eastern European countries, such as Bulgaria, Czechoslovakia, Hungary and Romania.<sup>337</sup>

164. By 1957 almost the entire agricultural population of China were members of co-operative farms. The average co-operative had about 160 households, or some 600 persons; the co-operatives were subsequently merged into larger units known as communes.<sup>338</sup> The largest *kibbutzim* in Israel have attained a population of 1,500-1,700; all meals are served in a communal dining hall, and child care and many other services are communally organized.<sup>339</sup>

### (vi) Role of small towns

165. Johnson has examined settlement hierarchies with special emphasis on the role of small towns in facilitating rural and national development. From the historic role of towns in Belgium and the Netherlands, he concluded that "a profound transforming influence can be exerted on rural hinterlands by cities that are not very large".<sup>340</sup> Where extensive rural areas are remote from cities, the prevalence or scarcity of intermediate and smaller towns

<sup>326</sup> Siddle, "The evolution of rural settlement forms in Sierra Leone ..." (1969), p. 33.

<sup>327</sup> Demangeon, "L'habitat rural" (1952), p. 156. At least one example has been described of a village in southern Italy in which 1,500 families farmed 9,000 scattered parcels of land. Carlyle, *The Awakening of Southern Italy* (1962), p. 36.

<sup>328</sup> In France it has been estimated that out of ten hours of paid work, there are only eight hours of actual work in a fragmented farm, as against nine and one-half hours of work in a consolidated farm. Committee for the World Atlas of Agriculture, ed., *World Atlas of Agriculture*, vol. 1 ... (1969), p. 122.

<sup>329</sup> Tsuchiya, *An Economic History of Japan* (1937), p. 74.

<sup>330</sup> Tregear, *A Geography of China* (1965), p. 113.

<sup>331</sup> The latest changes in the Hindu law make the situation worse (although perhaps more equitable) by giving shares to certain female relatives. India, the Central Gazetteers Unit, *The Gazetteer of India*, vol. 1 (1965), p. 532. According to the 1961 census, there were over 560,000 villages in India containing 359.8 million persons, or about 82 per cent of the population. Patel, "Rural housing in the Economic Commission for Asia and Far East Region ..." (1969), p. 32.

<sup>332</sup> Pinchemel, *France: a Geographical Survey* (1969), p. 333.

<sup>333</sup> Eyheralde, "Rural resettlement in agricultural villages ..." (1969), pp. 124-125.

<sup>334</sup> For statistical series on collective farms in the USSR going back to early dates, see USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Strana Sovetov za 50 let ...* (1967), pp. 116-117.

<sup>335</sup> Pécsi and Sáfalvi, *The Geography of Hungary* (1964), pp. 172-173.

<sup>336</sup> Stern, "Puti razvitiia zhiloi zastroiki sela" (1970).

<sup>337</sup> Stasiak, Benko, and Rossochacki, "Rural housing and planning problems ..." (1969), p. 77.

<sup>338</sup> Tregear, *A Geography of China* (1965), pp. 165-169.

<sup>339</sup> Orni and Efrat, *Geography of Israel* (1964), pp. 206-207.

<sup>340</sup> Johnson, *The Organization of Space ...* (1970), p. 47.

may have great significance for development. As calculated by Johnson, the number of villages per town ranges from 23 to 41 in Italy, Greece, Lebanon, Sweden and Uruguay, but is high in Asian countries: 87 in Malaysia, 98 in Iraq, 99 in Syria, 117 in Turkey, 146 in Yemen, 185 in India, 269 in Iran and 355 in Indonesia.<sup>341</sup>

166. In China, the average ratio of villages to market towns was found to be around 18 to 1, according to the researches of Skinner.<sup>342</sup> In India, conditions in this respect are much less favourable. In 1961, there were more than 560,000 villages, averaging only 637 persons each, and less than 2,000 market towns.<sup>343</sup> For India to have the same village to market-town ratio as China would require more than 30,000 such towns. However, conditions vary in different parts of India and, according to Johnson, the ratio of villages to market towns ranged from a low of about 50 to 1 to a high of over 300 to 1.<sup>344</sup>

167. The role of the average small town in the more modernized nations is changing rapidly. The term "small town" has traditionally been equated with remote rural service centres. An analysis of United States census data for towns of less than 10,000 inhabitants during the decades 1940-1950 and 1950-1960 showed that existing towns are growing and a significant number of new small towns are being formed (although the group of towns with less than 1,000 inhabitants is decreasing). However, small towns in and near urbanized areas are growing more rapidly than towns in isolated rural areas.<sup>345</sup> The role of small towns in and around large agglomerations is distinctly different from the crossroad hamlets of isolated rural areas.

### 3. DEMOGRAPHIC COMPONENTS OF URBAN AND RURAL GROWTH

168. The differential levels of fertility and mortality in urban and rural areas have been discussed respectively, in chapter IV, section F and chapter V, section E. The discussion in this section is confined to a consideration of: (1) the combined effect of these components of change, that is, of natural increase; (2) the effect of migration, whether rural-to-urban, urban-to-rural, from smaller places to larger places etc.; and (3) the growth in urban areas due to reclassification of previously rural territory as urban.

169. Migration, as used here, refers to net migration. Although migration is usually a positive factor in the growth of cities, it must be remembered that large-scale migrations are occurring in all directions. In Poland during the period 1961-1965, the number of in-migrants to towns and cities was 2,467,000, but this was largely offset by out-migration of 1,890,000. Thus, out of a

gross exchange of 4,357,000 persons, the net gain to Polish urban areas was only 577,000.<sup>346</sup> In Greater Bangkok, place of birth statistics indicated that by 1960, 486,500 persons had migrated to Bangkok, while 144,500 had left Bangkok. The gross exchange between Greater Bangkok and the rest of Thailand, judged by life-time migration, involved some 631,000 persons, but the net gain was only 342,000.<sup>347</sup>

170. It is known that cities in Europe prior to the Industrial Revolution grew primarily by migration rather than natural increase.<sup>348</sup> In many cities there was actually a natural decrease rather than a natural increase. Early statistical evidence is afforded by the so-called "bills of mortality" begun in certain cities in the sixteenth and seventeenth centuries which almost uniformly showed more deaths than births each year. The cities then were actually consumers of population produced in the countryside. Indeed, it has been said that the rural-to-urban migrants "did little more than fill the vacant places caused by death."<sup>349</sup> That cities grew at all can only be attributed to migration. Captain John Graunt, an early demographer, estimated that in the early 1600s deaths caused by urban plague, no matter how numerous, could be replaced by in-migrants by the second year after the plague.<sup>350</sup> Thus, the process of urbanization came to be considered as a subtopic belonging under the more general subject of migration.

171. An important reversal occurred during the last century when many cities in Europe reached a point of self-maintenance and subsequently achieved an excess of births over deaths. Such a status was reached in Paris before the close of the eighteenth century, in London in 1800, in German cities in the first half of the nineteenth century, in Swedish cities in the mid-nineteenth century. Moreover, many cities were also growing by annexation of territory. According to Weber, during the course of the last century, a substantial proportion of the growth of some cities was due to incorporation of suburbs: for example, in Cologne 37 per cent, in Leipzig 44 per cent, in Paris 21 per cent, in Munich 17 per cent.<sup>351</sup>

<sup>346</sup> Kosiński, "The internal migration of population in Poland ..." (1970), p. 77.

<sup>347</sup> Goldstein, "Urban growth in Thailand ..." (1971), p. 2,897.

<sup>348</sup> Statistics referenced in this paragraph and the next were taken from Weber, *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), pp. 230-257, which contains a review of statistical literature and comment on this subject.

<sup>349</sup> *Ibid.*, p. 233.

<sup>350</sup> As described in Weber, *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), p. 233.

<sup>351</sup> In the present century in many western countries administrative expansion of cities, especially big cities, has failed to keep pace with the growth of the corresponding agglomerations with suburbs extending ever further beyond the rather rigid administrative boundaries. In recent decades, some big cities have actually incurred net population losses as a result of residential movements to their suburban zones, not reflected within the municipal limits. Thus, between 1960 and 1970 the forty-two cities in the United States with more than 300,000 inhabitants in 1960 had a population gain of only 2.0 per cent, the eighty-eight cities with 100,000 to 300,000 inhabitants had a gain of 12.6 per cent, while elsewhere in the country, i.e., in the combination of smaller cities, suburbs and rural areas, the population gain was 16.7 per cent. Virtually all of the 12.6 per cent gain in the middle-sized cities was due to

<sup>341</sup> *Ibid.*, p. 176.

<sup>342</sup> Skinner, "Marketing and social structure in rural China", part 1 (1964), p. 18.

<sup>343</sup> Johnson, *The Organization of Space* ... (1970), pp. 72, 83.

<sup>344</sup> *Ibid.*, p. 83. For a discussion of village settlement in India, see Nath, "The village and the community" (1961).

<sup>345</sup> Fuguitt and Thomas, "Small town growth in the United States ..." (1966). See also Lappo, "Geograficheskoe izuchenie naselennykh punktov ..." (1964).

172. The importance of an excess of births over deaths as a source of urban growth has continued to increase. While natural increase was previously much higher in the rural areas than in the urban areas, it is now quite possible that the levels may be more nearly the same in both urban and rural areas. On the one hand, it is believed that mortality may be generally lower in the urban areas than in the rural areas because of the greater prevalence of medical facilities in urban areas. On the other hand, fertility is also often lower in urban areas, so that the net excess of births over deaths can be similar in both urban and rural areas. This appears to be the case, for example, in the United Arab Republic, as shown in the following adjusted crude birth and death rates which have been estimated for urban and rural areas:<sup>352</sup>

	1934			1959		
	Urban	Rural	Difference	Urban	Rural	Difference
<i>Rates per 1,000 population</i>						
Birth rate .....	44.4	49.1	4.7	44.1	45.2	1.1
Death rate .....	29.5	36.0	6.5	17.8	19.4	1.6
Rate of natural increase .	14.9	13.1	1.8	26.3	25.8	0.5

In this instance the urban birth and death rates were each lower than the rural birth and death rates, but these differences were mutually offsetting so that the natural increases in both urban and rural areas were not very different. Despite the large fall in death rates from 1934 to 1959, this relationship remained approximately true.<sup>353</sup>

173. Where natural increase is similar in both urban and rural areas, the increases in the level of urbanization (that is, in the percentage of urban population) can be largely attributed to migration. In rapidly urbanizing areas, it has been observed that the cities often grow approximately twice as fast as the total population.<sup>354</sup>

the annexation of surrounding territory. Metropolitan Life Insurance Company, "Population growth in moderately large cities" (1972), p. 8.

<sup>352</sup> El-Badry, "Trends in the components of population growth in the Arab countries of the Middle East ..." (1965), pp. 144-145.

<sup>353</sup> Unpublished United Nations estimates of crude vital rates of urban and rural populations, around 1960, for the world and its major regions suggest that, on an average, differences in urban and rural rates of natural increase tend to be slight, though crude birth rates and crude death rates may differ more substantially.

	More developed regions			Developing regions		
	Urban	Rural	Difference	Urban	Rural	Difference
<i>Rates per 1,000 population</i>						
Birth rate .....	19.8	23.1	3.3	38.0	44.1	6.1
Death rate .....	9.0	9.5	0.5	15.3	21.6	6.3
Rate of natural increase .....	10.8	13.6	2.8	22.7	22.5	-0.2

It must be remembered that these are crude rates which are affected not only by fertility and mortality levels, but also by differences in age composition. As a rule, young adults are relatively more numerous in urban than in rural areas, and young adults tend to have higher age-specific birth rates and lower age-specific death rates than the remainder of the population.

<sup>354</sup> United Nations, *World Housing Conditions and Estimated Housing Requirements* (1965). Urban growth in Asia is said to be two to three times higher than the average growth of total popula-

If the natural increase component is the same in both urban and rural areas and the cities nevertheless grow twice as fast as the countryside, it can be supposed that, on the average, about half the increase in city population may be due to in-migration and the other half of the urban increase would be due to natural increase (given constant urban boundaries).

174. Statistical evidence concerning the relative contributions of the natural increase and migration components to urban growth is scattered and often non-comparable. Statistics from the Union of Soviet Socialist Republics indicate that in that country the contributions to urban increase provided by rural-to-urban migration and natural increase were roughly the same during the period 1959 to 1970—44 per cent and 41 per cent, respectively. The

factor of reclassification of localities was also quantitatively important: almost 15 per cent of the urban increase was attributable to the redefinition of previously rural settlements as urban.<sup>355</sup> The natural increase component of urban growth has been considerably augmented over time. Thus in the period 1926-1938, natural increase accounted for only about 18 per cent of urban increase; in the period 1939-1958, 20 per cent;<sup>356</sup> and in the period 1959-1970, 41 per cent.<sup>357</sup> In Poland, also, the contributions of the two components were nearly equal: in-migration represented 45 per cent of the urban growth, and the remainder was provided by natural increase during the period 1961-1965. (The effects of administrative changes were mostly offset by external migration abroad.)<sup>358</sup> Likewise, in Canada, the relative importance of migration and natural increase in the growth of all metropolitan areas combined appears to have been about equal during the period 1951-1961, though there was some variation among individual areas.<sup>359</sup> A study of Latin American countries during periods prior to 1950 showed that at that time the proportion of urban growth attributable to natural increase in nine countries ranged between 30 per cent and 58 per cent.<sup>360</sup> The contribution of natural

tion. United Nations, Economic Commission for Asia and the Far East, "Population growth and problems of employment ..." (1961), p. 14.

<sup>355</sup> Perevedentsev, "Migratsiia naseleniia ..." (1970), p. 34.

<sup>356</sup> Podyachikh, "Population projections ..." (1967), p. 85.

<sup>357</sup> "Gody rosta: ...", *Izvestiya* (1970), p. 1.

<sup>358</sup> Kosiński, "The internal migration of population in Poland ..." (1970), p. 77.

<sup>359</sup> Stone, *Urban Development in Canada* ... (1967), p. 179.

<sup>360</sup> United Nations, "Demographic aspects of urbanization ..." (1961), p. 110. In Brazil 29 per cent of the 1940-1950 increase in the eight largest agglomerations was said to be due to natural increase, while for smaller cities (those with 5,000 or more inhabitants) the natural increase component was 51 per cent. Beaujeu-Garnier, "Large overpopulated cities ..." (1970), p. 269.

increase appears to have been augmented during the decade of the 1950s, however. In a study of twenty Latin American countries, it was estimated that the natural increase component for these countries as a group was about 60 per cent between 1950 and 1960.<sup>361</sup> On the other hand, it appears that in African countries about 60 per cent of the urban increase during the same decade was due to migration.<sup>362</sup>

175. In several south Asian countries, the role of natural increase is said to be greater than that of migration. In Pakistan between 1951 and 1961, natural increase accounted for about 42 per cent of the urban increase, while migration accounted for no more than about 30 per cent. (The rest is attributed to definitional changes.<sup>363</sup>) In India, the contribution of natural increase to urban growth in the period 1951-1961 was almost 70 per cent.<sup>364</sup> It has been estimated that during the three previous decades the contribution of natural increase to urban growth ranged between 30 and 60 per cent.<sup>365</sup> An analysis of the available data relating to place of birth of the urban population in several Middle Eastern countries showed that natural increase rather than migration has been the predominant factor in urban growth. Internal migration (which in this instance includes town-to-city migration as well as rural-to-urban migration) has accounted for only about a fifth of the total urban growth in the Syrian cities of Damascus and Aleppo, about a third of the urban growth in Iraq and up to half of the urbanization of Jordan.<sup>366</sup>

176. In Chile, the natural increase component of urban growth is considerably greater than the migration component. Thus, it is estimated that natural increase accounted for 70 per cent of city growth during the period 1952-1960.<sup>367</sup> The large relative contribution of natural increase to urban growth in Chile is attributed to high rates of natural increase in the cities.<sup>368</sup> In the United States, also, natural increase has been the main contributor to urban growth; it accounted for more than three quarters of metropolitan population growth during the period 1960-1965.<sup>369</sup> This represented a substantial rise in the role of natural increase as compared with the previous period (1950-1960) when natural increase

contributed 65 per cent of the urban growth.<sup>370</sup> The role of rural-to-urban migration is decreasing relative to urban natural increase in the United States because the level of urbanization is already high and the farm population is approaching minimum levels.<sup>371</sup> Rural depopulation is occurring in other developed countries also.<sup>372</sup>

177. While the relative contribution of rural-to-urban migration to urban growth in some highly urbanized areas such as the United States may now be less significant than it once was, the negative impact on the relatively small remaining rural population is increasingly important. In a comparative analysis of metropolitan and non-metropolitan economic areas of the United States, it was found that more than half of the natural increase occurring in the non-metropolitan economic areas was offset by net out-migration.<sup>373</sup> In the less developed countries as a group, it has been estimated that rural-to-urban migration during the 1950-1960 decade might have been about one-fourth as large as natural increase in the non-city population.<sup>374</sup> In these countries, however, the ratio of rural out-migration to natural increase varies greatly from one country to another and from one time period to another. Data from Tunisia, for example, indicate that the ratio of rural out-migration to rural natural increase might have risen from about 20 per cent during the decade 1936-1946 to about 40 per cent during the decade 1946-1956.<sup>375</sup> While variations between countries in Latin America are wide, it has been roughly estimated that, for the region as a whole, approximately half of the natural rural population increase of 3 per cent per year has been moving out of the rural category.<sup>376</sup> In a study of Yugoslavia during the period 1948-1961, it was shown that smaller settlements had greater losses relative to natural increase than larger settlements. Thus, settlements with 300 to 500 inhabitants recorded a population

<sup>370</sup> *Ibid.* Earlier data for the forty-five largest metropolitan areas of the United States in 1960 indicate that for persons 10 years of age and over the contribution of natural increase was 67 per cent during the decade 1930-1940; 34 per cent during the decade 1940-1950; and 57 per cent during the decade 1950-1960. The high percentage contribution of urban natural increase during the 1930s was the result of a relative decline in net rural-to-urban migration during the depression of that decade when urban employment became scarce. Data adapted from Miller, *Net Intercensal Migration to Large Urban Areas of the United States* . . . (1964), p. 4.

<sup>371</sup> Farm population as a proportion of total population in the United States declined from about 35 per cent in 1910 to 17 per cent in 1950, to 8.7 per cent in 1960, to 6.4 per cent in 1965, and to 5.1 per cent in 1969. Data for 1910 and 1950 from International Labour Office, *Why Labour Leaves the Land* . . . (1960), p. 21; data for 1960, 1965 and 1969 from United States, Department of Agriculture, *Agricultural Statistics, 1970* (1970), p. 440.

<sup>372</sup> In France, for example, the population of agricultural households declined from 18 per cent of the total population in 1962 to 14.5 per cent in 1968, and by 1975 the percentage is projected to decline still further to 11.5 per cent. Locoh, "La population des ménages agricoles . . ." (1970), p. 513.

<sup>373</sup> Hauser, "Urbanization: an overview" (1965), p. 32.

<sup>374</sup> Macura, "Demographic factors in urban development" (1967), p. 280. The non-city population was defined as population residing in localities with less than 20,000 inhabitants.

<sup>375</sup> Seklani, "Villes et campagnes en Tunisie . . ." (1960), pp. 506-507.

<sup>376</sup> United Nations, Economic Commission for Latin America, *Population Trends and Policy Alternatives in Latin America* (1971), p. 12.

<sup>361</sup> United Nations, Economic Commission for Latin America, "Urbanization and distribution of population . . ." (1969), p. 191. See also Vaidyanathan, "El proceso de urbanización en América Latina . . ." (1972).

<sup>362</sup> United Nations, Economic Commission for Africa, "Size and growth of urban population in Africa" (1969), p. 144.

<sup>363</sup> Hashmi, *Main Features of the Demographic Conditions in Pakistan* (1963), p. 23.

<sup>364</sup> Vaidyanathan, "Components of urban growth in India" (1971).

<sup>365</sup> Vishwambhar, "Urbanization in India . . ." (1955), p. 852.

<sup>366</sup> United Nations, Economic and Social Office in Beirut, "Population distribution, urban growth and planning in selected Middle Eastern countries" (1966 ?), p. 693.

<sup>367</sup> Arriaga, "Components of city growth . . ." (1968), p. 241. See also Weeks, "Urban and rural natural increase in Chile" (1970).

<sup>368</sup> Arriaga, "Components of city growth . . ." (1968).

<sup>369</sup> United States, Advisory Commission on Intergovernmental Relations, *Urban and Rural America* . . . (1968), p. 16.



increase of about one quarter of their natural increase; settlements of 500-1,000 inhabitants—about one half; and settlements of 1,000 to 2,000 inhabitants—about three quarters. In settlements with 2,000-5,000 inhabitants the population gain was roughly equal to natural increase, while the other groups of settlements (with over 5,000 inhabitants) recorded a growth which was considerably larger than the natural increase of population.<sup>377</sup>

178. Whereas the range of variation in the components of growth for the combined urban areas and rural areas is considerable, the variation among individual cities is even greater. While 60 per cent of the growth of Paris between 1954 and 1962 was due to migration,<sup>378</sup> in London between 1951 and 1961 over 70 per cent of the growth was attributable to natural increase. Studies based on place of birth statistics also show great diversity. In a survey carried out in Djakarta in 1954, it was found that 74 per cent of the Indonesian household heads interviewed had been born outside the city.<sup>379</sup> On the other hand, in Greater Bangkok in 1960, only one quarter of the native-born Thais had been born in other provinces.<sup>380</sup> Place of birth statistics for African cities also show wide inter-city variation. In Abidjan in 1965, only 29 per cent of the total population and only 7 per cent of the 112,000 persons over 20 years of age had been born in the city. In fifteen West and Middle African cities, the percentage of the population which had been born there varied from a high of 62 per cent for Bathurst to a low of 26 per cent for Douala and Libreville and it averaged about 42 per cent in the early 1960s.<sup>381</sup> In individual cities, as opposed to total urban population, some of the in-migration would have come from other cities rather than the countryside.<sup>382</sup>

179. Migration from other cities can represent important sources of growth for individual cities. Results of a 1962 survey of Greater Santiago showed that two thirds of the in-migrants had arrived from other urban places (places of 5,000 or more inhabitants in 1952). Despite the fact that in 1952 almost 50 per cent of Chile's population outside Santiago was genuinely rural, only 13 per cent of the in-migrants had come from such origins. The balance had come from areas classed as semi-urban. Moreover, the migrants had moved very little before their journey to Santiago. Among those who were 15 years of age or older at the time of migration, more than half had moved directly from their place of birth to Santiago.<sup>383</sup> In Middle Eastern countries, the flow of migration has been typically from rural areas to metropolitan centres or from towns to metropolitan centres rather than from

rural areas to intermediate-sized towns, which are few in the region.<sup>384</sup> Investigations made in Latin America do not support the hypothesis that "step-wise" migration has been important there; that is, that migrants have moved first to the smaller local urban centres, then to the great cities. In at least one Latin American country, Colombia, the admittedly fragmentary evidence suggests a "fill-in" migration pattern—that is, a pattern in which rural migrants move to villages and small towns, while "other" residents move from villages and small towns to larger towns and cities.<sup>385</sup>

180. The contribution of natural increase cannot be clearly separated from the contribution of migration, for it must be remembered that part of the urban natural increase occurs among rural-to-urban migrants. This is especially important in countries where the level of rural-to-urban migration is high. The amount of natural increase among rural-to-urban migrants was found to be an important component of urban growth in the Soviet Union, for example.<sup>386</sup> It has, likewise, been observed that the newly urban population in Latin America, which consists predominantly of young adults retaining typically high rural fertility rates, accounts for an important proportion of urban natural increase.<sup>387</sup> In a recent study of the Lima Metropolitan Area, it was revealed that approximately 64 per cent of the currently mated women between the ages of 15 and 49 were in-migrants.<sup>388</sup> It has also been estimated, in a study of the urban area of the State of Guanabara, Brazil, that between 45 and 50 per cent of all pregnancies in this population occurred among in-migrants, about two thirds of them among in-migrants from rural areas.<sup>389</sup> In some countries it may be true that limitations on housing facilities and poor living conditions in urban areas motivate incoming migrants to restrict the size of their families permanently, or temporarily. In other areas of the world the family size of rural-to-urban migrants who live in squatter settlements at the peripheries of larger cities has been notably high. Several studies which compared the fertility of rural-to-urban migrants with that of urban natives were reviewed in section B above.

181. The question of fertility differences between migrants and non-migrants is clouded by many complexities and the issue is not likely to be resolved without further carefully controlled study in a diversity of national

<sup>377</sup> Ban, *Naselja u Jugoslaviji* . . . (1970), p. 131.

<sup>378</sup> Hall, *The World Cities* (1966), pp. 53, 60.

<sup>379</sup> McGee, *The Southeast Asian City* . . . (1967), p. 83.

<sup>380</sup> Goldstein, "Urban growth in Thailand . . ." (1971), p. 2,897.

<sup>381</sup> Hance, *Population, Migration, and Urbanization* . . . (1970), p. 269.

<sup>382</sup> Statistics showing natural increase for a number of cities of the world are listed in Tokyo, Metropolitan Government, *Showa 40-nen Sekai Daitoshi Hikaku Tokei Nempo* (1965), pp. 24-31.

<sup>383</sup> Survey conducted in Greater Santiago by the United Nations, Latin American Demographic Centre (CELADE) as described in Elizaga, "A study of migration to Greater Santiago (Chile)" (1966), p. 353.

<sup>384</sup> United Nations, Economic and Social Office in Beirut, "Population distribution, urban growth and planning in selected Middle Eastern countries" (1966 ?), p. 693.

<sup>385</sup> United Nations, Economic Commission for Latin America, *Population Trends and Policy Alternatives in Latin America* (1971), p. 14.

<sup>386</sup> Perevedentsev, "Migratsiia naseleniia . . ." (1970), p. 34.

<sup>387</sup> United Nations, Economic Commission for Latin America, *Population Trends and Policy Alternatives in Latin America* (1971), p. 12.

<sup>388</sup> Survey sponsored by the Latin American Demographic Centre (CELADE) at Santiago and the Dirección Nacional de Estadística y Censos in Peru, as described in Weller, Macisco and Martine, "The relative importance of the components of urban growth in Latin America" (1971), p. 230.

<sup>389</sup> Martine, *Internal Migration and Its Consequences: The Case for Guanabara State*, unpublished Ph.D. dissertation cited by Weller, Macisco and Martine, "The relative importance of the components of urban growth in Latin America" (1971), p. 230.

and socio-economic contexts.<sup>390</sup> For example, it would not be unreasonable, on purely logical grounds alone, to suppose that where accommodation to urban circumstances is difficult, the age-specific birth rate pattern of migrants may be different from that of urban natives. Problems faced by migrants, such as finding stable employment and establishing a permanent family residence, could be influential factors in decisions to postpone marriage and births until later ages. In a study of San Juan, Puerto Rico, a "crossover" effect was observed. The number of children ever born per 1,000 married women was lower for in-migrants than for urban natives at ages of less than 35, but higher than urban natives after the age of 35.<sup>391</sup> Such a "crossover" in total fertility at an age when one can presume that most child-bearing is complete has also been observed in an analysis of United States census data for 1960.<sup>392</sup> In another study, in Bombay, India, the factor of duration of urban residence was considered, with age controlled. It was found that within each age group the number of children ever born per 100 married mothers was greater in families where the husband had resided within the city for a long period of time than in families where the husband had arrived only recently.<sup>393</sup>

## D. Factors affecting urban-rural population distribution

### 1. OBSERVED CONDITIONS ATTENDING MODERN URBANIZATION

#### (a) Pre-industrial antecedents

182. It has been shown in section C above that the growth of urbanization throughout the world has been uniquely a characteristic of recent history. While a few cities have existed for millennia, it is only within the past two hundred years that they have become so universally apparent. Large urban populations could exist only when and where agricultural productivity had substantially increased beyond the subsistence level, since urban dwellers have not generally produced their own food and have depended upon non-urban populations to generate a surplus.<sup>394</sup> Early societies, with their low levels of technical development and capitalization of agricultural production and their generally small-scale techniques, therefore, were limited in their abilities to support any large urban populations. In addition, technological

limitations prevented the transportation of surpluses to distant areas.<sup>395</sup>

183. Under such conditions, the population was usually distributed more or less in accordance with the productivity of the land.<sup>396</sup> Population was probably most heavily concentrated on lands which could produce large returns with minimum equipment, while other lands were less densely settled. Although a relatively uneven distribution of population resulted, there were few settlements that could be considered as urban.

184. The early cities that existed performed functions that were mainly political. They produced little industrial output and the levels of productivity were low by current standards. Administrative and garrison towns were often created by the Greek, Roman, Chinese and Latin American Empires for the purposes of controlling conquered territories and facilitating the exploitation of their resources, especially foodstuffs.<sup>397</sup> In these early periods an agricultural surplus was often generated by taxing or appropriating a part of the food produced in return for protection. The producer was forced to extract a surplus from the land when otherwise he would have preferred more leisure once the needs of his immediate family were met. As the institutions became formalized, those who provided the protection, those who administered the taxes, and those who supplied the services and equipment necessary for such functions began to reside in more permanent structures within walled towns or "political" cities.<sup>398</sup>

185. The populations of these pre-industrial cities soon became highly dependent upon the economic activities that occurred within, especially trade. Technological improvements, especially in transportation and communications,

<sup>395</sup> Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), p. 163, observes that the existence of cities presupposes a surplus food supply, which in turn requires either very high fertility of the soil or a fairly well advanced agricultural technology and, in either event, convenient means of transportation. "All three conditions were present in the river valleys of the Nile and Euphrates when the first great cities of history arose—Thebes, Memphis, Babylon, and Nineveh. No accurate estimates of the number of their inhabitants exist; but as the Greeks, who had cities of their own with at least 100,000 inhabitants, regarded the ancient cities with wonder, it may safely be said that they were great cities. Similar conditions were present during the period of Roman city civilization, The high perfection to which the arts of agriculture had been brought . . . permitted the existence of a large number of Oriental cities with a population of 100,000 or more in the first century before Christ. Two cities, Rome and Alexandria, probably attained a population of half a million souls each—a number reached by no other cities until the end of the seventeenth century (London and Paris)." On the other hand, Jacobs believes that the generally accepted assumption that the growth of cities required an agricultural surplus is false. She argues that cities could easily have appeared within an early industrial society before the development of agriculture, and that there is little empirical proof that agriculture had to develop first. See her *The Economy of Cities* (1969). While possible in isolated instances, it seems unlikely that large-scale urbanization could have been supported under such conditions.

<sup>396</sup> George, *Introduction à l'étude* . . . (1951), pp. 122-123.

<sup>397</sup> See Sjöberg, *The Preindustrial City* . . . (1960); also his "The rise and fall of cities . . ." (1969).

<sup>398</sup> Boulding, "The death of the city . . ." (1963), pp. 134-135. It is interesting to note that the earliest hieroglyphics referring to a city were composed of a circle with a cross within it, signifying a crossroad surrounded by a wall. Lopez, "The crossroads within the wall" (1963).

<sup>390</sup> A chronologic listing of past studies of the relationship between migration and fertility is provided in Macisco, Bouvier and Renzi, "Migration status, education and fertility . . ." (1969), pp. 183-186.

<sup>391</sup> *Ibid.*, p. 171.

<sup>392</sup> Macisco, Bouvier and Renzi, "Migration status, education and fertility . . ." (1969), pp. 183-186. The possibility of a cohort factor cannot be dismissed however.

<sup>393</sup> El-Badry, "A study of differential fertility in Bombay" (1967), p. 639.

<sup>394</sup> See, for example, Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), pp. 160-169; Gras, *An Introduction to Economic History* (1922); Sjöberg, *The Preindustrial City* . . . (1960); Mumford, *The City in History* . . . (1961), pp. 3-28; Lampard, "Historical aspects of urbanization" (1965); Hauser, "Urbanization—problems of high density living" (1968), pp. 187-189.

not only stimulated increased agricultural productivity, but also made it possible to administer increasingly large and diverse regions.<sup>399</sup>

186. The emergence of these factors during the economic transformations of the Middle Ages changed the basic nature of the urbanization process. As the city itself became more productive, the need for forceful exploitation of farmers declined. The city was thus transformed from a political to an economic centre.<sup>400</sup> The importance of transportation and communication technology became further accentuated. This is most evident in the case of the modern metropolis, which is essentially economic in purpose, and which depends upon trade for its very survival.<sup>401</sup>

187. The process of modern urbanization began with the Industrial Revolution, first in England, from which it spread to the European continent, and, especially after 1850 with the development of the steamship and railway, to the overseas areas of European settlement. This process reflected the changes in economic opportunities which were generated by structural changes in production and consumption. Massive rural-urban migration was the means by which people responded to changing economic opportunities, leading to a drastic redistribution of population.<sup>402</sup> Continually improved methods of production as a consequence of the agrarian and industrial revolutions were associated with the breakdown of relatively self-sufficient local and regional markets and their integration into national, and eventually international, markets. The increased agricultural output permitted an ever larger proportion of the population to engage in non-food producing activities and, especially at the beginning, provided a growing market for the expanding production of the new manufacturing sector.<sup>403</sup> The expansion of manufacturing industries and the services of the related tertiary industries was proportionately much greater than

that of the agricultural sector—among other reasons, because of the relative inelasticity of demand for food products. These changes in the structure of production were accompanied by changes in the demand for labour, one of the principal factors of production. A relatively diminishing need for agricultural labour was matched by correspondingly increased needs in the more rapidly expanding, urban-based sector. Rural-urban migration in this sense represented the adjustment of labour supply, which at the outset was predominantly rural, to the rural-urban shift in labour demand. It is within this economic context that the various push and pull factors under review have exercised their effect.

### (b) *The beginnings of modern urbanization*

#### (i) *Economic determining factors*

188. The main determining factors of the massive rural-urban migration which had its beginnings in northern and western Europe in the nineteenth century were economic. Improvements in agricultural techniques which began in the early eighteenth century resulted in a marked rise in the level of living and in declining mortality,<sup>404</sup> and perhaps also in somewhat higher fertility. Rural population pressure, the combined effect of more rapid population growth<sup>405</sup> and a proportionately smaller demand for agricultural labour resulting from improved agricultural efficiency, at first found an escape outlet in emigration overseas. Late in the eighteenth century in England, incipient industrialization began to offer an alternative outlet in the form of movement from country to town.<sup>406</sup> This alternative was available only on a limited scale to other countries of Western Europe until the second half of the nineteenth century when the urban economy became able to absorb more of the surplus rural population.<sup>407</sup> During this latter period there was a reduced demand for agricultural labour and population pressure became even more intense when the development of the railroad and steamship opened up the rich, virgin prairie lands of North America, Russia, Argentina and Oceania, and made it possible for Europe to import certain agricultural products at lower cost than they could be produced domestically.<sup>408</sup> In this sense, rural-to-urban migration represented one form of adjustment to increasing rural population pressure. This adjustment varied in detail from one country to another. In every instance, however, the main factor of rural-to-urban migration was the shift of employment and income opportunities from agriculture to other activities.

<sup>399</sup> One of the remarkable features of Roman civilization was its advanced state of construction engineering. This was reflected in the extensive irrigation and highway networks that remain in evidence today, which increased the productive and administrative capabilities.

<sup>400</sup> Boulding, "The death of the city . . ." (1963). On the functions of mediaeval cities, see Hoselitz, "The role of cities in the economic growth . . ." (1969), particularly pp. 235-239.

<sup>401</sup> Highly industrialized and urbanized nations such as the United Kingdom produce only part of the food that they consume, obtaining the remainder through trade with countries all over the world.

<sup>402</sup> Kuznets, "Introduction: population redistribution, migration . . ." (1964), p. xxiii. This explanation has been characterized as "the generally accepted theory of the relationship between economic growth and occupational structure". See International Labour Office, *Why Labour Leaves the Land . . .* (1960), p. 189. Weber's explanation in terms of the "economic organization of society" is essentially the same theory. See his *The Growth of Cities in the Nineteenth Century . . .* (1899; 1963 ed.), pp. 157, 209-222. For examples of other migration studies in which use is made of this theory, see Daragan, "Economic development and internal migration" (1967), pp. 487-488; Konstantinov, "Rural-urban migration as a factor . . ." (1967), pp. 499-502; Medina Echavarría and Hauser, "Rapporteurs' report" (1961), pp. 36-37. Davis defined several phases of internal migration which he considered to be not merely responses to economic change, but also necessary for such change. See his "Internal migration and urbanization . . ." (1955).

<sup>403</sup> Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 98-101.

<sup>404</sup> See chapter V, section G; Weber, *The Growth of Cities in the Nineteenth Century . . .* (1899; 1963 ed.), pp. 162-165; Dovring, "The transformation of European agriculture" (1965).

<sup>405</sup> Saville, *Rural Depopulation . . .* (1957), p. 2.

<sup>406</sup> *Ibid.*, p. 5.

<sup>407</sup> Horstmann, "Rural-urban migration . . ." (1967), p. 496; Dovring, "The transformation of European agriculture" (1965), pp. 604-605. Dovring has also noted (pp. 633-634) that the spread of the potato (a crop with a high caloric yield per acre and a high labour input required per acre) in Scandinavia and many parts of the Continent, mostly during the first half of the nineteenth century, permitted a greater rural population density and represented a postponement of a Malthusian check on population growth.

<sup>408</sup> Saville, *Rural Depopulation . . .* (1957), p. 14; Weber, *The Growth of Cities in the Nineteenth Century . . .* (1899; 1963 ed.).

189. In general, the governments of the industrializing countries adopted tariff, taxation, monetary and other policies that promoted trade and manufacturing and strengthened the demand for labour in these sectors.<sup>409</sup> In England the enclosure acts, which resulted in "the consolidation of small farms into large", drove labourers off the land by depriving them of their vital "rights of pasturage for sheep and geese on common lands".<sup>410</sup> With the opening up of the farm lands of the New World, "the agricultural systems of Europe entered upon a highly critical phase".<sup>411</sup> The competition was especially severe in the cultivation of grain. Most countries reacted by converting arable land to the production of dairy produce and meat and by the adoption of mixed farming using labour-intensive methods of production and spreading the labour load over the year so as to absorb the available labour as completely as possible;<sup>412</sup> most countries also put up their tariff barriers.<sup>413</sup> In England, for example, the impact of falling prices was much greater upon the grain farmer than upon the meat and dairy farmer.<sup>414</sup> Notable also in all countries was the divorce of industry from the village and the decline of the rural craftsman and of rural industries in general, in part due to stagnant or declining population, but more significantly to the competition of goods manufactured more cheaply on a large scale in urban centres.<sup>415</sup> Another factor was the tendency towards administrative centralization with the transfer of duties from local to central authorities and of governmental machinery from the small locality to the large city.<sup>416</sup> Migration to a large city was often a complex process with the central city drawing population especially from nearby rural areas and from smaller cities and towns whose population was in turn partly replaced by agricultural migrants from distant rural places.<sup>417</sup>

190. The expansion of labour demand in urban areas was heightened by the slower or even negative rate of natural increase of population in the cities.<sup>418</sup> The growth of employment opportunities was not confined to unskilled

labour in workshops and factories, but embraced also construction, trade and related services with a demand for a wide variety of skills, both manual and white-collar. At this stage of industrial capitalism, most enterprises were small in scale so that the individual worker or employee could often with some degree of realism aspire by frugal living to accumulate enough capital to start his own workshop or business.<sup>419</sup> Furthermore, the deterioration of rural employment opportunities and the corresponding expansion of the urban sector was accentuated by the newly established international division of labour whereby colonial populations and non-industrial independent countries became profitable markets for manufactured goods in exchange for a supply of food products and raw materials.<sup>420</sup> The domestic market did not provide an ample base for the rapid industrial expansion that was taking place at this time. Although wages (and apparently incomes also) were substantially higher in urban centres,<sup>421</sup> this was before the era of the mass consumption economy, and the bulk of the working population in both urban and rural areas did not live at much above the subsistence level.

191. The economic history of the overseas areas of European settlement differed from that of Europe. Such countries as Australia, Canada, New Zealand and the United States of America at first shared with the less developed regions the role of exporters of primary goods, but at the same time they also made rapid strides in industrialization and urbanization. This was accomplished by different means in each instance. In the United States such development became possible because (a) agricultural expansion was based on a relatively wide distribution of land tenure,<sup>422</sup> which permitted the development of a substantial domestic market; and (b) the Government promoted a vigorous policy of industrialization by means of tariff protection against the competition of European manufactured goods. In all four countries, immigrant labour from Europe participated both in the agricultural expansion as well as in the industrial enterprises. As a result of their rapid development, fertility in these countries declined around the turn of the century, as it had in Europe, until it reached a point at which the natural increase of population in rural areas no longer exceeded the rural out-migration to urban

<sup>409</sup> Weber, *The Growth of Cities in the Nineteenth Century*... (1899; 1963 ed.), pp. 213-215.

<sup>410</sup> *Ibid.*, pp. 165-166.

<sup>411</sup> Medina Echavarría and Hauser, "Rapporteurs' report" (1961), p. 40.

<sup>412</sup> Dovring, "The transformation of European agriculture" (1965), pp. 634, 638; International Labour Office, *Why Labour Leaves the Land*... (1960), p. 193; Cole and Deane, "The growth of national incomes" (1965), pp. 12-14.

<sup>413</sup> Youngson, "The opening up of new territories" (1965), pp. 170-174.

<sup>414</sup> Saville, *Rural Depopulation*... (1957), p. 14.

<sup>415</sup> Horstmann, "Rural-urban migration..." (1967), p. 496. See also Saville, *Rural Depopulation*... (1957), pp. 20-30, for an account of the types of craftsmen and small-scale rural industries in England before the centralization of production that accompanied the spread of the factory system and how they gradually withered away.

<sup>416</sup> Weber, *The Growth of Cities in the Nineteenth Century*... (1899; 1963 ed.), p. 215.

<sup>417</sup> According to Weber's analysis of the data from several European countries, only a small proportion of the total in-migrants to large cities came from remote rural places. However, his data seem to indicate that most out-migrants from remote rural areas did not move by stages to the large city. *Ibid.*, pp. 267 and 270.

<sup>418</sup> See section C above.

<sup>419</sup> Bairoch, among others, has examined how this situation favoured the emergence of a capitalist class drawn in no small part from humble social strata and especially from the countryside and from agriculture. The rural origin of textile industrialists was particularly noticeable. Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 118, 205.

<sup>420</sup> Ferns, *Britain and Argentina*... (1960), p. 14; Singer, *International Development: Growth and Change* (1964), p. 168. Bairoch has gathered data on trends in foreign trade for England and France which enable him to argue convincingly that export markets could not have been a very significant factor in the economic growth of these countries prior to the last few decades of the nineteenth century. Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 258-265, 331-340.

<sup>421</sup> See Saville, *Rural Depopulation*... (1957), pp. 13-20, for an examination of urban-rural wage and earnings differentials in England before the First World War.

<sup>422</sup> Except for the cotton industry in the South which was relegated to a subordinate role in that nation's economic growth after the Civil War (1861-1865).

areas. Thus, with the completion of the last phase of the demographic transition, the decline of the rural population became absolute as well as relative.

192. In two Latin American countries—Argentina and Uruguay—economic growth was somewhat parallel to that in the four countries of North America and Oceania mentioned above. Although land ownership was more concentrated than in the United States, immigrant tenant farmers and some immigrant owners participated in the prosperity of economic expansion and a substantial domestic market developed. However, the Government of Argentina, reflecting the interests of large landowners, adhered strictly to its role in the international division of labour and discouraged the manufacture of whatever could be imported from Europe.<sup>423</sup>

## (ii) Socio-cultural determining factors

193. Various factors affecting socio-cultural conditions differentially in rural and urban areas are mentioned in the literature as having had a contributing influence upon rural-urban migration. The conditions most frequently referred to are educational opportunities, health services and conditions, the quality of housing, public service facilities (water supply, gas, electricity, telephone etc.), cultural and recreational opportunities (theatre, movies, libraries, newspapers and other mass media), and social legislation concerning working conditions, public welfare and relief programmes. Many of these differences were in a continuous state of evolution. Generally, however, educational opportunities were inferior in rural areas with the possible exception of village education at the primary level.<sup>424</sup> Although urban centres had usually become self-replacing in the sense of having a positive rate of natural increase, urban health conditions in terms of either infant mortality or life expectancy apparently remained inferior to the rural until well into the twentieth century.<sup>425</sup> In this, as well as in some other respects, conditions in urban areas were often discouraging at first,<sup>426</sup> but they gradually improved and eventually added to the factors of attraction. For those rural residents who were not unskilled manual labourers and especially those who could move at least into lower middle-class urban occupations, the socio-cultural conditions of city life had decidedly more to offer.

<sup>423</sup> Ferns, *Britain and Argentina* . . . (1960); Ferrer, *La economía argentina* . . . (1963), pp. 91-152. The intermediate status of Argentina and Uruguay between the more developed and less developed countries is reflected in Germani's characterization of them as modernized, although insufficiently developed. Germani, *Política y sociedad* . . . (1968), p. 223.

<sup>424</sup> Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), p. 218.

<sup>425</sup> See section C above; also chapter V, section E on rural and urban mortality conditions in the developed countries.

<sup>426</sup> Buchanan and Ellis, commenting upon the appalling conditions associated with the occupational and geographical redistribution of the labour force, observe that "usually the growth of cities was so rapid that overcrowding, bad sanitation and a generally unhealthy environment was inevitable. Moreover, during much of the nineteenth century, governments had no previous experience with such urban concentrations and the social costs they entailed and therefore had no knowledge of how to deal with them". Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 411.

## (iii) Facilitating and precipitating factors

194. In the literature, frequent reference is also found to other factors affecting migration that are less basic and, either implicitly or explicitly, are regarded as facilitating or precipitating factors. One such factor is the freeing of labour from the attachment or bondage to the soil characteristic of most agricultural societies with a heritage of feudalism and with relatively self-sufficient local and provincial markets. The development of industrial capitalism required the free movement of the inputs of production (labour and capital) and its outputs in the national market.<sup>427</sup> Not only did internal taxes and tolls on the movements of goods have to be abolished, but also "medieval restrictions had to be swept away to secure freedom of migration and domicile" in Europe.<sup>428</sup> Technological progress in transportation (first, the construction of canals, then the railroad and later the automobile and the airplane) was described by one writer as an accelerating, rather than an initiating factor.<sup>429</sup> Associated with this were improved communication methods which permitted migrants to share with their kinfolk and friends in the areas of origin information about opportunities and conditions of living in the urban places of destination. This flow of communication between place of origin and place of destination also made possible the formation of organization networks, either on a kinship or entire community basis, which helped migrants find jobs and often offered them temporary shelter until they could get settled.<sup>430</sup> Another facilitating factor was the urban type of education often provided in rural schools which gave children better training for urban occupations than for agricultural work.<sup>431</sup>

<sup>427</sup> Adam Smith observed that "whatever obstructs the free circulation of labour from one employment to another, obstructs that of stock likewise. . . . The obstruction which corporation laws give to the free circulation of labour is common, I believe, to every part of Europe". Smith, *An Inquiry into the Nature* . . . (1776; 1966 ed.), p. 135.

<sup>428</sup> Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), pp. 214-215, notes the modification of the English law of settlement in 1795 and the abolition of serfdom in Prussia in 1808. Gerschenkron sees the rapid industrialization of the 1890s in Russia, where liberation from the soil began with formal emancipation in 1861 and was not really consummated until the Acts of 1906 and 1910, as a refutation of the widely accepted supposition that agrarian reform is a major prerequisite of modern industrialization. Gerschenkron, "Agrarian policies . . ." (1965), pp. 712, 798-799. Several other writers have commented that a migratory movement, once established on a massive scale, moves out of a sort of inertia and imitation similar to the inertia of pre-industrial attachment to the soil. Mortara, "Factors affecting rural-urban migration . . ." (1967), p. 512; Petersen, *Population* (1961), p. 607. In this sense the pioneering efforts of the early migrants facilitated the movement of those who came later.

<sup>429</sup> Saville, *Rural Depopulation* . . . (1957), p. 10.

<sup>430</sup> Germani, "Migration and acculturation" (1964), p. 175; Sjöberg, "Rural-urban balance . . ." (1966), pp. 244-245; Brown, Schwarzweller and Mangalam, "Kentucky mountain migration . . ." (1963).

<sup>431</sup> United Nations, *Report on the World Social Situation* . . . (1957), p. 170; Mortara, "Factors affecting rural-urban migration . . ." (1967), p. 512; Herrick, *Urban Migration* . . . (1965), p. 37.

(i) *The presently more developed countries*

195. Rural-urban migration and especially the movement out of agriculture has continued unabated in western countries in the twentieth century. Beginning around the middle of the nineteenth century in a few countries, although not until the twentieth century in most countries, the agricultural labour force has been declining in absolute numbers as well as in proportion to the total labour force; furthermore, this decline has greatly accelerated in the years following the Second World War.<sup>432</sup> The principal economic factors have continued to be increased agricultural efficiency and the shift in labour demand from agriculture to the secondary and tertiary sectors in the cities.<sup>433</sup> One difference is that the conversion from steam to electric energy has permitted the dispersal of industry to less populated urban areas, or to wider metropolitan regions.<sup>434</sup>

196. In the United States, early internal migration represented a process of dispersion of population towards rural areas of attractive physical resources, but by the 1920s migration trends reflected the concentration of population around a small number of industrial centres.<sup>435</sup> The South was the area of heaviest out-migration, owing to the mechanization of agriculture as well as other conditions affecting farm labour demand in that region.<sup>436</sup> Recent decades have seen an increasing concentration of industry in the coastal areas while the economic basis of the agricultural interior has been deteriorating.<sup>437</sup> Over a long period, internal migration responded positively to decadal swings in economic activity, increasing in periods of prosperity and decreasing during depressions.<sup>438</sup> Studies aimed at distinguishing the influence of differentials in levels of living and income on migration have generally shown a high positive correlation, although during certain periods and for certain types of movements there have been exceptions.<sup>439</sup>

<sup>432</sup> Dovring, "The transformation of European agriculture" (1965), pp. 611-613. Of course the volume of the migratory stream has necessarily shrunk as the rural-agricultural population base has become smaller. See also chapter IX, section D, and chapter XIV, section B.

<sup>433</sup> For a discussion of the factors affecting shifts in the structure of production in the United States, see Kuznets, "Introduction: Population redistribution, migration ..." (1964), pp. xxv-xxvi.

<sup>434</sup> For a discussion of factors affecting industrial location, see section A above.

<sup>435</sup> Vance, *Research Memorandum* ... (1938), pp. 89-91. See also Goodrich *et al.*, *Migration and Economic Opportunity* (1936); Landis, *Population Problems* ... (1954), pp. 407-408.

<sup>436</sup> Bogue, *The Population of the United States* (1959), p. 390; Duncan "The theory and consequences ..." (1956), particularly p. 430.

<sup>437</sup> Lee, "Internal migration ..." (1964), p. 125; and Bogue, *The Population of the United States* (1959), pp. 389-390.

<sup>438</sup> Eldridge and Thomas, *Population Redistribution* ... (1964), particularly pp. 333, 345, 368. See also Thomas and Zachariah, "Some temporal variations in internal migration ..." (1963).

<sup>439</sup> See, for example, Spengler, "Migration within the United States" (1936), pp. 8-9; Bogue, *Components of Population Change* ... (1957), pp. 24-29; and his *The Population of the United States* (1959), pp. 416-417; Eldridge and Thomas, *Population Redistribution* ... (1964), particularly pp. 353, 366-368; Thomas, "Internal migration in the United States ..." (1967), p. 536.

197. During the last decades of the nineteenth and the first decades of the present century, socio-cultural conditions improved markedly with the acquisition of leisure as an item of social living. Social legislation shortened the work day and lengthened the weekend, improved street lighting and sewage disposal made cities safer and healthier places to live in; and facilities for the enjoyment of leisure were developed. Educational opportunities were improved and social security programmes were adopted. Many of these changes were introduced first in the cities, to the relative exclusion of the countryside which then appeared as cultural abysses manifestly backward and outside the mainstream of life.<sup>440</sup> There is reason for thinking that socio-cultural push and pull factors assumed greater importance during this period. Temporary moves from the home community to places offering higher education tended to facilitate long-term migration, as persons once freed from social and family ties were potentially more mobile. Demographic factors also played a role, since rural areas have generally been found to have higher rates of natural increase than urban areas, with the result that the requirements for internal migration generated by shifts in industrial structure have been magnified.<sup>441</sup>

198. Since the Second World War, such developments as rural electrification and the popularization of the automobile have diminished the social and cultural differences between modernized rural areas, small and large cities, and over-crowdedness has detracted from the attractiveness of the great cities.<sup>442</sup> Commuting has severed the hitherto necessary relation between place of work and place of residence, and as a result, residential considerations have been growing in importance at the expense of economic factors, especially in the case of short-distance migration.<sup>443</sup> The lengthening of the

<sup>440</sup> Saville, *Rural Depopulation* ... (1957), pp. 30-37. On some of the changes which occurred in twentieth century cities, see also Hauser, "Urbanization—problems of high density living" (1968), p. 197.

<sup>441</sup> Kuznets, "Introduction: population redistribution, migration ..." (1964), pp. xxvii-xxviii. On the relationship between levels of natural increase and net migration see also Vance, *Research Memorandum* ... (1938), pp. 55, 101; Lee, "Internal migration ..." (1964), p. 125; Thomas, "Internal migration in the United States ..." (1967), p. 534; and Bogue, *The Population of the United States* (1959), p. 403. See also Hamilton, "Population pressure ..." (1956).

<sup>442</sup> Saville, *Rural Depopulation* ... (1957), p. 36; Germani, "Migration and acculturation" (1964), p. 169; International Labour Office, *Why Labour Leaves the Land* ... (1960), pp. 26, 117. Furthermore, government assistance has improved the position of agriculture in some of the advanced countries. Because of price and income support policies to raise farm prices, farmers' incomes are much higher in relation to incomes in other occupations than they were in the interwar years.

<sup>443</sup> In a study of internal migration in the Netherlands during the period 1948-1960, Ter Heide found a ratio of 41 to 24 between the influence of economic and residential factors. Comparing net migration during the periods 1951-1955 and 1956-1960 he found a decline of net out-migration in rural municipalities which he attributed to an increase in commutation among people already resident in rural areas because the flow of workers from agriculture intensified during this period. A somewhat similar explanation appears to account for decreasing net in-migration in large cities. Ter Heide, "Some aspects of internal migration ..." (1968), pp. 149-150.



years of life after retirement, increasing financial security of older persons, and changing family structure are developments believed to be conducive to a greater mobility of the retired population.<sup>444</sup>

199. Two large countries which began their industrialization much later than did the other presently developed countries are the Soviet Union and Japan. Deliberate economic planning has assumed a greater importance in both of these countries than it did in the countries which developed earlier, although the types of planning measures adopted in the two countries have been very dissimilar.<sup>445</sup>

200. Migration has been both a product and a precondition of the development of the Japanese industrial economy.<sup>446</sup> Despite the fact that Japan followed its own distinctive style in developing into a modern urbanized society, the underlying forces which brought a huge volume of migration from rural to urban areas are similar to those observed in Western Europe and the areas of overseas European settlement. The principal determinants of this migration were economic in nature; they included the continuous creation of employment opportunities in urban and metropolitan industries, and the existing disparities of levels of living between urban and rural areas, or between more industrialized and less industrialized prefectures.<sup>447</sup> From the beginning of industrialization in the late nineteenth century, industries were founded in the central regions of the Pacific Seaboard, such as Tokyo, Osaka and Nagoya, which occupied strategic locations in terms of space economy and geography. Other industries were attracted to these cities by the promise of external economies, and a snow-ball effect was generated. The economies of these great cities and their satellites were able to easily absorb the surplus labour force pushed out of the rural areas.<sup>448</sup> The almost constant numbers of the agricultural population, as well as agricultural workers, in the pre-war era<sup>449</sup> showed

that the surplus rural labour force had been siphoned off by the pull of the urban-industrial area.<sup>450</sup>

201. In the Soviet Union, although various kinds of incentives have been offered to persons willing to settle in sparsely populated areas east of the Urals (see section B above), the fact that opportunities are relatively better in cities than in most rural areas has resulted in a large flow of migration to cities from the rural areas.<sup>451</sup> The emphasis in government strategy in the past has not been to stem the flow of migration to all cities, but mostly to restrict the growth of the largest cities.<sup>452</sup> Restrictions have been difficult to implement, however, and it is anticipated that the number of cities of 1 million or more inhabitants will increase considerably during the next decade or so.<sup>453</sup> According to Valantei and Khorev, bans on new enterprises are often circumvented by undertaking new construction under the guise of extending and reconstructing existing enterprises situated in large cities. Administrative restrictions on residence in large cities have also been found to have unintended effects, since they dissuade some pensioners, who might otherwise move away from large cities after their retirement, from leaving, for fear that if they changed their minds, they would be prevented from returning.<sup>454</sup>

#### (ii) *The presently less developed countries*

202. In many of the presently less developed countries there is purported to be a "push" effect exerted upon rural inhabitants to migrate where they might be more productive.<sup>455</sup> There frequently exists an excess of rural population in relation to the land cultivated, resulting in much under-employment. In these circumstances, a decrease in the farm population may not reduce output, but may even increase it by permitting more efficiently organized production through larger-scale capital intensive farming operations.<sup>456</sup> There is often much indebtedness, while there is little cash-earning employment. Where rural poverty and under-employment are severe,

<sup>444</sup> Kuznets, "Introduction: population redistribution, migration..." (1964), p. xxviii.

<sup>445</sup> The Government of Japan, beginning with the Meiji Restoration of 1868, pursued a vigorous, long-range policy of very rapid industrialization. Levy, "Contrasting factors in the modernization..." (1955), p. 527; Allen, "The industrialization of the Far East" (1965), p. 909. Effective economic planning in the Soviet Union began half a century ago. USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Strana Sovetov za 50 let...* (1967).

<sup>446</sup> Taeuber, *The Population of Japan* (1958), p. 123.

<sup>447</sup> Saito and Kobayashi, "Sengo ni okeru wagakuni kokunai jinko..." (1967), pp. 188-190, 232-234; Tachi, *Jinko Mondai no Chishiki* (1969), pp. 167-168; Okazaki, *Nihon no Rodoryoku Mondai* (1966), pp. 131-133; Umemura, *Chingin, Koyo, Nogyo* (1961), p. 198.

<sup>448</sup> See, for example, Nojiri, "Nihon ni okeru..." (1954). Compared to conditions in many parts of South Asia at present, the rate of natural increase in Japan was never very high. It was under 1.4 per cent per annum even during the early decades of the twentieth century. Tachi, *Jinko Mondai no Chishiki* (1969), p. 98. Moreover, urban-rural differences in the rate of natural increase have not been very great; between 1920 and 1940 the rate seldom exceeded 16 per thousand in rural areas, while in urban areas it was estimated to be between 10 and 12. See Japan, Institute of Population Problems, *Zenkoku Shibu-gunbu...* (1968), p. 16.

<sup>449</sup> Namiki, "Sengo ni okeru nogyo jinko..." (1958).

<sup>450</sup> Minami, "Rodoryoku no hendo" (1964). Minami showed that rural-urban migration in Japan during this period was closely related to the supply of surplus labour in rural areas and the demand for labour in secondary and tertiary industries in urban areas. He found a significant statistical relationship between the volume and rate of rural-urban migration and the business cycle.

<sup>451</sup> Valantei and Sorokina, *Naselenie, trudovye resursy SSSR...* (1971), pp. 210-216.

<sup>452</sup> See, for example, Khorev, "Kakoi gorod nuzhen?" (1969), and his *Gorodskie poseleniia SSSR...* (1968).

<sup>453</sup> Svetlichny, "Gorod zhdet otveta" (1966). For a discussion of the economic and social factors which will ensure the future population growth of large cities, see Perevedentsev, "Goroda i gody" (1969). Selyunin has observed that it is precisely the restricted cities in the Soviet Union that attract the most new settlers. Selyunin, "Trud nash nasushchnyi" (1967).

<sup>454</sup> Valantei and Khorev, "Problemy gorodov" (1966). Migration to cities where construction of industrial enterprises has been prohibited appears to continue despite restrictions. A table showing the volume of expected migration to eighteen such cities during the period 1966-1980 is shown in Mkrtchyan, "Metodologicheskie voprosy razmeshcheniia proizvoditelnykh sil" (1969).

<sup>455</sup> The "push" effect in these countries is considered by many authors to be of greater importance than the forces of urban attraction. See, for example, Beaujeu-Garnier, "Large overpopulated cities..." (1970), p. 269.

<sup>456</sup> See Leibenstein, *Economic Backwardness and Economic Growth* (1957), pp. 58-76. See also chapter XIII, section C.



there may develop a strong belief that the economic conditions of urban areas are more promising, provoking city-ward migration.<sup>457</sup>

203. Even in those instances in which technological progress in agriculture (such as improved equipment, seeds, fertilizers, and working methods) has increased the productivity of both land and labour, a distortion often occurs in the relationship between the rural and urban sectors. While the improvements eventually reduce the need for agricultural labour and provide an increased output capable of supporting more people, in many contemporary examples the urban economies are not expanding rapidly enough to generate productive employment opportunities on a sufficient scale, and rural-urban migration exceeds the absorptive capacity of the cities.<sup>458</sup>

204. The situation is substantially different from that which accompanied urban growth in the presently developed nations. The urban and rural economies in many developing countries, rather than being related to each other, are often closely identified with activities within the highly industrialized countries.<sup>459</sup> This is reflected in a poorly integrated national economy and excessive urban growth.<sup>460</sup> This outward-looking orientation in many developing countries is a legacy of their colonial history, but even those developing countries which were not subject to colonial administration show many of the same tendencies owing to the fact that the system of international trade was dominated by the major industrial and commercial powers of the time who fostered arrangements designed to gain the greatest commercial advantages for themselves. Major port cities in the less developed countries concentrated on the functions of shipment and handling of exports, mostly raw materials, and imports, mostly finished goods. Industrial processes for the transformation of raw materials appeared in later phases of development, mostly in a subordinate role.<sup>461</sup> Many of these patterns persisted in the less developed countries even after the attainment of political independence, and a "dual economy", characterized by a modern sector including a large capital city on the one hand, and an impoverished rural hinterland on the other, has resulted.<sup>462</sup>

<sup>457</sup> The "push-pull" hypothesis of migration is a classical explanation of the phenomenon and is discussed later in this section.

<sup>458</sup> See the discussion in chapter IX, section E and chapter XIII, section C.

<sup>459</sup> See, for example, Hauser, "Urbanization—problems of high density living" (1968), p. 203.

<sup>460</sup> For a discussion of how the notions of classical economics have affected the structure of under-developed countries see Frank, *Capitalism and Under-development in Latin America* (1967).

<sup>461</sup> A study of the United Nations Economic Commission for Asia and the Far East notes that during the "commercial" phase of Asian urbanization, which can be related to the colonial period, trade cities began to develop along the coasts and gradually became the focal points for the collection, storage, handling and distribution of exports and imports. Later the processing of raw materials from the hinterland was added to the activities of these centres. See "Economic causes and implications of urbanization ..." (1957), pp. 140-141. See also Murphey, "Urbanization in Asia" (1969). For a discussion of similar patterns in Africa see Mobogunje, *Urbanization in Nigeria* (1968), pp. 107-171.

<sup>462</sup> On the concept of "dual economy" see Boeke, *Economics and Economic Policy of Dual Societies* ... (1953). For further discussion see chapter XIII, section D.

205. The economic relationships described above had a profound effect upon the manner in which urbanization progressed, and urban conditions as observed in many developing nations have been described by the controversial term "over-urbanization". This term has often been used to describe a situation where a country has a larger urban population than seems justified by its levels of industrialization.<sup>463</sup> Some writers have objected, however, that this conclusion is based on the experience of the countries which had developed earlier and that western models for development are not necessarily valid for the rest of the world.<sup>464</sup>

206. A comprehensive international study of rural-urban migration undertaken by the International Labour Office pointed to similarities in the determinants of migration in the more developed and less developed countries, but noted markedly different conditions under which these determining factors operate in the two groups. The report stated that "... the factors determining movement are the same in all countries, namely relative incomes in agriculture and other occupations, employment opportunities, and a variety of social and institutional disadvantages affecting agricultural workers and the rural community. 'Push' and 'pull' vary in strength in different conditions but, to a greater or lesser extent the same factors are universally operative."<sup>465</sup> On the other hand, the conditions within which these push and pull factors operate in Africa, Asia and Latin America were found to be basically different from those of North America, Oceania and Western Europe in the past century.<sup>466</sup> The most notable difference is the questionable causal relationship in the developing countries today between change in occupational structure and economic growth. This difference is the basis for the conclusion of certain scholars, as noted above, that many developing countries are "over-urbanized" in relation to their low levels of industrialization.<sup>467</sup>

<sup>463</sup> The term was suggested by Davis and Hertz Golden, "Urbanization and the development of preindustrial areas" (1954). See also Hauser, "Urbanization—problems of high density living" (1968), pp. 203-204; Breese, *Urbanization in Newly Developing Countries* (1966), pp. 134-136. Friedmann and Lackington used "hyperurbanization" to denote a similar concept. See their "Hyperurbanization and national development in Chile ..." (1967). For contrary views see Sovani, "The analysis of 'over-urbanization'" (1964) and Kamerschen, "Further analysis of overurbanization" (1969). See also the discussion of over-urbanization in chapter XIV, section C.

<sup>464</sup> See, for example, Abu-Lughod, "Urbanization in Egypt ..." (1965).

<sup>465</sup> International Labour Office, *Why Labour Leaves the Land* ... (1960), pp. 182-183. See also Kosiński and Prothero, "Migrations and population pressures ..." (1970), p. 252. The findings of the ILO study appear to be consistent with the results of various local studies. For example, Schultz found differential incomes in urban and rural areas to be an important factor in internal migration in Colombia between 1951 and 1964. See his "Rural-urban migration in Colombia" (1971), p. 163. See also Piplai and Majumdar, "Internal migration in India ..." (1969), p. 512.

<sup>466</sup> International Labour Office, *Why Labour Leaves the Land* ... (1960), pp. 182-183.

<sup>467</sup> Germani observed that mass migration may occur even when stimulated only slightly, if at all, by urban industrial growth. Germani, "Migration and acculturation" (1964), p. 160. Medina Echavarría and Hauser speak of "urbanization without economic development". See their "Rapporteurs' report" (1961), p. 37. Herrick suggested "a model in which the urban migration is not

Nevertheless, the International Labour Office survey found the volume of rural-urban movement to be much larger in those countries that were rapidly industrializing and in which the demand for non-agricultural labour was, in fact, increasing.<sup>468</sup>

207. Even in the more industrialized of the less developed countries, migration cityward generally is well in excess of economic growth as there is an insufficient expansion of labour demand. Friedmann and Herrick, for instance, have commented upon continued rural-urban migration despite high levels of urban unemployment in Venezuela and Chile, respectively.<sup>469</sup> These differences, the rural economic stagnation and insufficient expansion of urban demand for labour, have received some attention in the migration literature and various explanations have been proposed. Some writers have suggested the greater relevance in the present-day context of many non-economic causes of dissatisfaction with the rural environment or attraction to the cities.

208. Among the explanations advanced for rural backwardness have been: (a) land tenure systems in which large estates obtain a secure income by extensive use of land for livestock grazing;<sup>470</sup> (b) official economic development policies emphasizing industrialization almost to the exclusion of agriculture;<sup>471</sup> (c) the specialization of agriculture in many of the less developed countries during the second half of the nineteenth century in export crops whose markets in the advanced countries have subsequently ceased to expand and whose profitability has diminished further because of a deterioration in the terms of trade.<sup>472</sup>

209. The inadequate labour-absorptive capacity of industrialization in even the most rapidly developing countries has been explained partly in terms of the highly capital-intensive nature of modern industry in which

such a clear sign of well-being in the economy". Herrick, *Urban Migration* ... (1965), p. 2.

<sup>468</sup> International Labour Office, *Why Labour Leaves the Land* ... (1960), pp. 16-17, 144.

<sup>469</sup> Friedmann, *Regional Development Policy* ... (1966), pp. 32-33; Herrick, *Urban Migration* ... (1965), pp. 69-70. In Friedmann's opinion migration continues until urban unemployment reaches a certain critical level which "appears to depend on the extent of rural misery and is reached in many under-developed economies at about 15 per cent".

<sup>470</sup> Mortara, "Factors affecting rural-urban migration ..." (1967), p. 510; Medina Echavarría and Hauser, "Rapporteurs' report" (1961), p. 35.

<sup>471</sup> Mortara, "Factors affecting rural-urban migration ..." (1967), p. 512; Smith, *Latin American Population Studies* (1960), p. 60; Sjöberg, "Rural-urban balance ..." (1966), p. 246; United Nations, *Report on the World Social Situation: with Special Reference* ... (1961), p. 21; United Nations, *Report on the World Social Situation* ... (1957), p. 171.

<sup>472</sup> Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 187-188; Mortara, "Factors affecting rural-urban migration ..." (1967), p. 510. Bairoch observes (pp. 186-187) that this specialization was usually in industrial (non-alimentary) export crops and involved a type of plantation agriculture whose techniques were not readily transferrable to traditional agriculture which remained technologically backward. Many of these countries used their export surplus to import food products as well as manufactured products.

employment has grown more slowly than output,<sup>473</sup> and partly as a function of the restricted market available for its products<sup>474</sup> so that operation at capacity, in order to take advantage of economies of scale, is not feasible. However, various sources have pointed out that although investment in modern industry is not very productive of employment in manufacturing itself, urban employment expands more as a result of the need for services connected with manufacturing (banking, communications and transportation, advertising, maintenance and repair etc.).<sup>475</sup> In part because of the present structure of international trade, the expansion of manufacturing in developing countries has to contend with the obstacle of limited production for a highly protected and narrowly based domestic market, whereas the industrializing countries of the late nineteenth century, during their peak period of population growth, were able to count on a relatively flourishing rural market and also to tap the markets of their colonies (or expanding frontiers) and of relatively backward countries.<sup>476</sup>

210. Certain aspects of these differences in the relationship of rural-urban migration to economic growth are of special demographic interest. The historical experience of the less developed countries in the integrated world market that emerged in the second half of the nineteenth century has been mentioned as having contributed to cumulative population pressure in several ways. The destructive impact of imported manufactured goods on village crafts and small-scale industries owing to the newly established international division of labour has been often noted, especially with respect to India.<sup>477</sup> Davis has shown how British relations with India initiated

<sup>473</sup> United Nations, *Report on the World Social Situation* ... (1957), p. 126. It has also been noted that the developing countries today, in their efforts to accelerate the process of industrialization, are frequently relying on imported capital equipment and even raw materials. The indirect or secondary creation of employment opportunities under this form of production is much less than in more integrated economies. Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 180-181; Ferrer, *La economía argentina* ... (1963), part 4, pp. 155-235.

<sup>474</sup> Nun, "Superpoblación relativa, ejército industrial ..." (1969), pp. 206-207, 215; Singer, *International Development: Growth and Change* (1964), p. 162-164.

<sup>475</sup> Mortara, "Factors affecting rural-urban migration ..." (1967), p. 511.

<sup>476</sup> A United Nations report observed that "in nineteenth century Europe, industry produced for a world market in which little competition existed; the manufacturers of the newly industrializing countries may find international markets well-stocked with competing goods of the industrialized countries ...". United Nations, *Report on the World Social Situation* ... (1957), p. 129.

<sup>477</sup> Myrdal, *Asian Drama* ... (1968), vol. 2, chap. 25; Allen, "The industrialization of the Far East" (1965), pp. 908-909; Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 174-175; Ferrer, *La economía argentina* ... (1963), part 4, pp. 82-83. The decline of rural crafts and industries in the face of competition from machine-made manufactured goods occurred also in the industrializing countries of the nineteenth century. The crucial difference is that in the present instance the manufactured goods were imported from the industrialized countries. Because there was generally a prolonged "lacuna between the collapse of the older industries and the rise of" new ones (Allen, pp. 908-909 describing India's experience), the place of the eliminated jobs was taken by newly created jobs in other countries. In other words, the rural "push" factor was not being generated to the accompaniment of a corresponding urban "pull" factor.

a decline in mortality and Arriaga's study of historical trends of mortality in Latin America indicates that many if not most of the countries in this region had declining mortality during this period.<sup>478</sup> The greatest demographic significance of this one-sided economic development is that it was not associated with those changes in the social structure which would have laid the groundwork for a decline in fertility. As a consequence of continued high fertility and rapid declines of mortality, population in the less developed regions is now growing at unprecedented rates. In contrast to the situation that prevailed in the advanced countries during the nineteenth century, there is some evidence to suggest that the rate of natural increase may be of comparable magnitude in urban and rural areas.<sup>479</sup> Urban natural increase may thus to a considerable extent satisfy the increased demand for urban manpower created by economic growth.<sup>480</sup> Moreover, the pressure resulting from the natural growth of population is unalleviated by the emigration escape valve that was available to the countries of Western Europe during their phase of maximum population growth.<sup>481</sup> One analyst has found evidence not only of a rural population push factor, but also of an urban population "push-back" factor.<sup>482</sup> Other studies of internal migration in India explain the decline of migration to the cities during the 1951-1961 period mainly in terms of the faster urban rate of natural increase which may have left less room for migrants in the absence of corresponding growth of opportunities.<sup>483</sup> In Latin America the excess population is increasingly being characterized as a "marginal population" accumulating at the peri-urban fringes, and various

studies of this question have been made or are in process.<sup>484</sup>

211. Aside from pressures arising in the rural areas, the urban localities gain in relative attractiveness also for various other reasons. As the countryside in some regions suffers the loss of its non-farm industry and the cities become "more 'modern' in their patterns of consumption than in their patterns of production",<sup>485</sup> society to some extent becomes polarized into a modernized urban sector and a traditional rural sector.<sup>486</sup> The influence of socio-cultural factors of this kind is mentioned especially in the literature on rural-urban migration in Latin America.<sup>487</sup> The proximity to cultural features enjoyed by some in the city, however, constitutes for most migrants a strictly psychological satisfaction. Many of these superior urban conditions are not accessible to migrant workers of little economic skill.<sup>488</sup> But these psychological attractions are seldom fully revealed in sociological surveys. As a rule, most migration surveys indicate that economic factors are salient<sup>489</sup> and writers generally assume that for the majority of migrants socio-cultural factors are secondary or ancillary to the basic economic considerations.<sup>490</sup>

212. With due regard for the many differences within each region, rural-urban migration in Asia, and even more so in Africa, reflects the more retarded character of urbanization and of economic development in these regions as compared with Latin America. Educational development is less advanced,<sup>491</sup> as also are legislative provisions for social security and labour protection.<sup>492</sup> In India, "health conditions, though bad in the villages, are worse in the cities, and the migrants themselves are

<sup>478</sup> Davis, *The Population of India* ... (1951), pp. 38-42; Arriaga, *New Life Tables* ... (1968). Confirmation of mounting population pressure at this time in India and China is found in the emigration movements overseas and to neighbouring countries described in chapter VII. There was also much internal migration in India to the estate regions of the north-east and south-west where the export crops were being produced. Davis, *The Population of India* ... (1951), pp. 114-117.

<sup>479</sup> See the discussion in section C above. See also Arriaga, "Components of city growth ..." (1968); Davis, "The urbanization of the human population" (1965), pp. 48-51; Kuroda, "Internal migration ..." (1967), p. 505; Bose, "Internal migration in India ..." (1967), pp. 483-486.

<sup>480</sup> Contrasting conditions in Europe in the nineteenth century with those in India at present, Mitra emphasized the low rate of natural growth in European cities which was inadequate to meet growing labour demands. See his "Problems of internal migration ..." (1968), pp. 8-9.

<sup>481</sup> Easterlin, "Influences in European overseas emigration ..." (1961), pp. 331-351.

<sup>482</sup> Bose, "Internal migration in India ..." (1967), p. 484.

<sup>483</sup> Rele, "Trends and significance of internal migration ..." (1969), p. 505; Zachariah and Ambannavar, "Population redistribution in India ..." (1967), p. 105. The latter authors also considered that the pattern of India's development programme may have caused a structural change in internal migration, whereby urban-to-urban and rural-to-rural movements assumed greater importance. Mitra cited rural development as a possible contributory factor to the slowing down of urbanization and noted "the new sense of power and destiny that the villager has gained, together with the rise in grain prices and the increasing profitability of agriculture". Mitra, "Internal migration and urbanization ..." (1967), p. 611; and his "Problems of internal migration ..." (1968), p. 6. Brush, on the other hand, cited the restricted opportunities, facilities and amenities which Indian cities have to offer rural migrants. Brush, "Some dimensions of urban population pressure ..." (1970), pp. 300-301.

<sup>484</sup> See, for example, the special issue of *Revista Latinoamericana de Sociologia* (1969) devoted exclusively to the subject of "La marginalidad en América Latina".

<sup>485</sup> United Nations, *Report on the World Social Situation* ... (1957), p. 128. See also Singer, *International Development: Growth and Change* (1964), pp. 61-64; Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 190-191.

<sup>486</sup> See Eisenstadt, *Modernization: Protest and Change* (1966), pp. 86 ff. with special reference to Latin America.

<sup>487</sup> Matos Mar, "Migration ..." (1961), pp. 182, 186-190; Mortara, "Factors affecting rural-urban migration ..." (1967), pp. 511-512; Herrick, *Urban Migration* ... (1965), pp. 35-38; Smith, *Latin American Population Studies* (1960), pp. 59-60. See also International Labour Office, *Why Labour Leaves the Land* ... (1960), pp. 158, 211-212.

<sup>488</sup> United Nations, *Report on the World Social Situation* ... (1957), p. 181.

<sup>489</sup> MacDonald and MacDonald, "Motives and objectives of migration ..." (1968), p. 434; Matos Mar, "Migration ..." (1961), p. 182.

<sup>490</sup> Caldwell observed, for example, that "The bright lights [of the towns] are not the primary cause of Ghanaian rural-urban migration; the primary causes are much more down-to-earth economic facts; but they exert an important supplementary attraction". Caldwell, *African Rural-Urban Migration* ... (1969), p. 210. See also Prothero, "Socio-economic aspects of rural/urban migration in Africa ..." (1965), p. 278.

<sup>491</sup> In Latin America, school enrolment ratios are generally higher than in the African and Asian countries. See, United Nations Educational, Scientific and Cultural Organization, *Statistical Yearbook, 1970* (1971), table 2.5.

<sup>492</sup> United Nations, *Report on the World Social Situation* ... (1957), p. 181.

aware of the contrast".<sup>493</sup> In Latin America, rural-urban migration results in a more stable urban residence, whereas "in Asia and perhaps even more in Africa, many ... villagers ... seek urban employment ... for the express purpose of earning a specific sum of money" after which they return to their rural families.<sup>494</sup> Among the developing countries today, urbanization in Latin America, as compared with Asia and especially Africa, may be said in very general terms to proceed from higher initial levels, relatively lower population pressure on the land and to be characterized by more rapid rates of economic growth.

## 2. GENERAL THEORIES CONCERNING INTERNAL MIGRATION

213. Most scholars who write about migration theories and models recognize the very imperfect state of present-day theoretical and empirical knowledge of the migration phenomenon.<sup>495</sup> There is considerable agreement that the study of migration has been hampered by the grave deficiencies in migration theories which tend to be "time-bound, culture-bound and descriptive bound".<sup>496</sup> To some extent this situation may be attributed to the greater complexity of migration as compared with the other two components of population change, mortality and fertility. Because it involves a change from a place of origin to a place of destination, migration has both a separative and an additive effect and both aspects are relevant to an understanding of why people move. In this sense its complexity is twice that of mortality and fertility which are concerned with the determinants of only one aspect, either the separations (mortality) or the additions (fertility).<sup>497</sup> Furthermore, both births and deaths are clearly identifiable biological phenomena (although influenced by social and other non-biological factors) whereas migration (defined as a "change of residence" across an "administrative boundary") lacks this precision.<sup>498</sup>

214. Owing in part to the predominantly empirical orientation of demographers and in part to the seriousness of data deficiencies, most migration studies have eschewed generalizations and have tended to be factual reports, describing the volume of the different movements revealed by the data and, where possible, the differential characteristics of the migrants. Among those who have attempted to generalize, two more-or-less distinct approaches may be discerned. One of these, mainly situation-oriented in terms of push and pull factors, has taken as its starting-point the differences in characteristics of the places that have experienced net out-migration and of

those with net in-migration in order to arrive at an explanation of why the migratory movements occurred. The other approach has sought to formulate empirical generalizations describing patterns of migration, preferably in the form of mathematical models and valid as universal laws. The objective of this approach has mainly been descriptive, although, as noted below, some scholars have explored its explanatory potentialities.<sup>499</sup> An illustration of the distinction between these two approaches and their utilization is found in Weber's study of nineteenth-century urbanization.<sup>500</sup>

215. Two famous papers by Ravenstein published in 1885 and 1889, both entitled "The laws of migration",<sup>501</sup> are the starting point for the second approach to migration theory involving the formulation of empirical generalizations in regard to patterns of migration.<sup>502</sup> Some of his laws have been challenged or have been discovered to have exceptions.<sup>503</sup> But his observations that migration is preponderantly of short distance, that the volume of migration diminishes as the distance from the centre of absorption increases, and that most long-distance migration proceeds to "the great centres of commerce and industry"<sup>504</sup> gave rise to the fundamental idea underlying the gravity models of Kant and Zipf.<sup>505</sup> According to these, migration is directly proportional to the product of the populations of the places of origin and destination and inversely proportional to the distance between them. On the other hand, Stouffer's well-known model of intervening opportunities denies that there is any necessary relationship between mobility and distance. He formed the hypothesis that the number of persons

<sup>499</sup> Germani, "Migration and acculturation" (1964), pp. 159-160; Bogue, *Principles of Demography* (1969), p. 755; Petersen, *Population* (1961), p. 607; Folger, "Models in migration" (1958), p. 157.

<sup>500</sup> Weber, *The Growth of Cities in the Nineteenth Century ...* (1899; 1963 ed.). The book includes one chapter on the causes of concentration of population which analyses the forces that "act upon men in various ways to produce the necessary shifting of population" (p. 209). A section of the following chapter lays down three laws and discusses another hypothesis on the "nature of the migratory movement" (p. xxii).

<sup>501</sup> Ravenstein, "The laws of migration" (1885 and 1889).

<sup>502</sup> However, the laws Weber presented draw not only upon Ravenstein but also upon the earlier work of Von Mayr who "made the first thorough investigation in the field of internal migration in 1871 ...". Weber, *The Growth of Cities in the Nineteenth Century ...* (1899; 1963 ed.).

<sup>503</sup> For example, it was noted in section B that his law that females predominate among short-distance migrants appears not to be valid in many parts of Africa and Asia. See also Price, "Distance and direction ..." (1948). Weber produces statistics which place in doubt, without entirely disproving, the hypothesis that internal migration proceeds *stapelweise*, i.e., "by stages through village, town, city and metropolis". Weber, *The Growth of Cities in the Nineteenth Century ...* (1899; 1963 ed.).

<sup>504</sup> For a concise statement of Ravenstein's laws based on a selected arrangement of quotations from the 1885 and 1889 papers referred to above, see Lee, "A theory of migration" (1966), p. 48. A further discussion can be found in Macisco and Pryor, "A reappraisal of Ravenstein's 'laws' of migration ..." (1963). Heberle found support for one of Ravenstein's laws in the finding of an inverse correlation between the rate of mobility and size of city in Germany. Heberle, "Migratory mobility ..." (1955), p. 532. See also Heberle and Meyer, *Die Grossstädte ...* (1937).

<sup>505</sup> Pred, *The External Relations of Cities ...* (1962), p. 6; Kant, "Den inre omflyttningen ..." (1946), pp. 83-124; Zipf, "The  $P_1 P_2 / D$  hypothesis ..." (1946).

<sup>493</sup> International Labour Office, *Why Labour Leaves the Land ...* (1960), p. 128.

<sup>494</sup> United Nations, *Report on the World Social Situation ...* (1957), p. 130. See also Caldwell, *African Rural-Urban Migration ...* (1969), particularly chapter 8.

<sup>495</sup> Germani, "Migration and acculturation" (1964), p. 167.

<sup>496</sup> Mangalam and Schwarzweller, "General theory in the study of migration ..." (1968), p. 4.

<sup>497</sup> Bogue, "Discussion ..." (1958), p. 170.

<sup>498</sup> Some of the limitations and ambiguities of this twofold criterion for defining migration are noted in section B above.

migrating a given distance is directly proportional to the number of opportunities at the place of destination and indirectly proportional to the number of intervening opportunities.<sup>508</sup> Various tests have been made by the Zipf and Kant models and the Stouffer model or variants of these models and high correlations between expected and observed migrants have been reported.<sup>507</sup>

216. Laws and models of this kind suffer from the handicap that they tend to describe rather than to explain;<sup>508</sup> nor do they take into account all the diverse circumstances under which migration can occur; also, because they "are incomplete as far as migration factors are concerned, nobody would suggest that they might be used for population projections".<sup>509</sup> Ter Heide has reviewed many of the efforts that have been made to overcome these handicaps so as to make the models more useful. One partial solution has been the use of parameters whose values are dependent on situational factors. Other scholars have qualified the meaning of the factors, distance and population size, in the Zipf-Kant model and then proposed appropriate modifications.<sup>510</sup> Some have experimented with more elaborate mathematical models, involving, for example, stochastic process analyses with Markov chain techniques.<sup>511</sup>

<sup>508</sup> Stouffer, "Intervening opportunities ..." (1940); see also his "Intervening opportunities ..." (1960); Porter, "Approach to migration ..." (1956).

<sup>507</sup> Folger, "Some aspects of migration ..." (1953); Hägerstrand, "Migration and area ..." (1957); Anderson, "Intermetropolitan migration ..." (1955); Agersnap, "Studier over indre Vandringer ..." (1952); Lövgren, "The geographical mobility of labour ..." (1956); Bright and Thomas, "Interstate migration and intervening opportunities" (1941); Isbell, "Internal migration in Sweden ..." (1956); Strodbeck, "Equal opportunity intervals" (1949). For references to other tests see Ter Heide, "Migration models and their significance ..." (1963), pp. 58 and 65; Folger, "Models in migration" (1958), pp. 156-157; and Pred, *The External Relations of Cities* ... (1962), pp. 61 and 63.

<sup>508</sup> According to Pred, *The External Relations of Cities* ... (1962), p. 63, Stouffer's formulation of his intervening opportunities hypothesis was intended to include explanatory variables such as employment possibilities, but this operational definition of opportunities in terms of migrants into an area, in the opinion of many, has circumvented this objective. See Folger, "Models in migration" (1958), p. 158; Lowry, *Migration and Metropolitan Growth* ... (1966), pp. 9-10.

<sup>509</sup> Ter Heide, "Migration models and their significance ..." (1963), p. 71.

<sup>510</sup> Migration may be influenced, for example, not only by sheer geographical distance but also by technical distance in terms of communication and transportation facilities and by social distance in terms of cultural, linguistic and religious differences between places of origin and destination. Ter Heide reports that one aspect of technical distance has been studied in Denmark by Agersnap and that Somermeijer included a social distance factor in a migration model applied to the Netherlands. Others such as Miller, Dodd, Stewart, Isard and Somermeijer have proposed that weights be attached to the population figures in the formula on the basis of relevant differences in their characteristics. Ter Heide, "Migration models and their significance ..." (1963).

<sup>511</sup> Muhsam, "Toward a formal theory of internal migration" (1963); Myers, McGinnis and Masnick, "The duration of residence approach ..." (1967), pp. 121-126; Morrison, "Duration of residence and prospective migration ..." (1967), pp. 553-561. Rogers, *Matrix Analysis of Interregional Population Growth* ... (1968); Tarver and Gurley, "A stochastic analysis of geographic mobility ..." (1965); Kamiya, "Korekara no jinko bumpu ..." (1963); Shimizu, "Waga kuni ni okeru jinko ..." (1964).

217. Somermeijer made a major improvement in the Zipf-Kant model by introducing explanatory "attractiveness factors", each of them with different values in the place of origin and in the place of destination.<sup>512</sup> This innovation enables the model to describe both net and gross migration instead of only the gross migration between two places; in principle (providing appropriate weights can be assigned) it also permits the incorporation of all the explanatory push-pull factors supplied by the situation-oriented approach; it assumes that each factor influences a different class of migrant and allows for different subjective values for different persons within the class of migrants influenced by a given factor.<sup>513</sup> Lowry, acknowledging his indebtedness to Somermeijer, applied a model with nine independent variables to the analysis of internal migration in the United States.<sup>514</sup> Numerous studies conducted in Japan have investigated the importance of disparities in income and employment opportunities between the more urban industrial areas and the more rural agricultural areas as factors explaining internal migration.<sup>515</sup>

218. In the situation-oriented approach to migration theory, explanation has been the chief objective and the push-pull hypothesis has dominated the mode of thinking.<sup>516</sup> In this type of analysis, migration is considered to be "the outcome of the interplay and balance of expulsive forces ... and of attractive forces" in the places of origin and destination.<sup>517</sup> The push-pull hypothesis has proved to be a useful device for listing all the factors affecting a given migratory movement,<sup>518</sup> and has produced lucid and convincing expositions of the underlying factors in

<sup>512</sup> Somermeijer, "Een analyse van de binnenlandse migratie ..." (1961).

<sup>513</sup> Ter Heide, "Migration models and their significance ..." (1963), pp. 57-64, 67-69. Others working with models have also commented on the need to take into account the difference between the objective factors affecting migration and the potential migrants' perception of these factors. Folger, "Models in migration" (1958), p. 162; Muhsam, "Discussion ..." (1958), pp. 169-170.

<sup>514</sup> Lowry, "Migration and metropolitan growth ..." (1966), p. 11 ff. Also of interest is the model tested by Sahota with interstate migration data from the 1950 Brazilian census. See his "An economic analysis ..." (1969), pp. 73-88. See also Greenwood, "An analysis of the determinants of geographic labor mobility ..." (1969); Sjaastad, "The relationship between migration and income ..." (1960).

<sup>515</sup> See for example, Umemura, *Chingin, Koyo, Nogyo* (1961), pp. 203-205; Nishikawa, *Chiiki-kan Rodo Ido* ... (1966), pp. 227-239; Kanekiyo, *Hito no Ugoki* ... (1970), pp. 110-112; Okazaki, *Nihon no Rodoryoku Mondai* (1966), pp. 132-133; Tachi, "Kokunai jinko ido no kino" (1967), and his "Regional income disparity and internal migration ..." (1964), pp. 186-204; Tachi and Misawa, "Nihon ni okeru kokunai ..." (1969), pp. 1-19; Suzuki, "Rodoryoku no chiiki-kan ido" (1968); Kono and Shio, *Inter-Prefectural Migration in Japan* ... (1965). Some of these studies took into account the factor of distance, as well as demographic and social factors which were considered to function as intervening variables which might modify the direct relationship between economic factors and migration.

<sup>516</sup> Mangalam and Schwarzweller, "General theory in the study of migration ..." (1968), p. 8.

<sup>517</sup> Germani, "Migration and acculturation" (1964), p. 159.

<sup>518</sup> For examples of such inventories, see Mortara, "Factors affecting rural-urban migration ..." (1967); Smith, *Latin American Population Studies* (1960), pp. 59-60; and Bogue, "Internal migration" (1959), pp. 499-501.

migration.<sup>519</sup> The approach in and by itself, however, does not lead to any theory and some students of migration have questioned the adequacy of its basic concepts. The force of accumulated push and pull factors can be so overwhelming that it neglects to make clear "why . . . some migrate and some not".<sup>520</sup> The use of Lee's conceptual framework<sup>521</sup> which incorporates push and pull factors at both the origin and destination would overcome this limitation. Another difficulty with push-pull analysis emerges when an attempt is made to characterize the combined effect of all the factors as predominantly either push or pull.<sup>522</sup> Some scholars have avoided this kind of difficulty by observing that many push and pull factors can be mated into pairs, each pair representing two different values of one single variable.<sup>523</sup> Following this line of reasoning some have concluded that the push-pull dimension is a subjective characteristic of migration. Whether the individual migrant thinks of himself as being pushed by the poorer job, health, educational, and other conditions in his rural habitat or is attracted by the better urban conditions depends in part on his evaluation, and may well be different before and after the fact of migration.<sup>524</sup> While personal reasons and individual motivations are important during the pioneer phases of a migratory movement, they are of little interest during the mass or social movement phase which is largely sustained by imitation and inertia.<sup>525</sup> Nevertheless, under circumstances of rapid change taking place only at the origin or only at the destination, a movement might more clearly and legitimately be distinguished as push or pull.

219. The greatest challenge to migration theorists is the organization of all hypothetically relevant factors into one coherent theoretical framework that will specify their interaction with each other in empirically testable form and thereby serve as a guide to future research.

<sup>519</sup> See, for example, Weber, *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), chap. 3; Saville, *Rural Depopulation* . . . (1957), chap. 1; and International Labour Office, *Why Labour Leaves the Land* . . . (1960).

<sup>520</sup> Petersen, *Population* (1961), p. 607.

<sup>521</sup> Lee, "A theory of migration" (1966), pp. 49-51. See chapter VII, section B for a further discussion of this framework.

<sup>522</sup> For example, a number of studies have concluded that rural-urban migration in the less developed countries today is activated primarily by push, whereas in the more advanced countries the pull factors have been stronger. Germani, "Migration and acculturation" (1964), p. 160; McGee, *The Southeast Asian City* . . . (1967), pp. 84-85; Sjöberg, "Rural-urban balance . . ." (1966), p. 243.

<sup>523</sup> Thus Herrick unifies the push and pull hypotheses of lower rural and higher urban income into "one in which urban migration is a function of expected rural-urban income differences." Herrick, *Urban Migration* . . . (1965), p. 14. Similarly, Kuznets and Thomas speak of differential economic opportunities. See their "Internal migration and economic growth" (1958). Todaro devised a model for analysing the determinants of urban labour supply which takes into account differential expected real earnings in urban and rural employment, after allowance is made for the probability of finding an urban job. See his "A model of labor migration . . ." (1969); see also Harris and Todaro, "Migration, unemployment and development . . ." (1970).

<sup>524</sup> Sjöberg, "Rural-urban balance . . ." (1966), p. 243.

<sup>525</sup> Mortara, "Factors affecting rural-urban migration . . ." (1967), p. 512; Petersen, *Population* (1961), p. 608. See section B for a further discussion of the pioneer and mass phases of migratory movements.

Generally speaking, the more elaborate frameworks remain on the drawing-board because of data deficiencies and other difficulties in their application; analytical systems which have been designed for use with a specific body of data have necessarily had to sacrifice rigour and elegance of formulation.<sup>526</sup> Because of the existence of many diverse types of migration, some scholars have abandoned the search for universally valid generalizations about migration in preference for the construction of migration typologies,<sup>527</sup> as a necessary preliminary step in the development of migration theory.

220. Among the theoretical frameworks which have been formulated for migration analysis, those of the economists Schultz and Sjaastad consider internal migration in terms of costs and returns on investments in human capital. The costs of the investment, such as moving costs, earnings foregone while searching and training for a new job and psychic costs such as homesickness, must be compared with the returns, such as expected better earnings etc.<sup>528</sup> Petersen, a sociologist, has urged that an attempt be made "to distinguish among underlying causes, facilitative environment, precipitants and motives".<sup>529</sup> Germani devised a sociological framework that identifies three levels of analysis: an objective level and two subjective levels, the normative and psychosocial levels.<sup>530</sup> His framework is principally programmatic and he uses it to indicate the kind of data a researcher should look for in a rural-urban migration study. In view of the complexity of the conceptualization of the objective and subjective components of migration motivation, and the design of surveys investigating them in depth, it is understandable that most migration studies and surveys have in the past pursued more limited aims.

<sup>526</sup> Weber's analysis published in 1899 still remains highly pertinent. See his *The Growth of Cities in the Nineteenth Century* . . . (1899; 1963 ed.), pp. 157, 209-222. For Weber the principal cause of migration is the economic (or structural) forces comprised under the term "economic organization of society" to which population distribution adjusts following the line of least resistance. After tracing the structural evolution of rural and urban centres, he introduces a group of "secondary or individual causes" classified into economic, political (with five sub-categories), and social (with six sub-categories).

<sup>527</sup> Petersen, *Population* (1961), p. 607. Petersen's typology distinguishes "innovating" from "conservative" migration on one dimension, and five broad classes of migrants' level of aspiration on the other dimension. Heberle's typology also uses two dimensions: the social relationships of the migrants and differences in socio-cultural systems between areas of origin and of destination. Heberle, "Types of migration" (1956), p. 1. Another typology that is basic to any discussion of factors affecting migration is that which distinguishes, on the one hand, between those persons who make the decision to migrate and, on the other hand, those persons whose migration is merely derivative from a decision made by the head of the family. Shryock designated these two kinds of migration respectively as "primary migration" and "secondary migration". Shryock, *Population Mobility* . . . (1964), pp. 403-409.

<sup>528</sup> For a summary of much of their work, see Schultz, "Reflections on investment in man" (1962) and Sjaastad, "The costs and returns of human migration" (1962). The brief description presented here is taken in part from Herrick, *Urban Migration* . . . (1965), pp. 18-20, and in part from Sahota, "An economic analysis . . ." (1969), pp. 74-75. This kind of model is clearly appropriate to countries with market economies, such as the United States, and not to socialist economies, such as the Soviet Union.

<sup>529</sup> Petersen, *Population* (1961), pp. 607-608.

<sup>530</sup> Germani, "Migration and acculturation" (1964), pp. 160-163.



### 3. THE ECONOMIC FUNCTIONS OF CITIES

221. The most commonly used approach to the study of urban economic functions is the economic base concept.<sup>531</sup> While there remains a considerable controversy over both the actual meaning of the "economic base" and its analytical validity, it remains one of the fundamental tools for urban economic analysis.<sup>532</sup> As it is generally used, this concept relies upon the distinction between those activities which are essential to urban growth and those which exist primarily to support these activities. Accordingly, the "basic" or "city-forming" activities involve those functions that relate to the processing or trading of goods or the provision of services or capital for residents or establishments located outside the urban area. "Non-basic", "service", "city-serving", or "city-filling" activities comprise the complement to the economic base.<sup>533</sup> Consequently, basic activities, by serving as the urban equivalent to the national "export" sector, are considered to be the key to the levels and growth of urban employment, income and population.<sup>534</sup>

222. Methodological difficulties have hampered the effectiveness of the economic base approach,<sup>535</sup> since most activities are neither purely basic nor totally non-basic in their function. For example, the manufacturer of a product may be producing some of his output for local consumption and some of it for export. Since data

<sup>531</sup> The nature of the theory of economic base was first explicitly stated in Weimer and Hoyt, *Principles of Urban Real Estate* (1939). For a comprehensive discussion of the development, uses, and shortcomings of economic base theory, see Pfouts, ed., *The Techniques of Urban Economic Analysis* (1960); especially the articles by Andrews, "Mechanics of the urban economic base ..." (1960); Alexander, "The basic-nonbasic concept of urban economic functions" (1960); Blumenfeld, "The economic base of the metropolis" (1960); and Tiebout, "The urban economic base reconsidered" (1960). See also Mattila and Thompson, "The measurement of the economic base ..." (1961); Stewart, "Economic base dynamics" (1959); Ullman and Dacey, "The minimum requirements approach ..." (1960); Tiebout, *The Community Economic Base Study* (1962); Hoover, *An Introduction to Regional Economics* (1971), pp. 221-224; Richardson, *Regional Economics* ... (1969), pp. 165-170.

<sup>532</sup> For a comprehensive discussion of the problems of terminology, see Andrews, "Mechanics of the urban economic base ..." (1960), pp. 39-50. Pfouts, ed., *The Techniques of Urban Economic Analysis* (1960), pp. 213-358, delineates the theoretical objections to the economic base theory. See also Isard, *Methods of Regional Analysis* ... (1960), pp. 199-205.

<sup>533</sup> An early statement of this distinction was made by Nussbaum, *A History of the Economic Institutions of Modern Europe* ... (1933), p. 36: "The principal elements of the town were those who are able by power or wealth to command a means of subsistence from elsewhere, a king who can tax, a landlord to whom dues are paid, a merchant who makes profits outside the town, a student who is supported by his parents. These are 'town builders'. After them come what we call the 'town fillers', those who serve the needs of the 'town builders'; the shoemaker who makes the king's shoes, the jeweller who depends on the purchases of the merchant's wife, the landlady from whom the student rents his room."

<sup>534</sup> Ferguson, "Statics, dynamics, and the economic base" (1960), notes that in its static form the economic base hypothesis "states that residentiary employment, income, and population can be explained and predicted by reference to employment in basic activities", and in its dynamic form "the rate of change in residentiary employment, income, or population is functionally dependent on the level of employment in basic activities".

<sup>535</sup> For a discussion of the technical and conceptual difficulties of economic base studies, see Isard, *Methods of Regional Analysis* ... (1960), pp. 194-205.

are rarely available in such detail, an accurate identification of the economic base is not easily achieved. In Andrews's view, one of the reasons that the analytical tools for economic base identification have as yet been insufficiently refined is that most of the work in this area has been undertaken as part of a larger project, and measures of expediency have frequently been adopted in view of the variety of problems to be dealt with.<sup>536</sup>

223. The gauge most commonly used to measure the economic base is the number of people employed, tabulated by industry, since, in most countries, employment data are relatively easy to obtain. Other less frequently used alternatives include total payrolls, income payments and "value added" by activity.<sup>537</sup> All of these approaches suffer from conceptual and technical difficulties, and some authors have concluded that the best theoretical alternatives to employment data are empirically impracticable.<sup>538</sup> Various indices utilizing employment data have been constructed to identify the urban economic base, the most common being the ratio of an industry's share in local employment to its share of national employment, or the ratio of a locality's share of national employment in a particular industry to the locality's share of total national employment.<sup>539</sup>

224. Other techniques, as well as economic base studies, have been used to construct classification schemes of urban functions. Frequently, the principal functions of cities have been identified on the basis of industrial or occupational employment data. Rather complex indices have sometimes been adopted which take account of the fact that few cities are characterized by any single activity and many carry on several functions which may constitute distinguishing features. Many of the classification schemes consider social and demographic, as well as economic characteristics.<sup>540</sup>

225. Harris and Ullman have suggested the following classification of urban functions: (1) central-place cities, which perform centralized services, such as retail trade and political administration, for the adjacent areas,

<sup>536</sup> Andrews, "Mechanics of the urban economic base ..." (1960), pp. 95-96.

<sup>537</sup> Isard, *Methods of Regional Analysis* ... (1960), pp. 194-195. For a discussion of the benefits of using "value added", see Leven, "Measuring the economic base" (1956).

<sup>538</sup> Mattila and Thompson, "The measurement of the economic base ..." (1961), p. 332.

<sup>539</sup> For a discussion of these and other indices, see *ibid.*, p. 333 ff.

<sup>540</sup> Arousseau, in an early classification, identified six major functional types of cities. See his "The distribution of population ..." (1921). The following are among the many other classifications which have been developed: Ogburn, *Social Characteristics of Cities* (1937); Harris, "A functional classification of cities ..." (1943); Kneeder, "Functional types of cities" (1945); Jones, "Economic classification of cities and metropolitan areas" (1953); Bergel, *Urban Sociology* (1955), pp. 150-152; Duncan and Reiss, *Social Characteristics of Urban and Rural Communities* ... (1956); Nelson, "A service classification of American cities" (1955); and Pownall, "The functions of New Zealand towns" (1961). A number of studies have used factor analysis in the development of classifications of cities involving a large number of variables. See Price, "Factor analysis in the study of metropolitan centers" (1942); Moser and Scott, *British Towns* (1961); and Hadden and Borgatta, *American Cities* ... (1965).



variously called by geographers and economists as service areas, hinterlands, or urban fields etc.; (2) transport cities, which owe their economic base primarily to their location with respect to the transport network, including railway centres and ports; and (3) specialized function cities, performing one service such as mining, manufacturing, or recreation for large areas.<sup>541</sup>

#### 4. THE LOCATION OF ECONOMIC ACTIVITIES

226. It has been noted that "the locations and functions of cities are so closely related that a full explanation of one requires an explanation of the other".<sup>542</sup> Since the distribution of population is highly dependent upon the distribution of economic activities,<sup>543</sup> any meaningful discussion of the process of urbanization must consider the principles governing their location. This has been the objective of both the classical and modern location theorists, who have dealt with such problems as the locational equilibrium of each firm or the possibility of a general equilibrium of all firm locations. The discussion of the principles of location generally follows a theoretical approach emphasizing the efficiency of each economic unit of activity as the basis for analysis.

227. Of those activities which account for the growth of major cities, industry is generally the most important. Alfred Weber, in his classic work on industrial location, notes that "the location of industries forms the 'substance' (I do not say the cause) of the large agglomerations of people today".<sup>544</sup> His analysis, along with the later works of Lösch, Hoover and Isard, has provided the basis for most explorations into the factors influencing the location of industry.<sup>545</sup>

228. The influence on the location of industries of space relationships such as the distance from sources of raw materials and markets for finished products, and the availability of means of transport, is discussed in section A above. It was also noted that there is a tendency for each type of economic activity to be linked to other types so that a concentration develops in a particular locality. Once the infrastructure required by industries is provided—such as power supplies, communications networks, transportation facilities, and administrative services—there exist factors which encourage the location of additional industry in the same area. These might be broadly classified as "external economies", and include all of those requirements of industry which are not characteristic of an individual firm's production function but which have significant importance in the reduction of costs.<sup>546</sup> By locating near to already existing trans-

portation or communications facilities, for example, a firm can save itself the cost of providing them at its own expense. The prior existence of an industrial base creates an impetus for further industrialization, and, consequently, urban concentration.<sup>547</sup>

229. Concentration is also characterized by several external diseconomies. These do not normally become apparent until the city has grown very large and they include such factors as excessive transportation costs due to congestion, high land costs because of demand for centrally located property, higher production costs resulting from expensive treatment of polluted air or water etc. Factories located away from other activities, for example, are normally able to disregard such costs, but when they are situated in an urbanized area they usually cannot do so. The air and water effluence of industrial processes creates many costs which are imposed upon society as a whole in the form of pollution and possibly poor health. Individual firms do not ordinarily enter such costs into their accounts. If they did, the advantages of urban locations would eventually be visibly lessened, and many activities would tend to be relocated in other areas.<sup>548</sup>

230. Optimally, urban growth should begin to diminish when the marginal costs to the community begin to outweigh the marginal benefits.<sup>549</sup> The full range of social costs and benefits are not capable of being quantified, however, and this prevents the implementation of such a policy. Nor can the ultimate effect of time and technological change be fully comprehended. In most market economies individual firms are not required to internalize external social costs and individual firms tend to oppose legislation that would oblige them to do so.<sup>550</sup> Furthermore, some authors believe that *entrepreneurs* tend to overemphasize the advantages of urban locations and consequently often place themselves in big cities though, on strictly economic grounds, this is not always rational.<sup>551</sup> Of course, the presence of cultural amenities which can be enjoyed in major cities may be among the non-economic incentives for such location. As noted

<sup>547</sup> It has been observed that "the economic significance of cities lies in the external economies that they provide". See Tsuru, "The economic significance of cities" (1963). Lampard is more explicit: "It is precisely because urban sites offer an array of 'scale'-type economies almost regardless of actual plant-size that concentration endures. For example, better transfer facilities, broader and more flexible labor markets, numerous auxiliary business services like banking, insurance, brokerage, utilities, or fire and police protection. To these may be added increasing returns to larger operations, various economies of integration (used here in the sense of control), bulk purchase and handling, complementary factor requirements, greater density and frequency of customers: in short, most of the advantages of scale-economy and greater specialization." See his "The history of cities in the economically advanced areas" (1955), pp. 95-96.

<sup>548</sup> Such forces of deglomeration were recognized by Alfred Weber. See his *Theory of the Location of Industries* (1929), especially p. 132.

<sup>549</sup> See United Nations, *Urbanization: Development Policies and Planning* ... (1968), p. 75.

<sup>550</sup> Thus, there is great resistance to efforts to promote programmes of pollution control in which the producer bears the costs.

<sup>551</sup> Hirschman, *The Strategy of Economic Development* (1958), p. 185.

<sup>541</sup> Harris and Ullman, "The nature of cities" (1957).

<sup>542</sup> Duncan *et al.*, *Metropolis and Region* (1960), p. 31.

<sup>543</sup> See the discussion in section A above.

<sup>544</sup> Weber, *Theory of the Location of Industries* (1929), p. 6.

<sup>545</sup> Lösch, *The Economics of Location* (1954); Hoover, *The Location of Economic Activity* (1948); and Isard, *Location and Space Economy* ... (1956).

<sup>546</sup> Isard, in *Methods of Regional Analysis* ... (1960), pp. 404-405, calls such economies of location, "spatial-juxtaposition economies" and divides them into "localization economies", which are obtained when plants of like character (generally within a given industry) congregate at one site, and "urbanization economies", which are defined as economies which emerge when unlike plants congregate around one site.

earlier, some writers have argued that under conditions of socialist central planning the distribution of industrial locations can become economically more rational.<sup>552</sup>

## 5. CENTRAL PLACE THEORY

231. Many non-industrial urban activities must be centrally located in relation to the market areas they serve. For the most part, these are tertiary activities involving little use of raw material but mainly the distribution of goods and services: wholesale and retail trade and administrative, financial and personal services. These activities are found in varying degrees in cities, towns and villages of all sizes and their distribution has been observed to correspond closely to the number, size and spacing of populated centres. These functions, therefore, are called "central-place" activities, or functions, and the places in which they are concentrated are called central places.

232. The development of the concept of central places is generally attributed to Christaller.<sup>553</sup> Lösch later included it in his more comprehensive work on the location of economic activities.<sup>554</sup> In Christaller's view, "the geography of settlements is a part of economic geography" and therefore must draw upon economic theory in order to explain the character of towns.<sup>555</sup> His underlying assumption was that the basic function of a city, town, or village is that of a regional centre to provide services and distribute goods to that region—in other words, to serve as a central place. By concentrating upon the factors influencing the location of economic activities on a uniform plain, Christaller and Lösch provide an explanation of why, even in the absence of any significant geographic differentiation, there should arise a hierarchy of urban places. Significantly, Christaller's scheme has been widely regarded as a "theoretical framework for the study of the distribution of settlements".<sup>556</sup>

233. The analysis is based upon the notion that those activities which serve a surrounding population vary greatly in the minimum purchasing power needed for their support.<sup>557</sup> This minimum sales volume is a "condition of entry", or threshold, for the existence of any business establishment.<sup>558</sup> Corresponding to this threshold is some minimum number of consuming units, depending upon the distribution of population within the

region, its characteristic income distribution, its consumption patterns, and the cost and price of the central good or service. The smallest ring circumscribing the central place that contains the needed number of consuming units is a commodity's "real range". Also associated with the good or service is an "ideal range", defined by its economic distance which Christaller describes as "the farthest distance the dispersed population is willing to go in order to buy a good offered at a place—the central place."<sup>559</sup> The number of central places that exist reflects the difference between the ideal and the real ranges. So long as the real range is smaller than the ideal range, the market is capable of supporting the same activity at other places within the region, thus tending to eliminate all surplus profit.<sup>560</sup> At equilibrium, when the ideal and real ranges have been made equal, a network of hexagonal market areas surrounding the central places tends to result.<sup>561</sup>

234. Such a network can be shown theoretically to exist for every central place activity. Since each of them is characterized by a different threshold and range, the hexagonal market areas for each are of different size. If each of these activities is considered in relation to the same extent of land, then some of the points will serve as central places for many of the activities and many of them will only be central places for the more ubiquitous of them, possessing relatively small market areas. The functions of the former group of places—"central places of a higher order"—extend over larger regions encompassing the "central places of a lower and of the lowest order."<sup>562</sup> The regions associated with the central places are similarly defined as complementary regions of a higher order and complementary regions of a lower order.<sup>563</sup>

235. One of the principal advantages of central place theory, in contrast to economic base or industrial location studies, is that it treats the city or region in relation to a hierarchy of other related cities or regions, whereas most other studies are mainly concerned with each individual city or region under consideration. Philbrick has hypothesized a sevenfold hierarchy of nested functions corresponding to seven nested orders of areal units of organization.<sup>564</sup> Within the hinterland of each central place of a given order are a finite number of establishments of the

<sup>552</sup> George, *Introduction à l'étude ...* (1951), pp. 127-143; and Balzak, Vasyutin and Feigin, eds., *Economic Geography ...* (1949), pp. 109-110, 130-132, 167-196. See also section A.

<sup>553</sup> Christaller, *Central Places in Southern Germany* (1966). This work was originally published in German in 1933.

<sup>554</sup> Lösch, *The Economics of Location* (1954).

<sup>555</sup> Christaller, *Central Places in Southern Germany* (1966), p. 31. Christaller expressed the hope that his contribution might be regarded as "the theory of location of the urban trades and institutions, to correspond with von Thünen's theory of location of agricultural production and Alfred Weber's theory of location of industries ..." *Ibid.*, p. 7. See von Thünen, *Der isolierte Staat ...* (1826; 1875 ed.), regarded as one of the early important works on location theory. For a concise summary of the theory, see Chisholm, *Rural Settlement and Land Use* (1967), pp. 21-35. See also Weber, *Theory of the Location of Industries* (1929).

<sup>556</sup> Ullman, "A theory of location for cities" (1959), p. 203.

<sup>557</sup> Berry and Garrison, "A note on central place theory ..." (1958).

<sup>558</sup> Mayer, "A survey of urban geography" (1965), p. 90.

<sup>559</sup> Christaller, *Central Places in Southern Germany* (1966), p. 22. The economic distance itself is determined—with respect to goods rather than services—by (1) freight, insurance and storage costs, and (2) time and loss of weight or space in transit; with respect to passenger travel, the economic distance is determined by (1) the cost of transportation, (2) the time required, and (3) the discomfort of travel.

<sup>560</sup> Lösch, *The Economics of Location* (1954), p. 109. The argument is similar to the results of product differentiation as discussed by Chamberlin, *The Theory of Monopolistic Competition* (1933) and Robinson, *The Economics of Imperfect Competition* (1933).

<sup>561</sup> Christaller, *Central Places in Southern Germany* (1966); Lösch, *The Economics of Location* (1954), pp. 109-123.

<sup>562</sup> Christaller, *Central Places in Southern Germany* (1966), p. 17.

<sup>563</sup> *Ibid.*, p. 21.

<sup>564</sup> Philbrick, "Areal functional organization in regional geography" (1957); and Philbrick, "Principles of areal functional organization in regional human geography" (1957).

next lower order. This study emphasizes that "associated with a statistically regular hierarchy of cities must be a statistically regular hierarchy of commodity flows as characterized by both average length and volume of flow. Therefore it is to be expected that the structure of the internal economy of cities will differ according to order in hierarchy. To each order of city will correspond a different set of activities producing for export." This implies that the growth of a hierarchy of regions implies changing economic base and basic-service ratios for these regions.<sup>565</sup>

236. As is the case with most theory, however, the critical assumptions upon which central place theory depends are never obtained in reality. Differences in the natural factor endowments exist throughout geographic space: resources vary in type, quality, and quantity; variation in the accessibility of different locations results from topographical features such as rivers, lakes, mountains, deserts, swamps; the population is not initially uniformly distributed over the land etc. Consequently, it is unlikely that the hypothesized distribution of central places, and hence urban locations, ever exists in reality.

237. Despite the possible impact of such distorting factors, however, the conceptual framework provided by central place theory appears to be generally valid and improved methodology can be expected in this area in the future.<sup>566</sup> While they do not constitute proof of its validity, a number of studies have indicated that the central place hierarchy does seem to exist in cases where the strict assumptions underlying the theoretical framework are approximated.<sup>567</sup> This is most nearly the case in agricultural regions with little industrial development.

## 6. "LAWS" OF CITY-SIZE DISTRIBUTION

238. The spatial interrelationships of economic activities, especially as suggested by Christaller and Lösch, define an intricate network of urban places distributed over space. This, in turn, implies a hierarchy consisting of many small villages and towns fairly uniformly dispersed

<sup>565</sup> Isard, *Methods of Regional Analysis* ... (1960), p. 227. Also see Friedmann, "Locational aspects of economic development" (1956); Lampard, "The history of cities in the economically advanced areas" (1955); Stolper, "Spatial order and the economic growth of cities ..." (1955).

<sup>566</sup> One technique which is being investigated is the adoption of the concept of entropy to measure the order of the hierarchy. See Medvedkov, "The concept of entropy in settlement pattern analysis" (1967) and Fano, "Organization, city size distributions and central places" (1968). Another approach is through topological analysis. See Medvedkov, "An application of topology in central place analysis" (1967).

<sup>567</sup> Among the studies that have considered this problem are: Smailes, "The urban hierarchy in England and Wales" (1944); Bracey, "Towns as rural service centers ..." (1953); Brush, "The hierarchy of central places ..." (1963); Brush and Bracey, "Rural service centers in ..." (1955); Carruthers, "A classification of service centers ..." (1957); Berry and Garrison, "A note on central place theory ..." (1958); Berry and Garrison, "The functional bases of the central place hierarchy" (1958). Central place theory has also been discussed in relation to the situations in Nigeria, China, and the USSR. See Mobogunje, *Urbanization in Nigeria* (1968); Skinner, "Marketing and social structure in rural China" (1964); and Kovalev, "Razvitiye seti gorodskikh poselenii ..." (1954).

over the landscape and of fewer urban places in each successively larger size class. This hierarchy has often been referred to as a "system of cities", implying that it is a reflection of their functional and spatial interdependence.<sup>568</sup> Its apparent regularity has led to numerous attempts to describe and quantify it and to explore the reasons for its occurrence.

239. The most commonly discussed empirical rule involves a class of skewed distributions suggested by Pareto's inverse exponential law of income distribution when applied to the populations of cities. This might be expressed as  $RS^a = 10^4$ , where  $S$  is the number of inhabitants in a given city,  $R$  is the number of towns with  $S$  or more inhabitants (the rank of the town), and  $A$  and  $a$  are parameters.<sup>569</sup> An important sub-case of this relationship is known as the rank-size rule. According to Zipf, the size of a city varies inversely with its size-rank in an order running from the largest to the smallest in the group of cities under consideration. This rule is further specified to the effect that a city's rank in a national "system" of cities multiplied by its size tends to be a constant, which is equal to the size of the largest city.<sup>570</sup> The number of cities, together with the fraction of the population living in the largest cities, depends on the strength of "unification".<sup>571</sup> His analysis includes an attempt to show how changes in the conditions surrounding economic activities make for the ascendancy of either the "force of unification" or the "force of diversification" and consequently for a redistribution of the population among the communities comprising a nation. This redistribution tends to proceed in accordance with the rank-size rule and its corollaries.<sup>572</sup>

240. Lotka, who was one of the earliest scholars to observe the statistical regularity that existed in the distribution of population among cities of different sizes, noted that "it may be left an open question how much

<sup>568</sup> See Hoover, "The concept of a system of cities ..." (1955); and Berry, "Cities as systems within systems of cities" (1964).

<sup>569</sup> Singer, "The 'courbe des populations' ..." (1936), p. 254. Perhaps the first attempt to formulate in terms of a "law" the distribution of population among cities of varying size was that of Auerbach, "Das Gesetz der Bevölkerungskonzentration" (1913).

<sup>570</sup> Stewart states Zipf's rank-size rule as follows:  $R^n S_R = M$ . Here  $M$  and  $n$  are constants,  $R$  is the rank of the city in question, and  $S$  stands for the number of people who live in the  $R$ th city in the group. The constant  $M$  is equal in size to the population of the largest city, while the exponent  $n$  equals unity except in those countries which are less advanced or unevenly developed and which have an exponent less than unity. Stewart, "Empirical mathematical rules concerning ..." (1947), pp. 462-468. According to Stewart: "the rank-size rule represents an equilibrium among competing cities", *ibid.*, p. 469.

<sup>571</sup> Let  $P$  represent the population of the largest community in a group of  $n$  communities; and  $P.S_n$ , the total population living in the  $n$  communities. Then

$$P.S_n = \frac{P}{1^p} + \frac{P}{2^p} + \frac{P}{3^p} + \dots + \frac{P}{n^p}$$

"The exponent,  $p$ , will increase and  $n$  will decrease, under the increasing relative magnitude of the force of unification." Zipf, *Human Behavior* ... (1949), p. 366.

<sup>572</sup> Zipf, *Human Behavior* ... (1949), chaps. 9 and 10; and his *National Unity and Disunity* (1941), chap. 3. On applications to a given "system of cities" see Madden, "On some indications of stability in the growth of cities ..." (1956).

TABLE VI.14. SIZE-OF-PLACE STRUCTURE FOR THE WORLD, 1950 AND 1960,  
FOR PLACES WITH 125,000 OR MORE INHABITANTS

Size-class (thousands)	Population in cities (thousands)		Number of cities	
	1950	1960	1950	1960
Total .....	383,339	566,909	757	1,071
8,000 and over .....	22,724	34,751	2	3
4,000-8,000 .....	47,004	76,136	9	13
2,000-4,000 .....	38,937	70,523	15	27
1,000-2,000 .....	72,970	100,798	53	71
500-1,000 .....	73,023	98,107	108	138
250-500 .....	63,180	91,727	189	268
125-250 .....	65,501	94,867	381	551

SOURCE: Compiled from Davis, *World Urbanization, 1950-1970* ... vol. 2 (1972), tables 5 and 7.

significance is to be attached to this empirical formula".<sup>573</sup> Simon and Rashevsky have both expressed interest in the mathematics of the relationships, but have offered little in the way of explanations for their existence.<sup>574</sup> Berry, who made numerous tests of the rank-size rule, concluded that the existence of log-normality, a more generalized form of the rank-size relationship, is principally due to the interaction of many contributory factors to the growth of the urban system rather than to a few dominant forces.<sup>575</sup>

241. Both Lösch and Hoover have observed that the size distribution of cities in a central place scheme should closely follow a Pareto distribution.<sup>576</sup> If a Pareto distribution of urban places exists in actuality, it would seem that it should perhaps be attributed to the rational location of economic activities. In such a distribution, if size-of-place categories are selected so that the upper and lower limits of each size group represent a doubling (or some other constant multiple) of the next lower size class (e.g., 125-250, 250-500, 500-1,000 etc.), then the amount of population in each size group will tend to be equal to the amount of population in the other size groups.<sup>577</sup> Correspondingly, the number of cities in each progressively larger size category tends to be roughly one-half the number in the next lower size category,<sup>578</sup> or at least it can be said that the number of cities in each size category varies inversely with the size of city.<sup>579</sup> In literature

concerned with the distribution of the population by localities of diverse size, this is generally referred to as the "rank-size rule".

242. In a strictly empirical study, Davis found that the 1950 and 1960 size-of-place structure among cities of the world with 125,000 or more inhabitants could be described, with some exceptions, as roughly consistent with the characteristics described above. Some of his statistics are summarized in table VI.14.<sup>580</sup> It must be emphasized, however, that these observations are based only on the combined world-wide data. The patterns for individual countries and regions vary considerably, especially in small countries.

243. Beckmann has concluded that "the empirical rank-size rule ... is compatible with the ideas on hierarchies of market areas and their central cities as developed by Lösch and other location theorists".<sup>581</sup> It might be noted, however, that although a Pareto distribution might be compatible with the central place scheme, an empirical fit of the Pareto curve hardly validates central place theory. While such curves may provide an excellent fit to the size distribution of the largest cities, the largest cities of a country rarely have locational and functional characteristics that can be accounted for by a strict central place rationale.<sup>582</sup>

244. If the rank-size rule or some variation of it is the result of the rational location of economic activity, this concept might be usefully applied in planning for industrial and economic development. Berry has warned, how-

<sup>573</sup> Lotka, *Elements of Physical Biology* (1925), p. 307.

<sup>574</sup> Simon, *Models of Man* ... (1957); Rashevsky, *Mathematical Biology of Social Behavior* (1959).

<sup>575</sup> Berry, "City size distributions and economic development" (1961). See also his "Research frontiers in urban geography" (1965); and Mayer, "A survey of urban geography" (1965).

<sup>576</sup> Lösch, *The Economics of Location* (1954), pp. 433-436; Hoover, "The concept of a system of cities" (1954).

<sup>577</sup> This is true in the most widely used models which generally make use of the simple assumption of a unity gradient. Other gradients have also been taken into consideration by which numbers of population in successive size groups tend to increase or diminish at a constant rate.

<sup>578</sup> If the class size limits are not in a ratio of one to two, then some other fraction will result.

<sup>579</sup> Plotted on a double logarithmic scale with size rank as one co-ordinate and amount of population as the other co-ordinate the theoretical distribution of individual cities appears as a straight line at an angle of 45 degrees. If the gradient is not unity then the slope of the straight line would be at some different angle.

<sup>580</sup> Davis, *World Urbanization, 1950-1970* ... vol. 2 (1972), pp. 17-28. The characteristics of the upper open-ended category of 8 million or more inhabitants are rather accidental because such cities are very few, and none of them can be considered as the world's chief centre.

<sup>581</sup> Beckmann, "City hierarchies and the distribution of city size" (1958). Paar, in "City hierarchies and the distribution of city size ..." (1969), criticized Beckmann's formulation, and maintained that a correct formulation would have led him to conclude that city hierarchies are not compatible with the rank-size rule. Beckmann and McPherson, "City size distribution in a central place hierarchy ..." (1970), again assert that the central place model is consistent with the rank-size rule.

<sup>582</sup> This has been shown for the United States by Duncan, "Population distribution and community structure" (1957), p. 365; and by Schnore and Varley, "Some concomitants of metropolitan size" (1955).

ever, that at the present time there is insufficient evidence to support such a conclusion.<sup>583</sup> None the less, it seems clear from the experience of many nations that the spatial relationship of the various elements of the economy is an extremely important factor influencing the over-all process of national development. Vapnarsky, for example, shows how the structure of city sizes within Argentina has been affected by strong economic relationships with other nations and weak internal linkages. During its colonial period, there was a tendency towards heavy concentration in the national capital and an obvious lack of middle-size cities. As the economy achieved greater internal integration, the urban structure reflected this in a movement towards the norm indicated by the rank-size rule.<sup>584</sup> Within this context, it must be concluded that the structure as well as the level of urbanization is an important consideration.

### E. Policies and programmes affecting urban and rural population distribution

245. A number of types of policy strategies and programmes have come into evidence with respect to urban and rural population distribution in response to the special problems that have to be faced in the current development of urban and rural areas. In this section, the types of problems prevailing in urban and rural areas are briefly summarized and some illustrations are given of policy strategies that have been formulated in response to prevailing conditions.

246. Problems of rural poverty have always existed—until recently the world habitat was mostly rural and it was technologically not yet significantly developed. For the bulk of the population living conditions superior to mere subsistence were hardly attainable. Rural settlement patterns were closely tied to conditions of soil fertility and climate. Three circumstances are new with regard to the present condition of rural areas. First, there is an unprecedented overcrowding of rural population in many of the developing nations where fertility rates are still high and urban employments have not yet sufficiently developed to absorb the surplus rural population. Secondly, and conversely, in the more developed nations many rural areas suffer problems of depopulation.<sup>585</sup> For instance, such a densely settled nation as Japan has experienced problems with regard to rural depopulation.

<sup>583</sup> Berry, "City size distributions and economic development" (1964). See also the discussion in Richardson, *Regional Economics* (1969), pp. 183-184.

<sup>584</sup> Vapnarsky, "On rank-size distributions of cities ..." (1969).

<sup>585</sup> For discussions of rural depopulation and its demographic and socio-economic consequences in France and selected areas of the United States, see Locoh, "La population des ménages agricoles ..." (1970); and Loomis and Beegle, *Rural Sociology* ... (1957). Weber, in *The Growth of Cities in the Nineteenth Century* ... (1899; 1963 ed.), p. 230, notes that instances of rural depopulation in France due to rural-to-urban migration can be traced back in history at least as far as the writings of Quesnay and other eighteenth century physiocrats. Gravier, *Paris et le désert français* (1947), p. 28, observes that the majority of rural cantons in France had already reached their maximum, or near maximum, population size by the census of 1851. In cantons which remained rural, an average population decrease of 25 per cent was registered between 1851 and 1936.

Thus, between 1960 and 1965, 27 out of 46 prefectures in Japan lost population, and smaller cities experienced declines during the same period while larger cities increased greatly.<sup>586</sup>

247. Thirdly, the spatial distributions of agricultural activities and settlements have come increasingly to be influenced by the urban settlement patterns rather than soil fertility. The intensity of agriculture is greatest near large cities and declines with distance from cities even though the soil quality close to large cities is not necessarily better than that in less accessible areas.<sup>587</sup>

248. Modern cities differ from ancient cities chiefly in scale and in the degree of integration of their economic functions. One reason why the great cities of the ancient world could not attain a very large size was that they had neither the lateral nor the vertical transportation capabilities of modern cities. Rome was one of the large cities of the ancient world. As the population of imperial Rome increased, the common people were crowded together in ever-increasing congestion. Apartment houses rose to six or eight floors.<sup>588</sup> The inhabitants had to carry out their varied functions within feasible walking distance. The streets were very narrow. Vehicular traffic within the city was prohibited during day-time. Thus, the population potential of the ancient cities was limited as compared with modern possibilities.

249. The modern city is favoured by various new forms of transportation. Vast networks of highways and train tracks, some of them underground, facilitate the movement of both passengers and freight within large metropolitan agglomerations and between them. Large systems of satellite cities have arisen.<sup>589</sup> Moreover, the capacity for concentration of population in the central metropolis has been increased by the development of high-rise buildings in which vertical transportation is provided by elevators.<sup>590</sup> Some of the occupancy in high-rise buildings is not residential, but rather a concentration of daytime office workers.

250. The variety of experience in different nations, at different levels of development and under varied circumstances has led to a wide spectrum of planning strategies.

<sup>586</sup> Japan, Bureau of Statistics, *Showa 40-nen Kokusei Chosa* ... (1970), pp. 6-25, 236-237 and 252-253. Rural depopulation in Japan became intense after 1955. Prior to 1955, only a few prefectures suffered population losses.

<sup>587</sup> Hathaway, Beegle and Bryant, *People of Rural America* (1968) and also Duncan *et al.*, *Metropolis and Region* (1960), pp. 180-196 and 557-559. In a correlation analysis (p. 190), the authors found a negative relationship between an index of soil quality and rural-farm population density. See also von Thünen, *Der isolierte Staat* ... (1826; 1875 ed.).

<sup>588</sup> Hilberseimer, *The Nature of Cities* ... (1955), p. 70.

<sup>589</sup> Schnore has written extensively on the subject of metropolitan decentralization in the United States. See, for example, *The Urban Scene* ... (1965); *Class and Race in Cities and Suburbs* (1972); "Municipal annexations ..." (1961); "Metropolitan development in the United Kingdom" (1962); "On the spatial structure of cities in the two Americas" (1965); Schnore and Petersen, "Urban and metropolitan development ..." (1958); and Schnore and Klaff, "Suburbanization in the sixties ..." (1972).

<sup>590</sup> According to Gottmann, the first passenger elevator officially recorded was installed in 1857 in a not very high building in New York City. Gottmann, "The skyscraper amid the sprawl" (1967), pp. 127-128.

A systematic review of these policies is clearly beyond the scope of the chapter. An attempt is made, however, to cite a number of examples out of the diversity of opinion and practice.<sup>591</sup>

251. The discussion below is organized under the following headings: (1) return of rural migrants, (2) rural development, (3) decentralization of industry, (4) construction of new towns, (5) development of growth poles, and (6) redevelopment of the big city. These headings represent different policy measures which have been adopted to deal with population excesses in urban areas resulting from rural-urban migration. But policy systems actually in existence cannot be so simply classified. Some combination of several types of policy is followed in many countries. Often theoretically diverse policies are emphasized among different regions of the same nation where different circumstances prevail. For example, there may be policies for the simultaneous development of both new towns and existing growth centres within the same country. While new towns are theoretically quite different from growth centres, they are often empirically indistinguishable.

252. Administrative and legislative measures directly affecting rural-urban migration have been introduced in few countries only, but indirect measures which can encourage or discourage migratory flows are widely applied. Aside from legislation ensuring orderly development and growth of cities and other settlements, several Governments provide cities and local governments with technical and financial assistance and create special organizations or departmental units responsible for various aspects of urban development. Eventually, widely ramified systems concerned with urban and regional planning can result.

253. A good example of legislation in this area is provided by the United Kingdom, where legislation regarding city planning began as early as 1848, being incorporated in the Public Health Act of that date. The Royal Commission on the Distribution of the Industrial Population, appointed in 1937, examined the factors affecting the geographic distribution of industry, its probable change in the future, and the desirability of remedial measures.<sup>592</sup> The findings of that Commission were eventually reflected in the Distribution of Industry Act<sup>593</sup> and to some extent in other legislative acts regarding town and country planning which also have a profound meaning for the migration and redistribution of population.<sup>594</sup>

254. Similar indirect legislative measures have been introduced in many other countries.<sup>595</sup> On the basis of such acts, regional and master plans are prepared for selected areas and cities, which in more distinctive ways

set forth population policies for the regions under consideration. Another good example is the Regional Plan of the Paris region, which recommends the limitation of population growth in the region to 100,000 a year.<sup>596</sup> This recommendation was approved by the Government.<sup>597</sup> The French Government had earlier adopted a policy of decentralization of industry, which was at least partly aimed at easing the population pressure on the region of Paris.<sup>598</sup>

## 1. RETURN OF RURAL MIGRANTS

255. Among the most direct measures adopted by some countries to stem urbanization has been the attempt to dissuade rural migrants from going to urban centres, or to organize their return to the villages. Both the economic and social costs of maintaining surplus labour are much greater in the cities than in the countryside. Examples of such action occurred in the presently modernized countries at earlier stages of development. The extension of Paris beyond certain limits was prohibited by law in 1549, 1554, 1560, 1563, 1564, and 1672.<sup>599</sup> In the time of the later Tudors and Stuarts, proclamation after proclamation was issued forbidding the erection of new houses in London and enjoining the country people to return to their homes.<sup>600</sup> Similar proclamations are currently being issued in Africa. Often the jobless are forcibly removed from the cities.<sup>601</sup>

256. The economic and social disadvantages of the mammoth urban aggregation have often been debated, and it has sometimes been suggested that the population of metropolitan areas should be restricted by law and migration stopped by police action. But police measures are difficult to enforce where migration movements are motivated by economic necessity.<sup>602</sup> In general, policies of direct control over internal redistribution of population (by restricting the right of migrants to travel and settle in the cities or by forcing them to return to the country) have not been considered either feasible or desirable in the countries with market economies.<sup>603</sup>

<sup>596</sup> France, Ministère de la construction, *Plan d'aménagement et d'organisation générale de la région parisienne* (1960), p. 102.

<sup>597</sup> France, Ministère de la construction, "Décret N° 60-857 du 6 août 1960 portant approbation du plan d'aménagement ..." (1960).

<sup>598</sup> France, Ministère du logement et de la construction, "Décret N° 55-36 du 5 janvier 1955 tendant à favoriser une meilleure répartition des industries ..." (1955).

<sup>599</sup> Weber, *The Growth of Cities in the Nineteenth Century ...* (1899; 1963 ed.), p. 454.

<sup>600</sup> *Ibid.*

<sup>601</sup> Hance, *Population, Migration, and Urbanization ...* (1970), pp. 277-278. In Niger, for example, a 1962 law specified that all unemployed urban youths must either perform some service or return to their villages. Moreover, the police were reported to have rounded up such youth in Niamey and sent them back to the country. *Ibid.* and Thompson, "Niger" (1966), p. 178.

<sup>602</sup> Koenigsberger, "Regional planning in Asia" (1959), p. 118.

<sup>603</sup> Medina Echavarría and Hauser, "Rapporteurs' report" (1961), pp. 25-26, noted that the development of urbanization in the advanced countries was haphazard and regulated only by spontaneous market forces. On the effectiveness of controls, see Ponsioen, "An analysis of—and a policy regarding—rural migration ..." (1967), p. 520.

<sup>591</sup> A collection of articles describing planning policies in many different areas of the world appears in United Nations, *Planning of Metropolitan Areas and New Towns* (1969).

<sup>592</sup> United Kingdom, Royal Commission on the Distribution of the Industrial Population, *Report* (1940), pp. vii-viii.

<sup>593</sup> United Kingdom, "Distribution of Industry Act" (1945).

<sup>594</sup> United Kingdom, "New Towns Act" (1946); "Town and Country Planning Act" (1944) and (1947).

<sup>595</sup> For example, Poland, "Ustawa z dnia 31 stycznia 1961 r. o planowaniu przestrzennym" (1961).



257. Perhaps the best known examples of regulated migratory movements are provided by centrally planned economies, where the migration of population from rural localities to towns is controlled by the State in the interest of the whole nation and follows a plan.<sup>604</sup> The acute shortage of dwellings as the result of wartime destruction in many of these countries is an added justification for such policies. The public management of dwellings and the compulsory registration of in-migrants and out-migrants are fairly good measures of control and ensure the effectiveness of these policies.

258. A restriction of migration to nearly all the large cities exists in Poland and was introduced shortly after the Second World War. While succeeding in slowing down the stream of migrants to cities which were the subject of limitation, this policy failed to prevent an undesirable, chaotic growth of many settlements and towns in suburban zones. As a result, to obviate further excessive immigration to those towns and settlements, the Government in 1966 extended restrictions on admitting in-migrants to another twenty-six cities adjacent to Warsaw and other urban settlements.<sup>605</sup>

259. An active policy of preventing the influx of peasants into the cities exists in China. A wide variety of measures have been employed, including, for example, the transfer of the surplus population of cities to the countryside and to "hilly areas" to engage in agriculture, forestry and other projects requiring the massive use of labour;<sup>606</sup> requirements of prompt registration by peasants and rural migrants upon entering cities;<sup>607</sup> instructions to agricultural producers' co-operatives to facilitate the readjustment of returned migrants to rural life; and also ideological education in villages to help the rural population appreciate the importance of agricultural production.<sup>608</sup> Critical housing shortages in the cities and the heavy demands for provisions and accommodations were among the reasons cited for the need to control urban population growth.<sup>609</sup> A directive issued by the State Council in 1955 concerning the establishment of a permanent population registration system placed restrictions on rural-urban migration.<sup>610</sup> Again, to prevent the urban population from swelling, a joint directive of the State Council and the Central Committee of the Communist Party was issued on 18 December 1957, which instructed the authorities concerned that they should stop the rural out-flow, turn back those peasants on the road or repatriate those who had already migrated

to the cities.<sup>611</sup> Furthermore, the Household and Population Registration Regulation promulgated by the Standing Committee of the All-China People's Congress on 9 January 1958 defined the conditions under which citizens living in rural areas may move to urban areas.<sup>612</sup> According to Chen, after the Great Leap Forward campaign began in 1958, migration to urban areas was again heavy in response to the opening up of industrial employment opportunities, but when economic conditions became less favourable, the Government took steps to return recent migrants to the villages; especially large numbers were returned to the countryside within a few months in 1961.<sup>613</sup>

260. In December 1968, Mao Tse-Tung called upon educated youths to return to the countryside to be re-educated by the poor and lower-middle peasants. Graduates of urban secondary schools and universities who had not been accepted by the next higher educational institutions, or had not been assigned to a post in industry, educational institutions, or other urban service units were urged to accept rural posts. In contrast with some other programmes in which urbanites are required to spend short tours of duty in the countryside, these youths are expected to settle in a rural village for life.<sup>614</sup>

## 2. RURAL DEVELOPMENT

261. In many countries where urban congestion has become conspicuous, the suggestion has been made that the urban problems might be eased by means of a programme of rural development. By improving rural living conditions and expanding rural and small-town employment, it is thought, the motivation for city-ward migration may lessen and, as a result, cities may grow at a more leisurely pace. There is, however, little evidence that rural development policies have been instituted in very many countries with precisely this aim in mind.<sup>615</sup> However, in Japan following the Second World War, a number of programmes were initiated to develop areas not densely populated where there was sufficient land and natural resources to build up both agricultural and industrial capacity. In practice, these policies were mainly directed towards utilization of relatively abundant land for more agricultural production. Two major programmes, "The post-war Hokkaido development programme" and "The development programmes for specially designated areas", emphasized the intensive development of areas, particularly in the northern regions of Japan, which had a potential for providing an abundance of food, minerals and electric power resources.<sup>616</sup>

<sup>604</sup> Konstantinov, "Rural-urban migration as a factor . . ." (1967), p. 499.

<sup>605</sup> Poland, "Rozporządzenie Rady Ministrów z dnia 11 stycznia 1966 . . ." (1966), p. 57. A list of conditions under which new in-migrants may be admitted is given.

<sup>606</sup> United Nations, Economic Commission for Asia and the Far East, "Population growth and problems of employment . . ." (1961), p. 22.

<sup>607</sup> New China News Agency, "Chungking conscientiously solves problems of blind influx of peasants into city" (1953).

<sup>608</sup> New China News Agency, "Joint Directive of Chinese Communist Party Central Committee and State Council on prevention of blind exodus of rural population" (1957).

<sup>609</sup> Sun, "It is necessary to control urban population" (1957).

<sup>610</sup> China, State Council, "The directive concerning the establishment of a regular household system . . ." (1956), p. 830.

<sup>611</sup> Jen-min Jih-pao, "Directive banning the influx of peasants into the cities" (1957).

<sup>612</sup> All-China People's Congress, Standing Committee, ninety-first session, "Household and population registration regulation . . ." (1958).

<sup>613</sup> Chen, "Overurbanization, rustication . . ." (1972), pp. 372-373. Other stringent measures adopted have included a food rationing system for urban non-agricultural residents and prohibitions against the recruitment of peasant-immigrants by urban plants and firms. *Ibid.*

<sup>614</sup> Chen, "Overurbanization, rustication . . ." (1972), pp. 365-367.

<sup>615</sup> Medina Echavarría and Hauser, "Rapporteurs' report" (1961), p. 69.

<sup>616</sup> Ito and Sakamoto, *Toshika Jidai no Nihon Keizai* (1967), pp. 181-190.



262. Rural policies adopted in many other countries may have had the incidental effect of slowing down migration to urban areas, though observations are too few to permit generalizations. Some agricultural development measures, such as the introduction of more efficient farming methods, may accelerate out-migration by reducing the demand for labour, while, on the other hand, land settlement projects in sparsely populated rural regions would appear to be more likely to ease urban population growth, since they could provide an outlet for inhabitants of densely settled rural regions and thus an alternative to migration to the cities. The Gal Oya project in Ceylon,<sup>617</sup> the subsidized migration to Mindanao in the Philippines,<sup>618</sup> the transmigration policy in Indonesia,<sup>619</sup> and the development of virgin lands in the Soviet Union<sup>620</sup> are projects of this type.

263. Whereas mechanization in agriculture tends to reduce the needed work force, there are certain forms of agricultural rationalization where even an increased work force may be maintained. Examples are multiple cropping of the same land area, bookkeeping and related activities in connexion with rural co-operatives and agricultural reform, warehousing, local food processing (also tobacco curing, leather tanning etc.), the generation of additional agricultural income upon which local social services may be maintained, and occupations related to the repair and maintenance of improved agricultural machinery. Still, in the majority of situations agricultural improvements alone will probably not by themselves effectively counteract the migratory tendency towards urban areas. Moreover, some local social improvements, notably education (with curricula usually biased by an urban orientation) can have the effect of intensifying urbanward migration by causing potential migrants to feel better prepared to earn their living in urbanized regions.<sup>621</sup>

264. In industrially advanced countries, especially the densely inhabited ones, rural developments such as schools, rural electrification, postal, police and fire-prevention services, the local availability of radio and newspapers, the nearness of hospitals and medical services and so forth have brought about living conditions which are no longer so categorically distinct from those in towns and cities as they used to be. These developments, to which may be added the movement of city inhabitants to rural areas in the city's surroundings, the widespread availability of motorized transport, and the general nearness of at least small towns to most rural communities, bring about

an "urbanization"<sup>622</sup> of rural regions where further development may well serve to diminish the rural exodus. These conditions will be found less frequently in sparsely settled countries (where distances from the nearest town are often considerable), and rarely in the less developed countries.

265. For the reasons stated, it is not surprising that a positive policy of rural development for easing the pressure on cities has hardly ever been systematically implemented. The nearest approximations may be either land settlement schemes—though these encounter numerous other problems—or the development of a wide and sufficiently dense network of small towns in proximity to the rural settlements.

### 3. DECENTRALIZATION OF INDUSTRY

266. A number of Governments have taken steps to discourage the further concentration and development of industries in crowded city areas through various regulations affecting the location of industrial units and through the creation around cities of zones allocated for industry. In Pakistan, government policy has encouraged investment, which contributes directly to the building up of infrastructure in rural areas, and priority has been given to industries directly based on agriculture.<sup>623</sup>

267. In India, the third five-year plan specifies that, in so far as possible, new industries should be established away from large, congested cities and in determining new industrial sites, the need for achieving a better regional balance in development should be kept in view.<sup>624</sup> China has actively pursued a policy of transfer of population from old urban centres to new towns (e.g. in the sparsely populated north-western province of Shansi) which are expected to develop into dynamic points of industrial growth and thereby ease the urbanization problems of the older metropolitan centres. A number of new industrial cities are reported to have sprung up in the interior of China during the past ten years as a consequence of this policy.<sup>625</sup>

268. Very active policies of decentralization and deconcentration of industry are applied in such countries as Hungary,<sup>626</sup> Poland<sup>627</sup> and the Soviet Union.<sup>628</sup> For example, in Poland, in addition to the employment limits set for industrial plants in big urban centres and the

<sup>622</sup> i.e., the attainment of a degree of "urbanism" in the sociological and cultural meaning of the word, though not necessarily in the form of settlement.

<sup>623</sup> United Nations, Economic Commission for Asia and the Far East, *Report of the Expert Working Group on Problems of Internal Migration and Urbanization* ... (1967), p. 44.

<sup>624</sup> India, Planning Commission, *Third Five Year Plan* (1961), pp. 144, 148.

<sup>625</sup> See, for example, New China News Agency, "Construction of cities along Szechwan-Sikang, Sikang-Tsinghai and Sikang-Tibet highways" (1953); New China News Agency, "Great achievement in city construction in China" (1956); and New China News Agency, "Building construction grows in cities" (1956).

<sup>626</sup> Kóródi, "The system and principal tasks of regional economic planning ..." (1965).

<sup>627</sup> Gorynski, "Metropolitan planning in Poland" (1969).

<sup>628</sup> Konstantinov, "Rural-urban migration as a factor ..." (1967), pp. 500-501.

<sup>617</sup> See the description in Koenigsberger, "Regional planning in Asia" (1959), p. 121.

<sup>618</sup> The Governments' efforts at giving desired direction to migration are said not to have been particularly successful, however. United Nations, Economic Commission for Asia and the Far East, *Report of the Expert Working Group on Problems of Internal Migration and Urbanization* ... (1967), pp. 46-47.

<sup>619</sup> *Ibid.*, p. 45.

<sup>620</sup> Konstantinov, "Rural-urban migration as a factor ..." (1967), p. 503.

<sup>621</sup> Caldwell has noted, for example, that in Ghana the imported educational system, with its content oriented towards advanced societies, appears to prepare persons only for life in the towns. Caldwell, "Determinants of rural-urban migration ..." (1968), p. 369.

required licensing of new ones, some existing plants or certain of their branches have been transferred from Warsaw to quite distant small cities in rural regions.

269. The decentralization of industry and the construction of new cities are very often based on regional development plans. It should be made clear, however, that due to the complexity of regional plans, their role as a tool in an internal migration policy may vary, depending on the kind of plan. As a rule, regional plans for metropolitan areas or already heavily industrialized areas are aimed at checking the flow of migrants and at the decongestion of cities, whereas regional plans like multi-purpose river valley plans or depressed areas regional plans create favourable conditions for an influx of migrants or a slackening of emigration.<sup>629</sup> Typical of the first group is the regional plan for Paris,<sup>630</sup> the Randstad Plan in Holland,<sup>631</sup> the regional plan of the Upper Silesian Industrial District in Poland;<sup>632</sup> on the other hand, the Regional Plan for Southern Italy,<sup>633</sup> and the Guyana Programme in Venezuela, are examples of the second type of regional plan. As a tool of internal migration policy, the latter programme is helping to relieve population pressure in areas that have limited prospects for development, in addition to diverting some of the flow of migrants from the central region of Venezuela.<sup>634</sup>

#### 4. CONSTRUCTION OF NEW TOWNS

270. One of the recently much advocated measures to check migration to large cities and metropolitan areas is the building of new urban settlements. The new towns type of policy is associated with the development of small, insulated urban settlements which are self-sufficient with respect to employment, shopping, community facilities etc.<sup>635</sup> Quite logically such activities are generally connected with policies of decentralization of industry. The idea of new towns developed in Britain as a reaction against the nineteenth-century metropolis. Later with the enactment of the New Towns Act by Parliament in 1946, the building of new comprehensively planned cities was undertaken as a measure to curb the growth of London, to provide a more effective pattern and method for metropolitan growth,<sup>636</sup> and to prevent the depopulation of the rural areas.<sup>637</sup> New towns have been or are being built in other countries as well. Partly to arrest movement to large cities of Western Holland, there has been established the new city of Emmen in north-east Holland. To slow the growth of Mexico City, a new town, Ciudad Industrial Bernardino de Sahagún, is being built by the Mexican

Government some sixty miles away. Also the construction of Santo Tomé de Guyana in Venezuela, located about 400 miles from Caracas is expected to relieve some of the pressure of migrants on Caracas.<sup>638</sup>

271. New towns, as a measure to relieve demographic pressure on large cities or to deconcentrate their population, are a prominent feature of planning in the Soviet Union and in Poland. A well-known example in Poland is the new town Nowe Tychy, designed to decrease population pressure on cities of the Upper Silesia Conurbation. Nowe Tychy reached 60,000 inhabitants in 1964 as against the projected figure of 120,000. In the Soviet Union a regional scheme for the Moscow Metropolitan Area provides for some twenty new towns (satellites) with a total of one million inhabitants.<sup>639</sup>

#### 5. DEVELOPMENT OF GROWTH POLES

272. One widely discussed policy with regard to population settlement patterns is based on the growth-pole theory. A large volume of literature devoted to this subject has appeared recently,<sup>640</sup> but unfortunately the term "growth pole" has been used with at least two distinctly different meanings.<sup>641</sup> Inasmuch as the subject of this chapter pertains to spatial distribution and migrations of population, the term is used here to refer to geographic nodes which are attractive for industrial development and population settlement.

273. Growth poles are cities, already existing or planned with the design to grow large enough to serve as "counter-magnets" to continued economic expansion and population settlement in very large cities. Growth-pole cities may be suburban satellite cities within commuting distance of a major metropolis, or they may be developed in isolated regions where it is desired to establish a nucleus for a new regional industrial complex.<sup>642</sup>

274. Like numerous other planners, Friedmann has stressed the benefits to be expected for the combined

<sup>638</sup> Rodwin, "Economic problems in developing new towns ..." (1969), pp. 153, 155.

<sup>639</sup> Malisz, "Physical planning for the development of new towns" (1969), p. 206-207.

<sup>640</sup> An extensive bibliography of English and French literature devoted to growth poles and the related concepts of external economies, agglomeration, optimum size, and certain aspects of regional planning appears in Darwent, "Growth poles and growth centers ..." (1969), pp. 26-31. See also the collection of articles reprinted in Boudeville, ed., *L'espace et les pôles de croissance* (1968).

<sup>641</sup> The term was initially popularized by François Perroux. See his "Note sur la notion de 'pôle de croissance'" (1955); "La firme motrice dans une région et la région motrice" (1961), and "Economic space ..." (1950). The term growth pole is often used to describe the polarity of certain firms or industries in an abstract "economic space", rather than in geographic space. Perroux's theory was of this type. Many recent authors, however (especially planners), have used the term to refer to the polarity of certain geographic nodes which offer sufficient external economies to be relatively more attractive to population and industry than other locations. The range of variation in usage of the term "growth pole" is reviewed in Darwent, "Growth poles and growth centers ..." (1969).

<sup>642</sup> George, *La ville* ... (1952), pp. 215-216, has contrasted the past development experience of pre-existing European cities with that of new cities founded by Europeans in their various colonies (such as Montreal, Chicago, Buenos Aires and Melbourne).

<sup>629</sup> See also the discussion in chapter XVI, section D.

<sup>630</sup> France, Ministère de la construction, *Plan d'aménagement et d'organisation générale de la région parisienne* (1960).

<sup>631</sup> Wissink, "Metropolitan planning problems in the Netherlands" (1969).

<sup>632</sup> Szmítke and Zieliński, "Regional planning in the Upper Silesian Industrial District" (1966).

<sup>633</sup> Ginsburg, "Regional planning in Europe" (1969), pp. 137-138.

<sup>634</sup> Friedmann, *Regional Development Policy* ... (1966), chap. 8.

<sup>635</sup> Rodwin, "Economic problems in developing new towns ..." (1969), p. 149.

<sup>636</sup> *Ibid.*

<sup>637</sup> Robson, "New towns in Britain" (1969), p. 168.

functioning of a country's economy by means of growth pole organization of urban settlements. He argues that accelerated urban growth is essential for economic development.<sup>643</sup> During the early phases of economic development, modernization must necessarily be associated with growth in the largest cities. The initial industrial innovations and experiments by small independent *entrepreneurs* could not occur in the absence of external economies available only in cities of significant size.<sup>644</sup> Essential external benefits to the consumer population are also available only in larger cities—such benefits as superior education, more complete libraries and museums, more effective and readily accessible health and medical services etc.<sup>645</sup> However, as the total size of city population increases, the necessity for extreme urban nodality decreases. The initial nodes of urban development become overwhelmingly large and it becomes expedient to consider the planned development of alternative nodes or “poles” of population settlement. To succeed, these growth poles must be large enough to provide the necessary external economies, but small enough to avoid excessive overcrowding of population and industry.<sup>646</sup> Friedmann advocates a policy of accelerated urbanization combined with “concentrated decentralization”.<sup>647</sup>

275. The growth-pole strategy has been applied in many areas of the world. According to Gokhman and Karpov, ideas similar to the growth-pole theory with regard to territorial development were used in the early five-year plans in the USSR.<sup>648</sup> Emphasis has been placed on the planned development of small towns linked with large cities by production, cultural and other ties—that is, “satellite cities”.<sup>649</sup> Recent planning in France has been devoted to the development of seven or eight major regional growth poles designed to reduce the primacy of Paris.<sup>650</sup> During the 1960s, the Japanese government

undertook the establishment of fifteen key industrial centres at strategic sites located in relatively remote prefectures and also promoted the development of medium-size cities up to a million population in these areas. The Government's aims were clearly at proliferating national sub-centres outside the megalopolitan belt on the Pacific Seaboard which can attract a substantial portion of migrants who might otherwise have tended towards Tokyo, Osaka-Kobe and Nagoya.<sup>651</sup> The outcome of these national programmes will not be known for some time to come. According to Ito, however, there have already been some indications of regional convergence in labour productivity and in *per capita* income.<sup>652</sup> Recent slackening in the in-migration into the three metropolitan areas of Tokyo, Osaka-Kobe and Nagoya on the Pacific Seaboard<sup>653</sup> may have been influenced at least partially by the effective formulation and execution of these programmes.

276. As yet there have been few applications of the growth-pole theory in the less developed regions. Hance observed, for example, that there are very few African countries that can afford the luxury of subsidizing the development of new towns or new poles of growth, but he lists roughly fifty existing cities which may have some potential as growth poles.<sup>654</sup> A scheme has been developed for the possible future application of the growth-pole theory in India.<sup>655</sup>

## 6. REDEVELOPMENT OF THE BIG CITY

277. Satellite cities need a centripetal focus—a centre that organizes and co-ordinates the activities within the entire network of economically specialized cities. Already in ancient times, the great cities controlled the economic and political systems of whole empires. In modernized industrial societies the role of the great cities as organizational centres for vast regions of population settlement and economic activity is indispensable. But the ever-increasing size and congestion in the great cities brings ever-increasing social problems. These problems represent the most challenging frontiers for social, economic, architectural, and physical planning innovation.

278. Even if the great cities were not an economic necessity, they would be a spatial necessity. Since the present population of the world is large and increasing, the reduction of *per capita* space available makes some

<sup>643</sup> Friedmann, “The strategy of deliberate urbanization” (1968). Friedmann's earlier contributions are reviewed in Darwent, “Growth poles and growth centers . . .” (1969). See also Hirschman, *The Strategy of Economic Development* (1958).

<sup>644</sup> Jacobs, *The Economy of Cities* (1969).

<sup>645</sup> Although the lack of medical facilities in rural and small-town areas of even modernized nations has often been described as problematical, the lack of medical facilities in the rural areas (relative to urban areas) is especially extreme in developing countries. Arriaga, “Components of city growth . . .” (1968).

<sup>646</sup> Advocates of the growth-pole theory have claimed sizes from 10,000 to 1,000,000 to be optimum. Darwent, “Growth poles and growth centers . . .” (1969), p. 24. The wide range of opinion may arise partly from the fact that in some instances the discussion of growth poles refers to new satellite cities within a metropolitan region, while in other instances it relates to the development of polarity for a metropolitan centre in a poorly developed region.

<sup>647</sup> Friedmann, “The strategy of deliberate urbanization” (1968).

<sup>648</sup> Gokhman and Karpov, “Growth poles and growth centres” (1970), p. 193. The authors note that these ideas were expressed most explicitly by N. N. Kolosovsky and his followers in their writings on industrial territorial complexes. Reference is made on p. 196 of the article to Kolosovsky, *Teoriia ekonomicheskogo raionirovaniia* (1969).

<sup>649</sup> See, for example, several articles published in Davidovich and Khorev, eds., *Goroda-sputniki* . . . (1961).

<sup>650</sup> Growth centres in France, and also in Bulgaria, are described in Bernard, *Les pôles et centres de croissance* . . . (1969). Plans for development of such regional centres (often called *equilibrium metropolises*) as alternative counter-magnets to the Paris region are described in Antoine and Weill, “Les métropoles et leur région”

(1968); Rodwin, *Nations and Cities* . . . (1970), pp. 193-199; and France, Press Information Department of the Embassy, *France: Town and Country Environment Planning* (1965), pp. 14-16. The planned development of several suburban growth poles within the Paris region is described in Hall, *The World Cities* (1966), pp. 89-92.

<sup>651</sup> Various judicial and financial privileges and conveniences were conferred to attract investment by big business. These included a large amount of special grants, funds, and subsidies, and enterprises were promised financial incentives such as tax exemptions and favourable low interest loans. Ito and Sakamoto, *Toshika Jidai no Nihon Keizai* (1967), p. 193; Tachi, Hama and Okazaki, *Mirai no Nihon Jinko* (1970), pp. 58-59; Ito, *Toshika Jidai no Kaihatsu Seisaku* (1971), pp. 52-54 and 127-131.

<sup>652</sup> Ito, *Toshika Jidai no Kaihatsu Seisaku* (1971), pp. 77-83.

<sup>653</sup> Kuroda, “Jinko ido no tenkan kasetsu” (1970), p. 22.

<sup>654</sup> Hance, *Population, Migration and Urbanization* . . . (1970), pp. 235-236.

<sup>655</sup> Misra, Prakasarao and Sundaram, *Growth Poles and Growth Centres in Regional Development and Planning in India* (1970).

degree of population concentration inevitable. The problem of spatial congestion varies in different areas of the world, depending on existing densities. Many Western European planners have argued that the optimum population of a city might be about 100,000 or 200,000. Gottmann argues that in Western European nations such as Belgium, France, the Netherlands, and the United Kingdom, there would be little if any agricultural space remaining if the population of these countries were to be dispersed into urban units of 100,000 or 200,000.<sup>656</sup> The Soviet Union, on the other hand, is a more spacious country, although it has much territory which is more or less uninhabitable. According to Lyashchenko, while the Soviet Union will never be threatened with shortage of land to house urban residents, a danger of land shortage exists as a result of increasing industrial construction. As a remedy, he advocated a decisive shift to new production technology consisting of vertical, rather than horizontal, production lines.<sup>657</sup> Such industrial concentration would appear to call for the further agglomeration of population in large cities as a need for a spatially concentrated labour force would arise.<sup>658</sup>

279. Kenneth Schneider has emphasized the need for development of three-dimensional space.<sup>659</sup> Space, as opposed to land, can be expanded through the use of architectural techniques. Schneider argues that the massive low-density horizontal organization of metropolitan space, which has resulted from the use of the automobile, has caused a wide sprawl of population settlement which has resulted in a certain degree of social isolation. "The non-driving half of the population is deprived of normal intercourse with society."<sup>660</sup> Often it is economically irrational to provide adequate public transportation facilities in low-density suburban settlements. Furthermore, the highway arteries themselves consume so much land that the population density becomes even lower.

<sup>656</sup> Gottmann takes issue with a school of French and Belgian architects and urbanists led by Bardet who advocate 200,000 as the optimum size for all cities. He states: "Now, France is not a densely populated country by West European standards, but if the 200,000 figure was adopted as a ceiling for city growth, most of the country would be urbanized; and, with a 100,000 limit, all of it; for the rural areas left between the urbanized districts would just be narrow strips in which the need for intensive agricultural production would probably preclude the undue wanderings of city dwellers. Such a solution applied to the Netherlands, Belgium and Britain, with their much higher average densities, would mean covering their territories with a kind of dispersed city network, within which the specialization of each would cause an incredibly dense traffic between all of them. Thus the generalized 'small-town' solution, even on a modern scale, is bound to produce more congestion and more frustration than ever." See Gottmann, "Urban sprawl..." (1967), p. 11.

<sup>657</sup> Lyashchenko, "Zemlia i gorod" (1967).

<sup>658</sup> The desirability of large cities is a much-debated question in the Soviet Union. For articles which criticize on economic and social grounds existing policy to restrict the growth of large cities see, for example, Baranov, "Bolshoi gorod, ego segodnia i zavtra" (1967); Perevedentsev, "Goroda i gody" (1969), and his "Kakoi gorod vygoden?" (1967). Other authors, however, argue that small and medium-size cities should be restricted. Khorev, "Kakoi gorod nuzhen?" (1969), and his *Gorodskie poseleniia SSSR*... (1968), especially pp. 95-214.

<sup>659</sup> Schneider, "The destruction of urban space" (1970).

<sup>660</sup> *Ibid.*, p. 66. According to Hawley, *Urban Society*... (1971), p. 146, the introduction of the automobile increased the local area within an hour's travel distance from the city centre from about 100 to 2,000 square miles.

280. In the Soviet Union, where private automobile ownership is less common than in many modernized nations,<sup>661</sup> urban sprawl has resulted in overloading of public transportation facilities and severe commuting strains on the part of workers who must commute either to a central city or another suburb. It is said that cities of the USSR far outrank the cities of other countries in passenger loads.<sup>662</sup>

281. Schneider has suggested that various related functions can be vertically organized in order to gain once more the horizontal space needed to make unobstructed pedestrian movement feasible.<sup>663</sup> If more population and economic activities were located in high-rise structures, there would also be more land for parks and other recreation areas essential for the well-being of the urban resident.<sup>664</sup> By concentrating more people in a smaller area of horizontal space, one would assume that high-rise structures could also be a means of relieving the pressures of urban sprawl, provided that they are effectively designed for human convenience.<sup>665</sup>

282. While evidence in favour of redevelopment of existing major metropolitan centres, even at heavy expense, appears to be clearly established in modernized nations, it is not so clear what policy alternatives should be adopted in some of the smaller developing countries where a single giant city, the so-called "primate city",

<sup>661</sup> Statistics shown in one source indicate that in 1960 there were 333 inhabitants per car in the Soviet Union, whereas there were less than 25 inhabitants per car in other European countries listed and only 3 in the United States. See Barzanti, *The Underdeveloped Areas*... (1965), p. 408.

<sup>662</sup> Sukholutsky, "Gorod i transport, ili otritsatelnye storony dostoinstva" (1968). Many commuters to Moscow spend an hour and a half or two hours (and sometimes even more) en route to work every day from the suburbs, and some come from suburbs 100 or more km away. Perevedentsev, "Goroda i gody" (1969).

<sup>663</sup> Schneider, "The destruction of urban space" (1970); Doxiadis has also written about the necessity for providing smaller territorial units of human pedestrian scale within the larger units of metropolitan organization. Doxiadis, *Ekistics: An Introduction to the Science of Human Settlements* (1968). The arguments are summarized in his "Ekistics, the science of human settlements" (1970) and in numerous articles which have appeared in the journal *Ekistics* which he edits. Svetlichny also stresses the need for preserving possibilities for pedestrian movement within a highly developed mass transportation system. See his article entitled "Gorod zhdët otveta" (1966). In a similar vein, Schneider visualizes a "metropolis of concentrated communities" containing high rise, multi-purpose structures and punctuated by broad expanses of open spaces between communities. Schneider, "The architecture of urban space" (1971), p. 50.

<sup>664</sup> A number of visionary models for efficient use of three-dimensional space (underground as well as overhead) have been developed, some of them involving designs for cities of as many as 50,000,000 inhabitants. See, for example, Driazgov, "Krizis plenokhnykh gorodov i trëkhmernyi gorod budushchego" (1968). See also Arsène-Henry, "La ville de l'an 2000" (1972); and Brugmann *et al.*, *The Ultimate Highrise* (1971). Lyashchenko has also described various models for the future in his "Zemlia i gorod" (1967).

<sup>665</sup> Not everyone agrees with the anti-sprawl view. Fagin writes: "... the kind of urban flow we've had is not necessarily bad, even though on an aerial photograph it may not appear at all orderly. After all, most of the people living in the urban amoeba's little feet do not judge life there by whether there is a neat exterior geometric shape. The question of how they do judge life has to do with the conditions they experience within the metropolis, not its bounding form. There is not yet proof that high density and centrality are conducive to the better life..." See Fagin, "Sprawl and planning" (1967), p. 153.

exists without a network of satellite cities. One of the more extreme examples is Thailand. In 1967, the population of Greater Bangkok was estimated to be 2,600,000—32 times as large as the population of the second largest city of Chiangmai.<sup>666</sup> The degree of primacy in Bangkok is increasing, rather than decreasing. In 1947, it was only 21 times as large as Chiangmai and in 1960, it was 27 times as large as Chiangmai. Whether it is better to allow Bangkok to grow at the expense of other cities or whether it is economically a sound idea to promote industrial activities and settlement in other locations is a complex problem to which there is no simple answer. Certainly, each such case will have to be evaluated in terms of the individual situation at hand, many factors being taken into account.

283. Perhaps the emergence of a modern territorial organization of population settlement in systems of satellite cities will have to await the emergence of a modernized industrial system—one in which activities are organized by large enterprises. In countries where industrial firms have grown large, many internal economies are possible: a big firm can absorb within it all the needed specialists. The firm is then enabled to move to satellite cities or new

outlying industrial parks where space is less expensive and wages are lower. This process, as it occurs in New York City, has been described by Raymond Vernon<sup>667</sup> and later by Jane Jacobs.<sup>668</sup>

284. Where a high degree of primacy exists in developing countries, the situation may be quite different. Technological improvements may not be introduced rapidly, firms may not grow in size or seek outlying locations. In such cases, policies designed to relocate industries away from the great cities must be carefully considered from the point of view of economic feasibility.

285. Because of land shortage, high local costs and the technical standards necessitated, redevelopment of a big city is an expensive and time-consuming operation. The need for redevelopment creates periodic financial crises even in highly developed countries, but much more acute problems in some of the less developed countries, where the fastest city growth is occurring and financial means for renewal are particularly limited.

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<sup>667</sup> Vernon, *Metropolis, 1985* (1963), pp. 99-118. See also Hoover and Vernon, *Anatomy of a Metropolis . . .* (1959).

<sup>668</sup> Jacobs, *The Economy of Cities* (1969).

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<sup>666</sup> Goldstein, "Urban growth in Thailand . . ." (1971).

## INTERNATIONAL MIGRATION

1. Various aspects of migration and population redistribution occurring within national boundaries have been discussed in the preceding chapter. Population movements which cross national boundaries merit special treatment because such movements are usually regulated by legal provisions and policies of the countries involved. Moreover, a country's net migration balance, being one of the components of its population growth, must be assessed in any analysis of population growth trends.

2. Migrations across international boundaries, whether voluntary or forced upon peoples by famine, conquest or other disasters, are known to be as old as history, but there was little precise information on the size and nature of such movements before the nineteenth century. Even today, very little is known about the volume of some intracontinental movements, such as those of African populations, though the directions of the main movements have been charted. There are also some startling gaps in the migration statistics of the most advanced countries; thus, Canada keeps no emigration statistics and the United Kingdom, until recently, kept no statistics relating to international movements by air.

3. Migration statistics are prepared primarily for national purposes, and international comparability is often difficult to achieve.<sup>1</sup> While international standards have been recommended for the collection of migration statistics,<sup>2</sup> no compilation of comparable data on a world-wide basis has yet been possible.<sup>3</sup> In fact, even among European countries and countries in which European migrants have settled, few have adopted international standards.<sup>4</sup> Analysis of international migration must therefore be based in part on statistics of passengers on ships and aircraft, statistics of work permits, and data from population censuses, rather than on migration statistics as such.<sup>5</sup> Sometimes only the net migratory balance can be calculated for a particular country, the far greater gross movements both in and out of the country

never having been tabulated. In other instances, the data collected pertain to movements in one direction only and, hence, the net balance of movements is unknown. There are also difficulties in differentiating between long-term migration and changes of residence of relatively short duration, and it is only recently that attempts have been made to establish a common terminology.<sup>6</sup>

4. The forces which impel people to migrate across international boundaries are often similar to those discussed in the preceding chapter which bring about internal movements. Many international movements proceed from rural areas in one country to urban areas in another, thereby displaying some of the features of rural to urban migration within a country. The economic and social effects of both types of migration are also often similar, as might be expected in view of the artificiality of distinctions based on national boundaries. Movements which constitute international migration in a continent of many small nations, such as Africa, are in many respects the equivalent of internal movements in countries of vast size and geographical variety, such as India or the USSR, where distances covered and differences in topology and environment may sometimes be even greater than those involved in international movements. Because of the considerable diversity of international migrations, it is often convenient for analytical purposes to distinguish transoceanic or intercontinental movements from those occurring within continents.

5. The chapter first summarizes the principal migratory trends of recent times in different regions of the world. It then discusses the economic and other factors which have influenced migratory streams, including also government policies in this field. The final sections of the chapter are devoted respectively to the demographic, economic and social effects of migration.

## A. Migration trends in recent times

## 1. INTERNATIONAL MIGRATIONS OF EUROPEANS

6. It is an outstanding fact in the history of international migrations that certain large regions, notably the Americas and Oceania, have remained virtually a preserve for migrants originating from Europe. In most of the coun-

<sup>1</sup> For a general discussion of the problems of improving migration statistics, see Thomas, *International Migration and Economic Development* ... (1961), pp. 19-24; United Nations, *Problems of Migration Statistics* (1949).

<sup>2</sup> United Nations, *International Migration Statistics* ... (1953).

<sup>3</sup> United Nations, "A survey of intercontinental migration in the post-war period" (1955), vol. 2, p. 261.

<sup>4</sup> Intergovernmental Committee for European Migration, Joint Statistical Project on European Migration, *A Decade of Post-World War II European Migration* ... (1959), pp. 3-5.

<sup>5</sup> Some important advances have been made in the utilization of population census data for analysing migration trends. See, for example, Kuznets and Rubin, *Immigration and the Foreign Born* (1954); Keyfitz, "The growth of Canadian population" (1950); McDougall, "Immigration into Canada ..." (1961).

<sup>6</sup> Permanent or long-term immigrants are for international purposes defined as those intending to remain for more than one year; temporary or short-term immigrants are non-residents intending to take up a remunerated occupation for one year or less. See United Nations, *International Migration Statistics* ... (1953), p. 17.

tries of overseas settlement, legislation was enacted to exclude immigrants from Asia, particularly from East Asia, soon after such migrants began to appear in significant numbers. Hence, a potentially large migration of Asians to these areas was prevented from developing.

7. It has been estimated that more than 60 million Europeans had emigrated overseas from the beginning of colonization movements up to the outbreak of the Second World War.<sup>7</sup> In the post-war period, between 1946 and 1963, there was a gross movement out of Europe of about 10 million people, with a net loss of 7 or 8 million.<sup>8</sup> The main features of European migrations since the Napoleonic Wars have been:<sup>9</sup>

(a) The major role of the British Isles (the United Kingdom and Ireland) as a source of overseas emigration throughout the whole period, with the number of emigrants averaging more than 150,000 annually between 1846 and 1963;

(b) The much less steady, although considerable, contribution of Germany, with the last four decades of the nineteenth century as the peak period;

(c) The large size of the total migratory flow from Europe in the fifteen years before the First World War, mainly as a result of a new outpouring from Southern and Eastern Europe, including Russia. During this period, the average annual emigration from Europe as a whole was well in excess of one million persons, a figure not reached before or since;

(d) The decline of overseas European migration between the world wars, arising partly as a result of restrictions on immigration by the overseas countries of settlement, but aggravated by the repercussions of the world depression of the early 1930s, which sent some movements into reverse. From 1921 to 1939 the average annual number of emigrants overseas was about 375,000;

(e) The large-scale compulsory transfers of population in Europe at the end of the world wars, and particularly after the Second World War, followed by the substantial recovery of gross voluntary emigration to levels much above those of the interwar period, though well below those of the years immediately preceding the First World War;

(f) The post-war increase in international migration within Europe, which has resulted in complicated patterns of migration, with many European countries, such as the Federal Republic of Germany, the Netherlands and the United Kingdom, not only sending emigrants abroad, but also drawing immigrants in from other parts of Europe and from abroad.

#### (a) Overseas emigration of Europeans to 1940

8. From 1820 to 1940 some 32.6 million migrants went to the United States from Europe.<sup>10</sup> Up to and including the 1880s the great majority of the migrants to the United States came from the British Isles and Germany, with sizable numbers also from Scandinavia; after 1880, immigration from Southern and Eastern Europe assumed greater importance, and between 1890 and 1920 the numbers coming from these regions exceeded by a considerable margin the numbers from Western and Northern Europe.<sup>11</sup> Over the whole 121-year period, Germany provided over 6 million immigrants, and Italy, Ireland, Great Britain and Austria-Hungary each between 4 and 5 million.<sup>12</sup>

9. Other parts of the American continent took most of the remainder of Europe's emigrants.<sup>13</sup> Some 6.7 million emigrants appear to have gone to Canada between 1851 and 1941, with 4.6 million arriving between 1901 and 1931, but included in these totals are a large number coming from the United States.<sup>14</sup> The number of emigrants from Canada was also very high, however, falling not far short of the number of immigrants during this ninety-year period; most of the emigrants went to the United States.<sup>15</sup>

10. From about 1880, immigrants began to enter Latin America in large numbers, the bulk coming from Southern Europe. One estimate places immigration to Argentina between 1857 and 1940 at 6.6 million, and that to Brazil between 1821 and 1940 at 4.7 million, the great majority

<sup>10</sup> Taeuber and Taeuber, *The Changing Population ...* (1958), pp. 53, 57. Official records of the number of immigrants were not kept prior to 1819, but estimates suggest that less than a quarter of a million immigrants entered the United States from 1790 to 1819. *Ibid.*, pp. 50-51.

<sup>11</sup> *Ibid.*, pp. 55-61. For a history of emigration from the British Isles, see Carrothers, *Emigration from the British Isles ...* (1929); Ireland, Commission on Emigration and other Population Problems, 1948-1954, *Reports* (1955), chap. 7; Walshaw, *Migration to and from ...* (1941); Shepperson, *British Emigration to North America ...* (1957). See also Burgdörfer, "Migration across the frontiers ..." (1931); Thomas, *Social and Economic Aspects ...* (1941); Ratti, "Italian migration movements ..." (1931).

<sup>12</sup> Taeuber and Taeuber, *The Changing Population ...* (1958), p. 56. Among the most significant of the many sociological and historical studies of the great transatlantic migration, which supplement the essentially statistical studies, are Hansen, *The Atlantic Migration ...* (1940); Foerster, *The Italian Emigration ...* (1919); Handlin, *Boston's Immigrants, 1790-1865 ...* (1941); Thomas and Znaniecki, *The Polish Peasant ...* (1958).

<sup>13</sup> Isaac has calculated that of a total of about 60 million European emigrants, nearly 60 per cent went to the United States, 11 per cent to Argentina, about 8 1/2 per cent to Canada, 7 1/2 per cent to Brazil, 5 per cent to Australia, 1 1/2 per cent to South Africa, and 1 per cent to New Zealand. These figures appear to refer to the period from about 1815 to 1932. See Isaac, *Economics of Migration* (1947), p. 62.

<sup>14</sup> See Keyfitz, "The growth of Canadian population" (1950), p. 48. During the period from 1908 to 1920, when about 2.5 million immigrants entered Canada, more than a third were from the United States, and over three-fourths of these were United States citizens. Ferenczi, "Introduction and notes" (1929), p. 366; Coats and Maclean, *The American-born in Canada ...* (1943), p. 50.

<sup>15</sup> Keyfitz, "The growth of Canadian population" (1950). See also Coats and Maclean, *The American-born in Canada ...* (1943); Truesdell, *The Canadian Born in the United States ...* (1943).

<sup>7</sup> Kirk, *Europe's Population ...* (1946), pp. 72-73.

<sup>8</sup> Data for the early part of the post-war period are given in International Labour Office, *International Migration ...* (1959), pp. 167-168. These figures have been supplemented by information for more recent years collected by the United Nations Statistical Office, or appearing in national publications.

<sup>9</sup> The estimates presented in this summary have been compiled mainly from Kirk, *Europe's Population ...* (1946), p. 279; International Labour Office, *International Migration ...* (1959); and national sources.



of these immigrants having arrived between 1881 and 1930.<sup>16</sup>

11. Another significant stream of Europe's migrants went to the British colonies and dominions, particularly Australia, New Zealand and South Africa.<sup>17</sup> Australia and New Zealand together appear to have absorbed about 2.3 million settlers in the period 1801-1935, most of them from the British Isles.<sup>18</sup>

12. Throughout much of the nineteenth century there was a high degree of complementarity between the sending and receiving countries. The settlement of the immigrants on the land was facilitated by land grants, and assisted passage schemes were in operation in Australia and New Zealand (see section B.2 below). A variety of factors, such as the decrease of the size of farms through inheritance or other reasons, as in southern Germany, Austria and Norway,<sup>19</sup> the consolidation of small holdings, as in England,<sup>20</sup> and increasing productivity, all tended to create surpluses of rural labour within Europe. The most acute pressures occurred in Ireland where absentee land-holding, rapid population increase and the potato famine of 1847 brought the people to destitution.<sup>21</sup>

13. By the latter part of the nineteenth century the heyday of land settlement was over in the United States. Investments in North America and the British colonies in particular, both from domestic capital and from foreign lending, especially from Britain, were going increasingly into railways, manufacturing and urban housing. There were temporary set-backs in the immigrant countries following excessive borrowings or withdrawals of overseas investments, but generally the economic factors favouring the New World were overwhelming. The high productivity of overseas farming, especially in the United States, was outstripping that of the European farmer, thus bringing a crisis to agriculture throughout Europe and thereby creating a further "push" factor making for increased emigration. These economic factors were operating at a

time when many of the European populations were reaching their maximum rates of natural growth, around 1 per cent per year.<sup>22</sup> These were the conditions behind the great outflows from the 1880s to the outbreak of the First World War. The great bulk of the immigrants, especially from continental Europe, continued to come from the peasantry, but they now found employment in railway construction, in mines and in the growing industries, rather than in rural occupations.

14. The war of 1914-1918 ushered in many changes which were to militate against international migration. The United States Quota Act of 1921 and the Immigration Act of 1924 severely restricted immigration, particularly that coming from Southern and Eastern Europe.<sup>23</sup> As a result of the general deterioration of economic conditions, British emigration to other parts of the Empire also decreased during the 1920s, despite the Empire Settlement Act of 1922 which aimed to maintain the flow of people from the United Kingdom.<sup>24</sup> In the ten years 1922-1931, over 400,000 emigrants were assisted under the scheme, most of them going to Australia and Canada.<sup>25</sup> The main attraction for British emigrants during this period continued to be North America, but the flow was less than half that of the 1880s.<sup>26</sup>

15. Southern Europeans, deflected from the United States after 1924, continued to find some outlet to Latin America, but opportunities were restricted by systems of land tenure which prevented most of the settlers from acquiring cheap land and by the inadequacy of domestic capital for the development of transport and productive plant. Many of the immigrants went to urban areas, where the attractions were limited because of low wages, inadequate housing and, frequently, political instability.<sup>27</sup>

16. The war had also brought a marked change in the pattern of international investments, with capital now flowing from the United States into Europe, and particularly Germany,<sup>28</sup> thus tending to decrease the incentives for emigration overseas. The collapse of the boom in the American economy and the onset of the world depression by 1930 virtually brought European overseas emigration to a halt until after the Second World War. Economic factors were undoubtedly the most important determinants operating in the 1930s to restrict the flows of international migration, but these were backed by immigration

<sup>16</sup> United Nations, *Economic Survey of Latin America, 1948* (1949), pp. 155-157. For other estimates of immigration into Latin American countries, see the following United Nations publications: *Immigration in Brazil* (1950), p. 64; *Immigration in Chile* (1950), table 62. See also Avila, "Brazil" (1958).

<sup>17</sup> See, for example, the following studies of immigration to these countries: Borrie, "Immigration" (1958); Forsyth, *The Myth of Open Spaces ...* (1942); Phillips and Wood, eds., *The Peopling of Australia* (1928); Cruickshank, "New Zealand—external migration" (1931); Carrothers, *Emigration from the British Isles ...* (1929); Robertson, "South Africa" (1958).

<sup>18</sup> Landry, *Traité de démographie* (1949), p. 471; Kirk, *Europe's Population ...* (1946), p. 90. Estimates for South Africa are more difficult to compile, since no records of immigration and emigration as such were kept before 1924. Katzen, "South-African immigration ..." (1963), p. 183. Some estimates for earlier years are given in Davie, *World Immigration ...* (1947), p. 437, but the author believed them to have little validity.

<sup>19</sup> Davie, *World Immigration ...* (1947), pp. 10, 118; Klezl, "Austria" (1931), pp. 403-404; Blegen, *Norwegian Migration ...* (1931), pp. 167-168; Hansen, *The Atlantic Migration ...* (1940), pp. 224-225.

<sup>20</sup> Snow, "Emigration from Great Britain" (1931), p. 240.

<sup>21</sup> Carrothers, *Emigration from the British Isles ...* (1929), chap. 10; Ireland, Commission on Emigration and other Population Problems, 1948-1954, *Reports* (1955), chap. 7; Harkness, "Irish emigration" (1931); Thomas, *Migration and Economic Growth ...* (1954), pp. 94-95.

<sup>22</sup> Thomas, *Migration and Economic Growth ...* (1954), pp. 205, 314 and chap. 7; and his *International Migration and Economic Development ...* (1961), pp. 10-11.

<sup>23</sup> The Act of 1921 set the limit of immigration permitted each year at about 357,000. The Act of 1924 reduced this limit to about 162,000 annually, and provided for a subsequent reduction to about 153,000, the latter going into effect in 1929. Thomas, *Migration and Economic Growth ...* (1954), p. 191. See also Davie, *World Immigration ...* (1947), pp. 375-381.

<sup>24</sup> Plant, *Oversea Settlement ...* (1951), pp. 91-92.

<sup>25</sup> United Kingdom, Inter-Departmental Committee on Migration Policy, *Report ...* (1934), pp. 6, 41, 82.

<sup>26</sup> Compiled from data in Thomas, *Migration and Economic Growth ...* (1954), pp. 57, 276.

<sup>27</sup> United Nations, *Immigration in Chile* (1950), pp. 12-21, 85-87; ———, *Immigration in Brazil* (1950), pp. 97-106; ———, *Immigration in Venezuela* (1950), pp. 47-59; Pan American Union, *Immigration in Latin America* (1964), pp. 91, 171.

<sup>28</sup> Thomas, *Migration and Economic Growth ...* (1954), p. 200.

restrictions in the receiving countries and by controls on emigration imposed by certain Governments within Europe.<sup>29</sup>

17. The majority of studies produced during the 1930s and early 1940s concluded that there was not likely to be a revival of emigration from Northern and Central Europe, since population decline was projected as the inevitable result of prevailing fertility levels.<sup>30</sup> The response in some European countries to this new demographic situation was to institute pro-natalist social and economic policies.<sup>31</sup> In such circumstances, the overseas receiving countries might have turned for their immigrants to Southern and Eastern Europe where population growth was still relatively rapid, had it not been for the fact that they were at the time struggling to achieve reasonably full employment of their existing populations and were thus unwilling to encourage new inflows.

(b) *Political transfers of European populations after the Second World War*

18. The largest international movements of population ever experienced within Europe—numbering in the tens of millions—occurred during and immediately after the Second World War. During the period when Germany had gained a temporary military dominance over major portions of Europe, large numbers of ethnic Germans residing in countries of Eastern and South-eastern Europe were “repatriated” in line with government policy. Other appreciable ethnic exchanges also took place during the war, as between Poland and the Soviet Union, Romania and Hungary, and Bulgaria and Romania. Running into many millions were the displacements of non-German nationals to participate in the German war effort, and the displacement of other persons, the great majority of them Jews, as a consequence of Nazi racist policies. It has not been possible to measure even with a crude degree of accuracy the gross volume of these movements back and forth across the face of Europe during the chaotic war years, but several detailed studies have dealt with various aspects of the subject.<sup>32</sup>

19. In Western Europe, numerically the most important category of post-war transfers consisted of German populations living mainly in the areas east of the Oder-Neisse line previously administered as part of Germany, and in Czechoslovakia, Hungary and Poland, who had to return within the new German boundaries in accordance with article XIII of the Potsdam Agreement of August 1945.<sup>33</sup>

20. By September 1950, there were over nine million national refugees in Western Germany (with a total population then of 47.7 million), and by 1957 this number had increased to over twelve million. Between 1950 and

1957 there appears to have been a net immigration of approximately 1.6 million from Eastern Germany alone. This massive input to Western Germany exceeded war losses, though the latter had been considerable. While the refugees had higher proportions in the young- and working-age groups than did the remainder of the population, the population structure of Western Germany was still far from “normal” by 1950.<sup>34</sup> About three and a half million German nationals had been transferred to Eastern Germany by October 1946, but this refugee influx was offset by emigration, resulting in a net decline in the population after 1948, and in an imbalance of the sexes even more marked than that of Western Germany.<sup>35</sup>

21. Quite massive movements also occurred elsewhere. Boundary changes led to the transfer in 1945 and 1946 of about 50,000 Lithuanians, 30,000 Byelorussians and 420,000 Ukrainians from the new Poland, and 1.5 million Poles and Jews into that country. In addition, between 1945 and 1948 at least half a million Poles returned to Poland from the Soviet Union, and in 1946-1948 a further 1.5 million were repatriated from elsewhere, mostly from Germany.<sup>36</sup>

22. Other substantial movements in Central, Eastern and Southern Europe included the transfer of 100,000 persons from Czechoslovakia to Hungary, the repatriation of about 100,000 persons from Germany and the Soviet Union to Czechoslovakia, the repatriation of about 130,000 Hungarian displaced persons, and in 1950 and 1951 the expulsion of 150,000 persons from Bulgaria and their resettlement in Turkey, mainly on land abandoned by the Greeks between 1922 and 1928.<sup>37</sup>

23. The countries most affected by these post-war transfers were Poland, Czechoslovakia and Germany. As a result of both war casualties and transfers of population and land, Poland and Czechoslovakia lost population, much of it highly skilled; this hampered reconstruction after the war. By contrast, the mass transfer of German expellees into Germany at first created acute problems of labour surpluses at a time when there was little capital to stimulate investment. However, by 1950, the unemployment rate among expellees in Western Germany had fallen below 7 per cent, and more than one million expellees were employed in such vital industries as metallurgy, engineering, manufacturing and construction. Thus, despite initial hardship, the influx of expellees gave the country the work force essential for economic reconstruction.<sup>38</sup>

pp. 36-37. See also Wander, *The Importance of Emigration* ... (1951), p. 10; Meyers and Mauldin, “Assimilation of the expellees ...” (1952).

<sup>34</sup> In the age group 25-44 years, for example, females outnumbered males by more than 1.7 million. International Labour Office, *International Migration* ... (1959), pp. 9-10, 25-27.

<sup>35</sup> *Ibid.*, pp. 35-36.

<sup>36</sup> International Labour Office, *International Migration* ... (1959), p. 63.

<sup>37</sup> *Ibid.*, pp. 60-61, 65.

<sup>38</sup> International Labour Office, *International Migration* ... (1959), pp. 23, 28-31, 68-69. Problems related to the integration of expellees and refugees in the West German economy are discussed in Edding, *Die Flüchtlinge als Belastung* ... (1952) and Schuster, *Übervölkerung und Auswanderung* (1951).

<sup>29</sup> Kirk, *Europe's Population* ... (1946), pp. 83-90.

<sup>30</sup> See, for example, Notestein *et al.*, *The Future Population of Europe* ... (1944); Charles, “The effect of present trends in fertility ...” (1935).

<sup>31</sup> For a full treatment of these policies, see Glass, *Population Policies and Movements in Europe* (1940). See also chapter XVII.

<sup>32</sup> See Frumkin, *Population Changes in Europe since 1939* ... (1951); Kulischer, *Europe on the Move* ... (1948); Schechtman, *European Population Transfers, 1939-1945* (1946).

<sup>33</sup> See Schechtman, *Post-war Population Transfers* ... (1962).

24. Between mid-1947 and the end of 1951, the International Refugee Organization also resettled over one million displaced persons, of whom 720,000 originated from Western Germany, 145,000 from Austria, and small numbers from other countries of Europe and the Middle and Far East. The main areas of resettlement were the United States (330,000), Australia (180,000), Israel (130,000), Canada (120,000) and the United Kingdom (85,000), with smaller numbers going to France, Argentina, Brazil and other countries.<sup>39</sup> This displaced person resettlement was undertaken for humanitarian reasons at a time when there was still considerable skepticism in some of the traditional receiving countries concerning the absorptive capacities of their economies. The Australian Government, for example, began with a cautious target of only 12,000 displaced persons a year, but the numbers were increased as the economy proved hungry for new workers.<sup>40</sup> In Canada, too, and to a smaller extent in the Latin American countries, the displaced persons prepared the way for larger flows of non-refugee immigrants.

#### (c) Post-war emigration from Europe<sup>41</sup>

25. From 1946 until 1964 there appears to have been an average annual gross outflow from Europe to overseas countries of close to 600,000 persons. The main sending countries were as follows:

*Gross overseas  
emigration,  
1946-1964  
(in thousands)*

United Kingdom .....	2,648
Italy .....	1,851
Federal Republic of Germany .....	1,683
Netherlands .....	785
Spain .....	815
Portugal .....	498

26. These figures can be taken only as approximations of gross movements overseas, since the statistics are subject to many shortcomings.<sup>42</sup> Moreover, it is important to note that some of the main sending countries were at the same time major receiving countries both from overseas and from intracontinental movements. So far as overseas migration alone is concerned, the greatest loss seems to have been sustained by Italy, which received back about one fourth of the gross overseas outflow, leaving a net loss of about 1.4 million. Statistics for the United Kingdom show an inflow from overseas of about 1.4 million

between 1946 and 1964, more than half the gross outflow, which still, however, left a net loss of about 1.2 million. Owing to a large movement from Netherlands territories overseas and from Indonesia, gross immigration to the Netherlands from non-European countries during this period amounted to 87 per cent of the gross overseas outflow. Estimated return movements were also considerable in the case of some of the other countries. So far as overseas movements are concerned, the inflows have tended to rise since about 1958, while the outflows from major sending countries declined.

#### (d) The overseas receiving countries of European emigrants<sup>43</sup>

27. The main overseas receiving countries for European emigrants since the Second World War have been the United States, Canada, Australia, New Zealand, South Africa, Israel and some of the countries of Latin America. The United States has retained its role as the leading immigrant country, receiving between 1946 and 1964 approximately 4.7 million immigrants, of whom some 2.4 million were from Europe and most of the remainder from other countries of the Americas. Immigrants to the United States from Latin America, who had numbered about 60,000 annually during the 1950s, numbered more than 100,000 per year in the 1960s and surpassed in number immigrants coming from Europe.<sup>44</sup> Emigration of aliens amounted to about 25,000 annually in the post-war period until reporting was discontinued in the late 1950s.<sup>45</sup> Thus, the loss through emigration was apparently slight, but substantial as the net inflow has been, it constitutes a small fraction of the average annual increase of about 2.8 million in the United States population during this period. Changes in immigration legislation enacted in 1965 are discussed in section B.

28. Canada received about 2,350,000 immigrants between 1946 and 1964, 85 per cent of them from Europe; the principal sending countries from Europe were the United Kingdom, Italy, the Federal Republic of Germany and the Netherlands. As Canada does not maintain statistics of emigrants, figures for net migration are difficult to determine, but it has been estimated that emigration to Europe did not exceed 150,000 (or about 10 per cent of the gross inflow) between 1946 and 1957, while emigration to the United States was larger in volume.<sup>46</sup> As seen in section B, new immigration regulations adopted in 1962 made sweeping changes in regard to unsponsored

<sup>39</sup> International Labour Office, *International Migration* ... (1959), pp. 50-51.

<sup>40</sup> Holborn, *The International Refugee Organization* ... (1956), pp. 394-396. See also Appleyard, "The economics of immigration into Australia" (1967).

<sup>41</sup> Data presented in this section were taken from International Labour Office, *International Migration* ... (1959); national statistical sources; and from the files of the Statistical Office of the United Nations.

<sup>42</sup> For example, statistics for the United Kingdom before 1964 refer only to persons departing for a year or more by long sea routes. In 1964 an International Passenger Survey, which included air travel, gave a figure for overseas emigration which was almost double the 1963 figure.

<sup>43</sup> Unless otherwise indicated, sources for data presented in this section are: International Labour Office, *International Migration* ... (1959); national statistical publications; and the files of the Statistical Office of the United Nations.

<sup>44</sup> United States, Bureau of the Census, *Statistical Abstract of the United States, 1967* (1967), p. 96.

<sup>45</sup> Akers, "Immigration data and national population ..." (1967), p. 267.

<sup>46</sup> International Labour Office, *International Migration* ... (1959), pp. 152-153, 191-192. Gross emigration to all areas was estimated at over 400,000 for the period 1946-1954. Timlin, "Canada" (1958), p. 150. For the 1951-1961 intercensal period, it has been calculated that about 400,000 foreign-born persons emigrated, compared with an immigration of 1.5 million. Pankhurst, "Migration between Canada ..." (1966), p. 56.

immigrants, setting requirements only as to skill or training. The basic objective of the new regulations was to remove any suggestion of discrimination on grounds of race or citizenship and to ensure that the new immigrants should have the skills required by the Canadian economy.<sup>47</sup> The proportion of all immigrants coming from Europe had already dropped to less than three-quarters in the early 1960s before the new legislation went into effect, and it showed little change in the next few years. On the other hand, there was a noticeable rise in 1964 and 1965 in the proportion of immigrants from Asia; about 4 per cent were from Asia in 1960-1963, 6 per cent in 1964, and 8 per cent in 1965.

29. Until 1966, Australian policy restricted immigration for permanent settlement almost wholly to Europeans; but within the European flow, there have been marked changes in the post-war period, as compared with pre-war patterns, partly as a result of changes in the provisions for State-assisted immigration (see section B.2 below). About half of the total of slightly more than two million persons arriving in Australia between October 1945 and March 1964, and intending to stay for twelve months or more, received passage assistance; of those receiving assistance, about half were non-British. The Italians, numbering about 272,000, dominated the non-British flow, other important groups being the Dutch (135,000), Greeks (112,000) and Germans (98,000).<sup>48</sup> Over the period from January 1945 to the end of 1964 there were more than 700,000 "long-term and permanent departures", compared to 2.2 million arrivals in the same category, thus leaving a net immigration of about 1.5 million.

30. British immigrants have dominated the post-war intake of both New Zealand and South Africa. New Zealand, with a net gain from migration of 246,000 between April 1946 and March 1965, has placed less emphasis than Australia on recruitment and sponsorship, and the only substantial supply of immigrants coming from countries other than the United Kingdom and Australia has come from the Netherlands. From 1946 to 1964, about 58 per cent of the total number of European immigrants to South Africa came from the United Kingdom, the other main European contributions coming from the Netherlands and the Federal Republic of Germany. A feature of South African international migration during the post-war period has been a two-way movement between South Africa and Rhodesia, the net movement varying in accordance with political conditions in the two countries. Migration trends in South Africa are more fully discussed in section A.3 below.

31. Israel, with three fifths of its Jewish population foreign-born at the end of 1964, is the classic example in the contemporary world of an immigrant country. The greatest movement into Israel occurred between 1948 and 1951, the period of the "ingathering of the exiles", when 690,000 Jewish persons, about half of them from Europe (340,000), but sizable numbers also from

Asia (240,000) and Africa (90,000), moved into the country. Of the number coming from Europe, more than two thirds were from Poland and Romania. From the date of the country's independence in May 1948, through to the end of 1964, total immigration had reached about 1.2 million. As discussed in section A.2, very large numbers of Palestinian Arabs left Israel after the founding of that State. The circumstances of Israel were unique in recent migrations, in that the building of a new nation rather than the growth of an established country was involved.

32. The records of European emigrant countries indicate a net migration of over one million persons from Europe to Latin America between 1950 and 1964; since the mid-1950s the annual figures have been declining, and the net gain became negligible before the end of the period. Return migration was apparently high, amounting perhaps to one-third of the gross immigration.<sup>49</sup> All but a small number of European immigrants to Latin America came from three countries of Southern Europe: Italy, Portugal and Spain. By the early 1960s more Italian migrants were returning to Italy from Latin America than were emigrating there. While Spain continued to show a loss, on balance, of migrants to Latin America, the number of Spaniards emigrating to other European countries was about four times the number going to Latin America in 1960-1963.<sup>50</sup> Owing to the high rate of natural increase, immigration has not been numerically important as a supplement to population growth in most countries of Latin America in the post-war period. The principal receiving countries have been Argentina, Brazil and Venezuela, but in relation to population size, the volume of immigration has been important only in Venezuela and, to a lesser extent, in Argentina.<sup>51</sup> Uruguay received a sizable number of European immigrants in relation to her population size, but outflows to other countries, particularly Argentina, appear to be partly unrecorded.<sup>52</sup> Small-scale selective immigration is highly desired by Latin American countries in order to supply necessary skills. Unfortunately, these countries have become in recent years less attractive economically to possible European emigrants, owing to the more rapidly rising standards of living in other immigrant countries and in Europe itself.<sup>53</sup>

#### (e) Immigration into European countries

33. In France, immigration had already begun to exceed emigration by the 1870s, and after 1920 the gaps left by casualties in the First World War were filled by a massive immigration primarily of Italians, Poles and

<sup>47</sup> Fairclough, "Social implications of the new ..." (1962), pp. 61-62.

<sup>48</sup> For a detailed study of Southern European settlement in Australia, see Price, *Southern Europeans in Australia* (1963).

<sup>49</sup> These estimates differ somewhat from the statistics of the countries of immigration, which are believed to be less reliable. For data derived from the latter source, see, for example, International Labour Office, *International Migration* ... (1959), pp. 193-198; Pan American Union, *Immigration in Latin America* (1964), p. 10. See also Neiva, "International migrations ..." (1965), p. 128.

<sup>50</sup> Martínez Cachero, *La emigración española* ... (1965), pp. 31, 37.

<sup>51</sup> International Labour Office, *International Migration* ... (1959), p. 308; Dollot, *Les migrations humaines* (1965), p. 125.

<sup>52</sup> United Nations, *World Population Prospects* ... (1966), p. 114.

<sup>53</sup> Neiva, "International migrations ..." (1965), p. 128.

Spaniards, but also including Algerians, Tunisians and Moroccans, residents of French colonies being able to enter France without restriction.<sup>54</sup> Net immigration averaged about 200,000 persons annually from 1921 to 1931, but showed a negative balance during the depression.<sup>55</sup> The inflow was resumed on a large scale after the Second World War, the intake of permanent immigrant workers and their families from 1946 to 1964 being about one and a half million.<sup>56</sup> The Italians were preponderant in the earlier years of this period,<sup>57</sup> but in the early 1960s Spain and later Portugal supplanted Italy as the main source of migrants, with Morocco becoming an important source by 1963-1964.<sup>58</sup> In addition, there has been a sizable two-way movement between Algeria and France of Algerian Moslems, many of them workers, during this period, with a net balance in France's favour.<sup>59</sup>

34. While France had more than one million of the total of over 3 million foreign workers from Europe and other continents estimated to have been employed in continental Western European countries in 1964,<sup>60</sup> in recent years the Federal Republic of Germany and Switzerland have had an even stronger attraction for migrants. Switzerland has absorbed a steady inflow of foreign labour since the Second World War, as a result of rapid economic expansion and the slow growth of the indigenous labour force. This inflow is to some extent seasonal, the summer figures being much higher than the winter figures. In February 1964 there were over half a million foreign workers registered in Switzerland, compared with an average of only about 100,000 in February of the years 1949-1951. Foreign workers constituted almost a quarter of the total labour force of Switzerland in 1964—a much higher proportion than in any of the other European countries of immigration.<sup>61</sup> Over a quarter of these workers were employed in construction, and about one fifth in the metals and machinery industry in 1964. Italians made up about two thirds of the total foreign labour force at that time.<sup>62</sup>

35. The Federal Republic of Germany, which showed a substantial net loss on overseas movements during the years following the war, recouped this loss through immigration received from other European countries. In addition to the 9.4 million refugees who had entered the country by September 1950, and the continued inflow from Eastern Germany and the former east German provin-

ces,<sup>63</sup> in the 1960s there was a very large immigration of foreign workers, mainly from Italy, Greece, Spain, Turkey and Yugoslavia.<sup>64</sup> In September 1964 there were about one million foreign workers in the Federal Republic of Germany, compared to only about 130,000 in the middle of 1958. Nearly one third of these workers in 1964 were Italians.<sup>65</sup>

36. Belgium and Sweden have also received a sizable immigration during the post-war period, the latter mainly from other Scandinavian countries.<sup>66</sup> Although both government and private sources in the Netherlands had deliberately assisted and encouraged emigration overseas after 1945,<sup>67</sup> the total gross outflow to overseas as well as Continental destinations from 1946 to 1964 of more than a million was almost entirely offset by a return from Netherlands overseas territories and Indonesia of about half a million, and by an inflow of another half-million from all other sources.<sup>68</sup>

37. Since the Second World War the United Kingdom has received substantial numbers of immigrants both from continental Europe and from overseas.<sup>69</sup> Between 1946 and 1957 nearly half a million continental Europeans, most of them workers, were admitted to the United Kingdom, and the net recorded balance of immigration from the Republic of Ireland was 318,000.<sup>70</sup> Between the mid-1950s and 1962 there was a flood of non-European immigration into the United Kingdom from the West Indies, particularly Jamaica, from India and Pakistan and, to a much smaller extent, from West Africa.<sup>71</sup> This flow was stemmed (but not stopped) by the Commonwealth Immigrants Act of 1962 (see section B.2 below). Nevertheless, by September 1964 there were estimated to be 800,000 immigrants from the new Commonwealth countries (i.e., excluding Australia, Canada and New

<sup>63</sup> Wander, "Migration and the German economy" (1958).

<sup>64</sup> Bideberry, "Some features of immigration ..." (1964), p. 280; United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1964* ... (1965), chap. 2, p. 34.

<sup>65</sup> Germany, Federal Republic, Bundesministerium für Arbeit und Sozialordnung, *Arbeits- und sozialstatistische Mitteilungen* (Juni 1966), p. 168.

<sup>66</sup> For example, see United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1964* ... (1965), chap. 2, p. 33.

<sup>67</sup> Hofstee, "Netherlands" (1958). For a discussion of post-war sponsored emigration from the Netherlands, see Petersen, *Planned Migration* ... (1955), pp. 108-116.

<sup>68</sup> Data from International Labour Office, *International Migration* ... (1959), pp. 174-175; Hofstede, *Thwarted Exodus* ... (1964), appendix 3; and national statistics.

<sup>69</sup> For a discussion of British post-war migration trends, see, for example, Isaac, *British Post-war Migration* (1954); Moindrot, "Les vagues d'immigration ..." (1965).

<sup>70</sup> International Labour Office, *International Migration* ... (1959), pp. 140-142. Since 1957, the flow from Ireland seems to have been sustained, the estimated net immigration to the United Kingdom during 1958-1964 being about 137,000. See United Kingdom, Central Statistical Office, *Monthly Digest of Statistics* (June 1966), p. 102. The figures for Ireland refer to movements by air and sea and take no account of overland movements between the Republic of Ireland and Northern Ireland.

<sup>71</sup> Moindrot, "Les vagues d'immigration ..." (1965), pp. 644-650; Davison, *Black British* ... (1966); Peach, "West Indian migration ..." (1967). It is estimated that the net result of movements from all sources was positive from 1958 to 1963. United Kingdom, Commonwealth Relations Office, Oversea Migration Board, *Statistics for 1963* (1964), p. 13.

<sup>54</sup> Kirk, *Europe's Population* ... (1946), pp. 97-109, 284.

<sup>55</sup> *Ibid.*, pp. 284-285; Landry, *Traité de démographie* (1949), p. 448.

<sup>56</sup> Bideberry, "Some features of immigration ..." (1964), p. 277; for 1964, national statistics.

<sup>57</sup> International Labour Office, *International Migration* ... (1959), p. 146.

<sup>58</sup> Bideberry, "Some features of immigration ..." (1964), p. 278; Tapinos, "L'immigration étrangère ..." (1965), pp. 680-681.

<sup>59</sup> Chevalier, "Chronique de l'immigration" (1964), p. 576; Nizard and Pressat, "Evolution générale ..." (1965), p. 1118.

<sup>60</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1964* ... (1965), chap. 2, p. 33.

<sup>61</sup> *Ibid.*, chap. 2, p. 34; Bickel, "Foreign workers and economic growth ..." (1967).

<sup>62</sup> Mayer, "Post-war migration to Switzerland" (1965), pp. 128-129.

TABLE VII.1. POPULATION CHANGES OWING TO NATURAL INCREASE AND MIGRATION  
FOR EUROPEAN COUNTRIES, MID-1950 TO MID-1960

(Figures in thousands)

Region and country	Mid-year population		Population growth 1950-1960		
	1950	1960	Total	Natural increase	Estimated net gain (+) or loss (-) through migration <sup>a</sup>
<i>Western Europe</i>					
Federal Republic of Germany (including West Berlin) .....	49,986	55,423	5,437	2,714	+2,723
France .....	41,736	45,684	3,948	2,868	+1,080
Netherlands .....	10,114	11,480	1,366	1,508	-142
Belgium .....	8,639	9,114 <sup>b</sup>	475	428	+47
Austria .....	6,935	7,048	113	254	-141
Switzerland .....	4,694	5,362	668	372	+296
Luxembourg .....	296	314	18	11	+7
TOTAL	122,400	134,425	12,025	8,155	+3,870
<i>Southern Europe</i>					
Italy .....	46,769	49,642	2,873	4,039	-1,166
Spain .....	27,868	30,303	2,435	3,261	-826
Yugoslavia .....	16,346	18,402	2,056	2,638	-582
Portugal .....	8,405	8,826	421	1,083	-662
Greece .....	7,554	8,326	773	964	-191
Albania .....	1,215	1,607	392	391	
Malta .....	312	329	17	59	-42
TOTAL	108,469	117,436	8,967	12,435	-3,469
<i>Eastern Europe</i>					
Poland <sup>c</sup> .....	25,008	29,776	4,768	4,960	-192
Romania .....	16,311	18,403	2,092	2,230	-138
German Dem. Republic .....	18,388	17,241	-1,147	727	-1,874
Czechoslovakia .....	12,389	13,654	1,265	1,265	
Hungary .....	9,338	9,984	646	810	-164
Bulgaria .....	7,251	7,867	616	780	-164
TOTAL	88,685	96,925	8,240	10,772	-2,532
<i>Northern Europe</i>					
United Kingdom .....	50,290 <sup>d</sup>	52,372	2,082	2,122	-40
Sweden .....	7,014	7,480	466	374	+92
Denmark .....	4,271	4,581	310	362	-52
Finland .....	4,009	4,430	421	493	-73
Norway .....	3,265	3,581	316	330	-14
Ireland .....	2,969	2,834	-135	262	-397
TOTAL	71,818	75,278	3,460	3,943	-484
EUROPE <sup>e</sup>	391,372	424,064	32,692	35,306	-2,615

SOURCE: Compiled from data in United Nations, *Demographic Yearbook*, 1965 ... (1966); ..., 1966 ... (1967); ..., 1967 ... (1968).

<sup>a</sup> Net migration has been calculated by subtracting natural increase (i.e., the excess of births over deaths) from the total population increase during the period.

<sup>b</sup> Unofficial estimate since official 1960 estimate was not revised for 1961 census results.

<sup>c</sup> Figures relate to December 1950 and December 1960 census dates and changes between these dates.

<sup>d</sup> For midyear 1951. Official estimate for midyear 1950 is out of line with 1961 census result.

<sup>e</sup> Excluding countries with less than 200,000 population in 1960.

Zealand) in the United Kingdom.<sup>72</sup> Despite the poor quality of existing migration data for the United Kingdom, which makes precise assessment impossible, it appears that there was a reversal of the traditional migratory flows and that in the latter 1950s, the United Kingdom became a country of net immigration.<sup>73</sup>

38. In view of the shortcomings of migration statistics, the net effect of migratory movements in European countries may be calculated more accurately by comparing the total population at or around two census dates and the balance of births and deaths between these dates. Derived in this manner, the net product of all movements, overseas as well as intracontinental for the 1950-1960 decade, is shown for the major countries of Europe in table VII.1 above.

39. As seen in this table, there was heavy net out-migration from both Eastern and Southern Europe, while Western Europe showed a net gain of 3.9 million. The net loss to Europe as a whole through emigration amounted to 2.6 million between 1950 and 1960. In contrast, Europe in the 1960s became a continent of net immigration. This reversal, which occurred despite continued out-migration to North America and Oceania, was made possible by the repatriation of close to one million Europeans from former overseas colonies during 1960-1966, and by the already mentioned substantial intake of workers from Asia, North Africa and the West Indies. Two countries which had experienced net emigration in the 1950s—the Netherlands and the United Kingdom—recorded net gains through migration in the 1960s.<sup>74</sup> Prosperous economic conditions and a shortage of labour in industrialized countries of Western Europe in the 1960s also drew many intra-European migrants, mainly from the countries of Southern Europe. Migrants have been attracted to a widening geographical area within Europe, and the movements across international boundaries have been accompanied by internal flows toward the centres of industrial development.<sup>75</sup> The countries of Western Europe have been successful in competing with some of the traditional overseas receiving countries for migrants from Southern Europe. This emigrant market may now be diminishing, and it is likely that in the future, as in the recent past, net migration will be the product of complicated intra-European and overseas flows.<sup>76</sup>

<sup>72</sup> United Kingdom, Parliament, *House of Commons Debates*, 5th series, vol. 702 (16-27 November 1964), cols. 277-278. See also Moindrot, "Les vagues d'immigration ..." (1965), p. 644.

<sup>73</sup> See, for example, Sauvy and Moindrot, "Le renversement du courant d'immigration séculaire: 2. Application à l'Angleterre" (1962), pp. 59-64.

<sup>74</sup> Adams, "International migration trends ..." (1971).

<sup>75</sup> Wander, "Wanderungen im westeuropäischen ..." (1966), p. 362; United Nations, *The European Economy in 1965* (1966), chap. 2, p. 78. See also Lannes, "Les migrations de travailleurs ..." (1962).

<sup>76</sup> For a discussion of the prospects for European migration, see Intergovernmental Committee for European Migration, *The Role of International Migration ...* (1962).

## 2. INTERNATIONAL MIGRATIONS OF ASIANS

40. Within Asia during the last one hundred years the principal countries of immigration have included Manchuria and certain countries of South and South-East Asia. The immigrants have come mainly from China, India and Japan, and to a smaller extent from Korea.<sup>77</sup> The Chinese are to be found in all countries of South-East Asia,<sup>78</sup> while the Indians are in considerable numbers in Burma, Ceylon and Malaysia, where they were drawn primarily by the demand for plantation labour during the latter part of the nineteenth and early twentieth centuries.<sup>79</sup>

41. The total number of Asians living outside their own countries before the Second World War has been estimated at between 10 and 20 million.<sup>80</sup> The Chinese and Indian migrant communities are now for the most part settled in their countries of adoption. With restrictions on the recruitment of unskilled labour in the emigrant countries and on new immigration in the receiving countries (see section B.2), all of which have rapidly growing populations, the amount of migration in the post-war period, apart from refugee population transfers and post-war repatriation of Japanese and Koreans, has been small.<sup>81</sup>

42. By far the largest post-war Asian civilian population transfer occurred between India and Pakistan following partition. In 1951, there were about 7.2 million refugees in Pakistan and a similar number in India. Although the numbers involved in these movements were the same on both sides, the geographical distribution of population in each country was to some extent altered. In West Bengal in India the incoming Hindus were three or four times the number of emigrating Moslems. On the other hand, immigrants to the Punjab in India fell far short of compensating for the number of Moslems who left. In relation to total population, the concentrations of refugees were greatest in Karachi Federal District in Pakistan and in Delhi state in India. According to available

<sup>77</sup> United Nations, "International migrations in the Far East ..." (1951), pp. 14-15.

<sup>78</sup> Estimates of their number vary. See, for example, Purcell, *The Chinese in Southeast Asia* (1965), p. 3; Hayase, "Overseas Chinese in southeast Asia" (1965), p. 580.

<sup>79</sup> Indian migrants were mostly labourers on rubber and tin estates in Malaya, and on coffee and tea estates in Ceylon, though there was also a small migration of traders and money-lenders. Sundaram, "Effects of emigration ..." (1955), p. 230. See also Kondapi, *Indians Overseas ...* (1951), pp. 29-52; Mukerjee, *Le migrazioni asiatiche ...* (1936); Davis, *The Population of India and Pakistan* (1951), pp. 99-106; Pillai, *Labour in Southeast Asia ...* (1947), pp. 73-75, 123-130, 143-144; Jacoby, *Agrarian Unrest in Southeast Asia* (1961), pp. 9, 90-92; Silcock, "Migration problems of the Far East" (1958), p. 262.

<sup>80</sup> United Nations, *Report of the Secretary-General on the Allocation of Functions ...* (1948), p. 90. The figures refer to "nationals" and thus probably include some persons born in the country to which their parents or grandparents had migrated. For studies of Japanese emigration, see Ishii, *Population Pressure ...* (1937), pp. 188-206; Ichihashi, "International migration of the Japanese" (1931). For summaries of Korean emigration, see Taeuber and Barclay, "Korea and the Koreans ..." (1950); Population Index, "Korea in transition ..." (1944), pp. 233-234.

<sup>81</sup> United Nations, "International migrations in the Far East ..." (1951).



official statistics, between 1951 and 1956, about 1.5 million Hindus moved from Pakistan into eastern India, 500,000 Moslems from west Bengal into east Bengal in Pakistan, and a further 650,000 from India into West Pakistan. These movements affected mainly the partitioned States of Bengal and the Punjab.<sup>82</sup>

43. Another significant population shift arising from the war and its immediate aftermath was the transfer of over 5 million civilian and military Japanese back to Japan by the end of 1946; by 1956, the figures had risen to 6.3 million. These repatriates greatly exceeded in number the 1.2 million foreigners who departed from Japan between 1945 and 1950. Net immigration from these movements amounted to about 5 million, which was about half the increase in Japan's population between 1945 and 1950.<sup>83</sup>

44. An important refugee transfer arose from the partition of Palestine in 1947. At the end of 1948, all but about 110,000 of 860,000 Palestinian Arabs had left the present boundaries of Israel for surrounding territories, particularly Jordan, the Gaza area, Lebanon and Syria. Some of these subsequently moved back into Israel, but the majority remained to become the core of the 960,000 refugees who were in the care of the United Nations Relief and Works Agency for Palestine Refugees in the Near East by 1950.<sup>84</sup> By the middle of 1965, the number of refugees registered with the Agency had risen to 1,280,823, about half of whom were under eighteen years of age.<sup>85</sup>

45. A major Asian immigration, when considered in relation to the population size of the receiving country, has been from China to Hong Kong. According to the 1961 census of Hong Kong, about 1.6 million persons, or over half of the population of 3.1 million, were born outside Hong Kong. About half of the immigrants were estimated to have arrived before September 1949.<sup>86</sup> Kuwait is another country where immigrants constitute a large proportion of the total population.<sup>87</sup>

46. In the post-war period, which has seen the establishment of many independent States in Asia, barriers have been raised against immigration in some countries, and earlier immigrants have in some cases been repatriated. Almost 100,000 Chinese were repatriated from Indonesia in 1961.<sup>88</sup> Indian migration into Ceylon and

Burma has been restricted, and both Indian and Chinese migrations have virtually ceased in Malaysia.<sup>89</sup>

47. The migration of Asians to other continents has been on a relatively small scale in modern times, largely because of restrictions imposed by potential receiving countries. Nevertheless, the political and social significance of such movements as did occur has been considerable. One of the important movements from Asia between the middle of the nineteenth century and the First World War, was of recruited and indentured labour.<sup>90</sup> The resulting Asian communities (mainly of Indian origin) in countries such as Fiji, Mauritius, Trinidad and Tobago and Guyana are either locally in the majority or form substantial minorities.<sup>91</sup> Originally recruited to work as indentured labourers in South Africa, many Indians remained after the completion of their indenture to become small farmers and merchants.<sup>92</sup> There was also a migration of Indian labourers, artisans, clerks and small traders to East Africa.<sup>93</sup> There have been modest movements of Japanese migrants to the United States, beginning late in the nineteenth century, and to Brazil in the twentieth century.<sup>94</sup> About 20,000 Japanese migrated to Brazil during 1946-1957, and over 30,000, most of them spouses or children of United States citizens, migrated to the United States.<sup>95</sup> Numerically, the largest migration from Asia to other continents during the post-war period was that from India and Pakistan to the United Kingdom.<sup>96</sup> Qualitatively, the most important post-war Asian migration has been the outflow of indigenous, professionally trained personnel and other skilled manpower, which has been parallel, but in the reverse direction, to the movement of technical assistance experts and other highly qualified persons from the richer countries of Europe and America.

### 3. INTERNATIONAL MIGRATION IN AFRICA

48. Since the abolition of the slave trade in the nineteenth century, few Africans have left the continent for permanent residence abroad. Intracontinental migration has been a much more common phenomenon, following the acquisition of territories by European Governments and the introduction of a market economy requiring wage labour. The labour requirements of European agricultural, mining and industrial enterprises in Africa often

<sup>82</sup> International Labour Office, *International Migration* . . . (1959), pp. 108-120. A different assessment of recent migration balances between India and Pakistan has been arrived at by Visaria. Working with census data for the two countries, he estimated a net immigration of 1.32 million into India from Pakistan during the 1951-1961 intercensal period. Visaria, "Mortality and fertility in India, 1951-1961" (1969), p. 113.

<sup>83</sup> International Labour Office, *International Migration* . . . (1959), pp. 121-122.

<sup>84</sup> *Ibid.*, pp. 102-103.

<sup>85</sup> United Nations Relief and Works Agency for Palestine Refugees in the Near East, *UNRWA, 1966* . . . (1966), p. 6.

<sup>86</sup> Hong Kong, Census Commissioner, *Report on the 1961 Census*, vol. 2 . . . (1962), pp. cvi-cviii.

<sup>87</sup> El-Badry, "Trends in the components . . ." (1965), p. 184.

<sup>88</sup> Kahin, "Indonesia" (1963), p. 686.

<sup>89</sup> In Malaya, a 1953 Act restricted immigration to professional persons and artisans assured of employment. Hayase, "Overseas Chinese in southeast Asia" (1965), p. 581.

<sup>90</sup> United Nations, "International migrations in the Far East . . ." (1951), p. 13.

<sup>91</sup> Davis, *The Population of India and Pakistan* (1951), p. 101; Sundaram, "Effects of emigration . . ." (1955), pp. 231-232.

<sup>92</sup> Mukerjee, *Le migrazioni asiatiche* . . . (1936), p. 25.

<sup>93</sup> Sundaram, "Effects of emigration . . ." (1955), p. 231; United Kingdom, *Indians in Kenya*, Cmd. 1922 (1923), p. 3.

<sup>94</sup> Thompson and Lewis, *Population Problems* (1965), pp. 486-487; Smith, *Brazil* . . . (1963), pp. 130-134.

<sup>95</sup> International Labour Office, *International Migration* . . . (1959), pp. 206-207.

<sup>96</sup> Data from the British Home Office show that between 1955 and midyear 1962 there was a net immigration of close to 145,000 persons from India and Pakistan. Davison, *Black British* . . . (1966), p. 3.

could not be met on a local basis or even within the country concerned.<sup>97</sup> Moreover, native farmers, particularly in West Africa, have also employed migrant labourers from other countries on a large scale to assist in the seasonal peak periods of agricultural work.<sup>98</sup> This intra-continental movement has tended to be primarily one of male workers moving temporarily out of tribal areas for employment, with periodic return movements to tribal homes, although in recent years there is evidence of more extensive family emigration, particularly in West Africa.<sup>99</sup> Statistical data are too meagre to measure with any degree of accuracy the flows of international migrations within Africa. It has been said that, as a conservative estimate, at least five million people are involved each year in migrant labour movements in Africa south of the Sahara.<sup>100</sup> Not all of these movements, of course, involve the crossing of international boundaries.

49. While some migrations have been of the traditional type of nomadic pastoralists, they have been increasingly the consequence of three factors: the poor land resources available to African tribes, the accelerating rate of population growth, and the attraction of wage labour in areas of relatively rapid economic growth. Recruitment of wage labour encouraged the temporary migration of male workers, but as wages were too low to allow these workers to transplant their families to their places of employment, they tended to return frequently to their tribal areas. African society, therefore, came to depend largely upon two types of economic activity: subsistence agriculture at the base, and industrial employment outside the base as a means of increasing cash income. The complement of this situation was that employers came to rely upon an apparently inexhaustible supply of unskilled labour to supplement the European capital, *entrepreneurs* and skilled manpower that were associated with European immigration.<sup>101</sup>

50. The directions of migration are known with greater certainty than the numbers involved.<sup>102</sup> In Central and Eastern Africa, the main movements have been towards the south. The two chief immigrant areas for labour have been the Republic of South Africa and Rhodesia. The 1960 census of South Africa enumerated about 580,000 Africans who had been born in other countries, mainly Lesotho (Basutoland), 197,000; Mozambique, 161,000; the former Federation of Rhodesia and Nyasa-

land, 96,000 (two thirds of these were from Malawi); Botswana (Bechuanaland), 59,000; and Swaziland, 39,000.<sup>103</sup> The large number of persons from Lesotho (Basutoland) present in South Africa is one of the striking features of interterritorial migration in this region. Nearly one fifth of the population of Basutoland was reported to be absent from the country at the 1956 census, the majority of the absentees having migrated to work in South African mines.<sup>104</sup> Country-of-birth data for Rhodesia in 1962 show that there were 200,000 Africans from Malawi, 118,000 from Angola and Mozambique, and about 70,000 from Zambia.<sup>105</sup> In 1963, Zambia had about 65,000 Africans from Malawi, about 60,000 from Angola and over 50,000 from Rhodesia.<sup>106</sup> Migration patterns in Eastern, Central and Southern Africa are more complicated than in the West. For example, Tanzania and Uganda have taken immigrants from Burundi and Rwanda, but they have also lost workers elsewhere.<sup>107</sup> Cotton-growing areas of Buganda in Uganda, farms in the highlands of Kenya, sisal estates in Tanzania, the copperbelt in Katanga (the Democratic Republic of the Congo) and Zambia, and the gold mines of the Witwatersrand in South Africa have been the chief centres attracting migrants from poorer areas.<sup>108</sup> Organized schemes of labour recruitment have played an important role in drawing workers to South Africa, but the success of these schemes has been affected by the South African Government's policy of *apartheid* (see also section B.2 below).

51. In Western Africa the movement of Africans has been to the south and west, particularly into Ghana where mining and agriculture are largely dependent upon extra-territorial labour. The number of foreigners entering Ghana temporarily or permanently rose from 108,000 in 1938 to 392,000 in 1953.<sup>109</sup> The census of Ghana in 1960 showed that one in twelve of the population was foreign-born and more than one in eight was of foreign ancestry. The most important sources of the foreign workers have been Togo, Upper Volta and Nigeria. This immigration has concentrated more and more in urban areas; almost one third of males aged 25-44 years in Accra in 1960 were foreign-born.<sup>110</sup> While migrants have more frequently been accompanied by their families in recent years, it is estimated that only about one fifth brought relatives with them in the first instance.<sup>111</sup>

<sup>97</sup> For example, see Hailey, *An African Survey ...* (1957), pp. 1270-1271.

<sup>98</sup> In West Africa, African farmers used hired labour from early in the century. Berg, "The economics of the migrant labor system" (1965), pp. 163, 174. This practice is also common in Uganda. See Southall, "Population movements in East Africa" (1961), pp. 177-178.

<sup>99</sup> Oblath, "International migrations in Africa ..." (1963), p. 8. With respect to Ghana, see Caldwell, "Migration and urbanization" (1967), pp. 113-121. This has also been noted with reference to migration into South Africa. Hailey, *An African Survey ...* (1957), p. 1431.

<sup>100</sup> Prothero, *Migrants and Malaria* (1965), p. 41.

<sup>101</sup> International Labour Office, "Inter-territorial migrations ..." (1957), pp. 292-310. See also Spengler, "Population movements and problems ..." (1964), p. 297.

<sup>102</sup> For a general summary see Prothero, "Migration in tropical Africa" (1969).

<sup>103</sup> South Africa, Bureau of Statistics, *Statistical Year Book, 1964* (1964), p. A-26. See also International Labour Office, "Inter-territorial migrations ..." (1957), p. 305.

<sup>104</sup> United Kingdom, Colonial Office, *Basutoland ...* (1964), pp. 22-23.

<sup>105</sup> Rhodesia, Central Statistical Office, *Final Report of the April/May 1962 Census ...* (1964), pp. 19-20.

<sup>106</sup> Zambia, Central Statistical Office, *Second Report of the May/June 1963 Census ...* (1964), p. 17.

<sup>107</sup> Oblath, "International migrations in Africa ..." (1963), p. 8.

<sup>108</sup> Prothero, *Migrants and Malaria* (1965), p. 44; Smith and Blacker, *Population Characteristics ...* (1963), pp. 27-30. See also Mitchell, "Wage labour and African population ..." (1961).

<sup>109</sup> International Labour Office, "Inter-territorial migrations ..." (1957), p. 306.

<sup>110</sup> Caldwell, "Population: general characteristics" (1967), pp. 25-27.

<sup>111</sup> Caldwell, "Migration and urbanization" (1967), pp. 117-118.

52. Political upheavals in Africa have also added considerably to the international movements of Africans. The disturbances preceding Algerian independence brought about a sizable exodus of Algerians who sought refuge in neighbouring Tunisia and Morocco; over 180,000 of these refugees were repatriated in May-July 1962.<sup>112</sup> In March 1964, there were 153,000 refugees from Rwanda in Burundi, the Democratic Republic of the Congo, Tanzania and Uganda, and about the same number of refugees from Angola were found in the Democratic Republic of the Congo.<sup>113</sup> Other movements on a smaller scale have occurred among some West African countries following their attainment of independence.<sup>114</sup>

53. The general pattern of the international migration of Africans during this century is thus one of very considerable movements, to be numbered in millions of persons,<sup>115</sup> across political boundaries which may bear little relation to ethnic or cultural zones.<sup>116</sup> The system of African migration has provided an important safety valve against the pressure of population on scarce resources. However, certain social ills, such as the disruption of family life resulting from detribalization, and extremely low wages, are often associated with it.<sup>117</sup> Moreover, the system sometimes led to a pattern in which a majority of the able-bodied men might be away for a substantial part of their adult life, a situation which some analysts believe contributed to economic and social stagnation in the home communities.<sup>118</sup> The establishment of new States, opposition to policies which associate migration with segregation and restrictions upon economic and social rights, and the emphasis upon economic development plans within each new nation are tending to restrict movements across national boundaries (see section B.2 below) and to accentuate internal movements from rural to urban areas, a trend particularly apparent in the Rhodesian copper belt and in the coastal towns of Ghana.

54. So far as intercontinental migration is concerned, the most important movement involving Africa from the middle of the nineteenth to the middle of the twentieth century was the immigration of European settlers.<sup>119</sup> From an estimated population of 135,000 in 1835,<sup>120</sup> the European population in Africa had increased to approximately 6 million by 1960; about 3 million were in the Republic of South Africa, over 1.5 million in

North Africa, and over 200,000 in Rhodesia.<sup>121</sup> Kenya, Tanzania, Uganda and Zambia have received immigrants chiefly from Great Britain,<sup>122</sup> but the number of Europeans settled in these countries is small in comparison with the countries mentioned earlier.

55. In South Africa the white population at the 1960 census consisted of 1.8 million persons whose home language (that is, the language spoken most commonly at home) was Afrikaans and 1.2 million whose home language was English. The Afrikaners are for the most part descended from a small number of early settlers, mostly Dutch and German. British immigration on a large scale took place in the late nineteenth and early twentieth centuries. Following the Anglo-Boer War there was a brief spurt in immigration, which then subsided owing to a period of economic depression. Immigration picked up again during the prosperous 1920s, when many persons arrived from Germany and the Netherlands, as well as from such Eastern European countries as Lithuania, Poland and Latvia. The Quota Act passed in 1930 severely restricted immigration from Eastern Europe however. Immigration declined to a very low level, and was exceeded by emigration during the war years. Between 1946 and 1964 over 250,000 immigrants from Europe entered South Africa, nearly three fifths of them from the United Kingdom. In 1961, new measures to recruit settlers were followed by a sharp upward trend in immigration, and the Government's goal of attracting 30,000 white immigrants annually was surpassed by 1963. The appeal for new immigrants was answered, not so much by migrants coming directly from Europe, as by white migrants from other parts of Africa; in 1961-1963 over half of the white immigrants to South Africa came from the African continent, mostly from the Rhodesias and Kenya as a result of political uncertainties in those countries. On the other hand, emigration to the Rhodesias, which had accounted for a large proportion of all emigration from South Africa, fell off considerably after 1957.<sup>123</sup>

56. The immediate post-war years also saw sizable movements of migrants from the United Kingdom into the Rhodesias, and of Europeans into other African territories, for example Portuguese into Angola and Mozambique, Belgians into the Congo, and French into the territories of French West Africa,<sup>124</sup> but Europeans later left in large numbers after some of these areas had achieved independence. Probably over one million

<sup>112</sup> United Nations, *Report of the United Nations High Commissioner for Refugees* (1963), pp. 9-10.

<sup>113</sup> United Nations, *Report of the United Nations High Commissioner for Refugees* (1964), pp. 13-14.

<sup>114</sup> Oblath, "International migrations in Africa ..." (1963), pp. 6-7.

<sup>115</sup> Smith and Blacker, *Population Characteristics* ... (1963), p. 28.

<sup>116</sup> International Labour Office, "Inter-territorial migrations ..." (1957), p. 292.

<sup>117</sup> For a discussion of the social effects of African migratory movements, see *Ibid.*, pp. 307-310. Also see section E.4 below.

<sup>118</sup> Smith and Blacker, *Population Characteristics* ... (1963), pp. 28-29; Mitchell, "Wage labour and African population ..." (1961), p. 236.

<sup>119</sup> Badenhorst, "Population distribution ..." (1951), p. 26.

<sup>120</sup> Kuczynski, *Population Movements* (1936), p. 91.

<sup>121</sup> Data compiled from the United Nations, *Demographic Yearbook*, 1963 ... (1964); and ———, *Demographic Yearbook*, 1964 ... (1965). The estimate of 6 million includes over a million Europeans living in Algeria at the time of the 1960 population census, but this figure was greatly reduced after independence.

<sup>122</sup> Kuczynski, *Demographic Survey of the British Colonial Empire*, vol. 2 ... (1949), p. 103; International Labour Office, *International Migration* ... (1959), p. 200.

<sup>123</sup> Trends in white immigration to South Africa are discussed in Marquard, *The Peoples and Policies* ... (1962); Robertson, "South Africa" (1958); and Katzen, "South-African immigration ..." (1963). Statistics for recent years are from South Africa, Bureau of Statistics, *Statistics of Immigrants* ... (1965). See also United Nations, *Demographic Yearbook*, 1963 ... (1964), table 10.

<sup>124</sup> International Labour Office, *International Migration* ... (1959), pp. 198-200.

Europeans left North Africa. It is estimated that only about 110,000 Europeans out of about one million remained in Algeria after that country attained independence.<sup>125</sup> In the United Arab Republic also, many nationals of European countries left after the Suez crisis in 1956.<sup>126</sup>

57. In addition to those who came as indentured labourers, there was a sizable unassisted migration of Indians to East Africa,<sup>127</sup> as mentioned in section A.2 above. In the East African countries of Kenya, Tanzania and Uganda, Indians constitute the largest non-native population group, outnumbering the Europeans in a ratio of about 4.5 to 1 in 1964.<sup>128</sup>

## B. Factors affecting international migration

### 1. ECONOMIC, SOCIAL AND OTHER FACTORS

58. Most analyses of the factors affecting migratory movements have been concerned with the relation between the volume of migration and economic, social, political and other conditions prevailing in the areas of immigration and emigration. They have thus been aimed at identifying the circumstances which make certain areas attractive to migrants and those which cause other areas to experience out-migration. Inquiries into individual motivations for migration have been fewer, and it has been pointed out that migrants are often themselves unaware of their real motives for migrating.<sup>129</sup> Recently, some writers have stressed the need for examining the migration process as a whole in order to illuminate the complex interactions of economic, social, cultural and psychological factors which have often provided the motivating forces in migrations.<sup>130</sup>

59. A few recent surveys carried out by sociologists and social psychologists have attempted to evaluate the importance of various factors in shaping individuals' decisions to migrate. Thus, an inquiry among Dutch emigrants in the mid-1950s suggested that while economic motives were frequently present, they could not be considered predominant, and that social and psychological factors also played a major role.<sup>131</sup> Other studies

identified the following among the factors which influenced migratory behaviour: degree of attachment to cultural patterns in the home country, previous residence abroad, presence of relatives in the country of destination, and a general feeling of discontent.<sup>132</sup> Certain personality traits associated with a high propensity to migrate were also identified, among them great vitality, strong self-assertion, an active personality and individualistic attitude.<sup>133</sup> It has been pointed out that whatever the motivation of the initial emigrants from a given geographic area or kin-group, chain migration frequently continues to move other members of the group by co-operative efforts which cut across economic factors.<sup>134</sup>

60. In attempting to formulate a theoretical framework for migration, Lee summarized the factors which enter into decisions of individuals to migrate under four categories: (a) factors associated with the area of origin; (b) factors associated with the area of destination; (c) intervening obstacles; and (d) personal factors. He pointed out the subjective nature of the assessment of positive and negative factors in the areas of origin and destination on the part of prospective migrants in view of their imperfect knowledge, particularly of the area of intended migration.<sup>135</sup> While improved communications have diminished the importance of the latter factor, it is still of some consequence, particularly in the developing countries.

61. The important role that social and cultural factors have played in determining the volume and direction of migrations cannot be denied. Emotional attachments to a community, culture, language, political or social institutions, or to a way of life, have at various times deterred people from moving from their native lands, or determined the choice of their new country. Such considerations account in large part for the fact that much of the emigration from the United Kingdom has been directed to the British Commonwealth during recent decades.<sup>136</sup> In like manner, Spanish and Portuguese emigrants have been drawn to Latin America, and Irish emigrants to the United States, because of the similarity in language and traditions.<sup>137</sup> Increases in emigration

<sup>125</sup> McDonald, "The repatriation ..." (1965), p. 148.

<sup>126</sup> International Labour Office, *International Migration ...* (1959), pp. 200-201.

<sup>127</sup> Hailey, *An African Survey ...* (1957), pp. 387-388; Kuczynski, *Demographic Survey of the British Colonial Empire*, vol. 2 ... (1949), p. 159; Sonnabend, "Population" (1949), p. 9.

<sup>128</sup> East African Statistical Department, *Economic and Statistical Review* (1965), p. 4.

<sup>129</sup> Hofmeijer, "On anticipating the future" (1966), p. 2; Hawley, *Human Ecology ...* (1950), pp. 328 ff. Hauser and Duncan have argued that in order to understand the factors influencing migration, a "psychological" approach (i.e., asking the emigrants their motives for migrating) is empirically incomplete and ought to be combined with a study of changing conditions in both the areas of immigration and emigration. Hauser and Duncan, "Demography as a body ..." (1959), pp. 101-102.

<sup>130</sup> Ellemers, "The determinants of emigration ..." (1964).

<sup>131</sup> Beijer, ed., *Characteristics of Overseas Migrants* (1961), pp. 3, 309. For studies of the motivations of emigrants from the United Kingdom, see Appleyard, *British Emigration to Australia* (1964).

<sup>132</sup> Hofstede, *De gaande man ...* (1958); Frijda, "Kwantitatieve analyse van een onderzoek ..." (1960). Several studies matched persons who emigrated with those who did not for a number of characteristics. See, for example, Frijda, "Verslag van een vergelijkend ..." (1960); Richardson, "Some psycho-social aspects ..." (1959).

<sup>133</sup> Wentholt, *Kenmerken van de Nederlandse emigrant ...* (1961).

<sup>134</sup> See, for example, Price, *Southern Europeans in Australia* (1963); also Borrie, *Italians and Germans in Australia ...* (1954).

<sup>135</sup> Lee, "A theory of migration" (1966), pp. 49-51. For additional frameworks of the determinants of emigration, see Ellemers, "The determinants of emigration ..." (1964); Richardson, "Some psycho-social aspects ..." (1959).

<sup>136</sup> See, for example, figures for 1946-1957 given in International Labour Office, *International Migration ...* (1959), pp. 170-172.

<sup>137</sup> Forsyth, *The Myth of Open Spaces ...* (1942), p. 48. But cultural affinities of the immigrant with his adopted country have not always prevented a substantial return movement, for example from South America to Italy and Spain, and from Australia and Canada to the United Kingdom. For return rates from Latin America, see Bouscaren, *International Migrations since 1945* (1963), pp. 75, 87. See also Appleyard, "Determinants of return migration ..." (1962).

from Europe following international crises, such as Berlin (1949) and Suez (1956), have had essentially psychological rather than economic motivations. The desire to escape from religious, ethnic or political oppression has also been a prime motivation for certain important migrations both of modern and earlier times.

62. Analyses of factors determining the main currents of international migration in the past have generally been based on the authors' assessments of what economic, social and other conditions were of importance to the migrants. Aside from forced movements of population resulting from war, social upheavals or natural catastrophes, most migrations in modern times are considered to have had economic factors as their most important underlying motives.<sup>138</sup> Migrants strive to obtain improvements in their material conditions of life, and they are attracted to areas where economic opportunities appear to be more abundant and remuneration higher.<sup>139</sup>

63. The classical analysis of factors determining international migration currents in the past has been in terms of "push" and "pull" theories, with movements tending to flow from countries with relatively low levels of living to those with relatively high levels. Usually, both factors have been involved in migratory movements. It is now generally accepted that the great underlying factors motivating international migrations during the nineteenth century were the push of land scarcity in Europe and the pull of virgin lands, available at low cost in the New World.<sup>140</sup> The same push force operated in high-density rural areas in China, India, Korea and pre-industrial Japan. While the more sparsely populated land of Manchuria attracted a steady stream of Chinese settlers, many of the Asian emigrants went to low-paid jobs on plantations or in factories and mines of foreign countries.<sup>141</sup>

64. In America, the attraction of unoccupied land was enhanced by the development of transportation facilities and other urban and commercial influences associated with the westward movement across the continent.<sup>142</sup>

<sup>138</sup> See, for example, Thomas, "International migration" (1959), p. 528.

<sup>139</sup> Appleyard, *British Emigration to Australia* (1964), pp. 54-55; Citroen, *Les migrations internationales* ... (1948), p. 22; Sauvy, *Richesse et population* (1944), pp. 169-172; Isaac, *Economics of Migration* (1947), pp. 28-34.

<sup>140</sup> The push of impoverished agricultural workers from the land was particularly strong in Ireland. See, for example, Harkness, "Irish emigration" (1931), pp. 261-264. The scarcity of land resources as a factor in emigration from other European countries is discussed in such works as Bürgdorfer, "Migration across the frontiers ..." (1931), pp. 346-353; Obolensky-Ossinsky, "Emigration from and immigration into Russia" (1931), pp. 548-552, 578; Hansen, *The Atlantic Migration* ... (1940); Blegen, *Norwegian Migration* ... (1931), pp. 167-173; Ferenzi, "Introduction and notes" (1929), p. 83; and Klezl, "Austria" (1931), pp. 403-404. On the attractive power of land in the United States and Canada, respectively, see Penrose, *Population Theories* ... (1934), p. 178; and Mackintosh, *Prairie Settlement* ... (1934), pp. xii, 58-85.

<sup>141</sup> United Nations, "International migrations in the Far East ..." (1951); Young, "Chinese immigration ..." (1932), pp. 334-338; Sundaram, "Effects of emigration ..." (1955), vol. 2, p. 232.

<sup>142</sup> See, for example, Wiers, "International implications ..." (1949), p. 39; Hansen, *The Immigrant in American History* (1942), p. 69.

This continuous pursuit of the frontier was not duplicated in Latin America, and despite the encouragement of Governments (see section B.2), the latter region has attracted relatively few immigrants for land settlement.<sup>143</sup> In addition to obstacles such as climate and topography, health hazards and transportation difficulties, the systems of land tenure and taxation in Latin America made it relatively difficult to acquire good land at attractive prices.<sup>144</sup>

65. With the advance of industrialization in the United States, pull factors in addition to the lure of the land became an important force in migration flows. Employment opportunities were increasingly associated with non-agricultural activities, and even before the end of the nineteenth century the bulk of immigrants to the United States were being absorbed into urban areas.<sup>145</sup>

66. The growth of industrialization both in countries of emigration and immigration altered the economic basis of international migration. Pressure of population on the land and little improvement in rural productivity sustained the push to emigrate in Southern Europe, but in countries undergoing industrialization the main push factor became labour redundancy in the manufacturing sector of the economy. First in England, and later in Germany, conditions which prevailed during the early stages of industrial development, when handicraft workers were unable to compete with factory production and the introduction of labour-saving machinery frequently created immediate unemployment, impelled many workers to migrate.<sup>146</sup> Continued industrialization on a large scale, however, eventually removed the need for emigration, as the former emigrant countries became able to provide employment opportunities for their population. The volume of emigration from the industrialized countries of Northern and Western Europe declined during the latter part of the nineteenth century and the early part of the twentieth.<sup>147</sup> Great Britain received substantial immigration from Ireland,<sup>148</sup> and Germany became a principal country of intra-European immigration.<sup>149</sup>

<sup>143</sup> Davis, "Future migration into Latin America" (1947); Smith, *Brazil* ... (1963), pp. 118-120.

<sup>144</sup> The failure to integrate land settlement schemes with economic and social development plans has also been mentioned as an unfavourable factor. United Nations, Economic Commission for Latin America, *Immigration in Chile* (1950), pp. 12-20, 85-87; ———, *Immigration in Brazil* (1950), pp. 97, 107; ———, *Immigration in Venezuela* (1950), pp. 47-59.

<sup>145</sup> By 1900, two thirds of the immigrants in the United States were living in urban areas. Taeuber and Taeuber, *The Changing Population* ... (1958), p. 125.

<sup>146</sup> In Great Britain, which had taken the lead in industrialization, the initial unemployment which acted as a stimulus to emigration occurred before the middle of the nineteenth century. Snow, "Emigration from Great Britain" (1931), pp. 251-253. See also Berthoff, *British Immigrants* ... (1953), p. 31. In Germany, these changes took place after 1860. Bürgdorfer, "Migration across the frontiers ..." (1931), p. 343. See also Citroen, *Les migrations internationales* ... (1948), p. 25; and, for Norway, Skaug, *Memorandum* ... (1937), pp. 65-66.

<sup>147</sup> Citroen, *Les migrations internationales* ... (1948), pp. 25-26.

<sup>148</sup> Harkness, "Irish emigration" (1931), pp. 263-264; Jackson, *The Irish in Britain* (1963), pp. 9-11.

<sup>149</sup> Kirk, *Europe's Population* ... (1946), p. 97.

67. Annual fluctuations in emigration from Europe, which had earlier been closely related to the occurrence of famines and variations in harvests,<sup>150</sup> became increasingly influenced by phases of the business cycle. Jerome found that over the period from about 1870 to 1922, business cycles in both Europe and the United States tended to coincide, with immigration reaching peak flows when prosperity prevailed in both. In the few periods when the cycles did not coincide, migration showed a high degree of consistency with the course of economic activity in the United States. He concluded that, on the whole, the pull from countries of immigration was more important in determining the annual flow of emigrants in the latter half of the nineteenth century than was the push of European depressions, though there were some minor exceptions to this thesis.<sup>151</sup>

68. Dorothy Thomas, studying emigration from Sweden to the United States during the late nineteenth and early twentieth centuries, found that though "prosperity in America was highly important as a stimulus to emigration from Sweden, . . . cyclical upswings in Sweden were a far more powerful counter-stimulant than is generally recognized. In prosperous years, Swedish industry was able to compete successfully with the lure to America; and the latent agricultural push towards emigration became an active force only when a Swedish industrial depression occurred simultaneously with expanding or prosperous business conditions in the New World".<sup>152</sup> Examining emigration from Norway, Skaug also found that it was not the economic conditions in either the home country or abroad that were decisive, but the relation between them.<sup>153</sup> A number of other studies have tended to emphasize the importance of pull factors in migrations during the late nineteenth and early twentieth centuries.<sup>154</sup>

69. Several more recent economic studies have examined the dynamics of international migration in terms of "long swings" or secular fluctuations rather than of short-run business cycles. Brinley Thomas described four major

upswings and downswings in transatlantic migration between 1845 and 1913, with corresponding fluctuations in the export of capital from the United Kingdom to the receiving countries. He found that from the 1840s the long-run construction cycles in the United States and the United Kingdom were inverse to one another and that transatlantic migration was positively correlated with American building activity. These upswings in the long cycles in the United States were substantially financed by capital investments from the United Kingdom, which temporarily reduced domestic investment there, and thus exerted push at home as well as pull abroad. But foreign lending in turn stimulated the demand for imports from the United Kingdom, thus beginning the reverse cycle of encouraging increasing home investment. When the United States became an exporter rather than an importer of capital after the First World War, this complementary, inverse relation with the United Kingdom was finally broken.<sup>155</sup>

70. Kuznets examined the relationship between long swings in economic conditions and population growth in the United States, the latter being accounted for mainly by immigration trends, at least until after the First World War. Observing that long swings in immigration from a number of European countries resembled each other rather closely and that they followed swings in additions to *per capita* flow of goods to consumers in the United States, he attributed more importance to pull than to push factors, thus differing somewhat from Brinley Thomas.<sup>156</sup> Easterlin further examined the possible influence of push factors in determining long swings in immigration to the United States. Finding little evidence that emigration cycles in European countries were closely related to prior swings in natural increase in these countries, or that long swings in economic activity in European countries were inversely related to those in the United States, he concluded that emigration swings in the several countries responded primarily to swings in labour demand in the United States.<sup>157</sup> These findings are thus consistent with those of Jerome concerning the relative influence of push and pull factors in shorter term cyclical fluctuations (see para. 67 above).

71. As indicated above, non-economic factors have been important stimulants to migration, but neither

<sup>150</sup> The most famous example is the emigration occasioned by the failure of the potato crop in Ireland in 1845-1846. Harkness, "Irish emigration" (1931), pp. 264-265. Variations in yearly overseas emigration were closely related to harvests, in Germany until the latter part of the nineteenth century, and in Sweden during the 1860s. Mönckmeier, *Die deutsche überseeische Auswanderung* . . . (1912), p. 41; Thomas, *Social and Economic Aspects* . . . (1941), pp. 90-92, 166. See also Yamzin and Voshchinin, *Ucheniia o kolonizatsii* . . . (1926), pp. 100-101.

<sup>151</sup> Jerome, *Migration and Business Cycles* (1926), chap. 8. It was observed, for example, that in a few years immigration to the United States from Italy increased although economic conditions were improving in that country and worsening in the United States.

<sup>152</sup> Thomas, *Social and Economic Aspects* . . . (1941), pp. 166-169.

<sup>153</sup> Skaug, *Memorandum* . . . (1937), pp. 73-74. See also Blegen, *Norwegian Migration* . . . (1931), pp. 174-175.

<sup>154</sup> The relationships between economic conditions and migration were traced for Germany by Fürth in "Wirtschaftslage und . . ." (1930), and by Burgdörfer in "Migration across the frontiers . . ." (1931), p. 343; for the Scandinavian countries by Jensen in "Migration statistics of . . ." (1931), pp. 295-297; for Italy by Winsemius in *Economische aspecten* . . . (1939), pp. 105-111; for France by Bunle in "Migratory movements between France . . ." (1931), p. 213; for Argentina by Bunge and Garcia Mata in "Argentina" (1931), pp. 148-152; for Australia by Forsyth in *The Myth of Open Spaces* . . . (1942), pp. 30-33; and for the United States by Commons in *Races and Immigrants* . . . (1924), pp. 63-64.

<sup>155</sup> Thomas, *Migration and Economic Growth* . . . (1954), chaps. 7, 10 and 14. For a discussion of the relationship between capital movements and migration trends in the period following the First World War, see Thomas, *International Migration and Economic Development* . . . (1961), pp. 16-17, 33-36; and his "International movements of capital . . ." (1956). See also Isaac, *Economics of Migration* (1947), pp. 247-257; Pletnev, *Mezhdunarodnaia migratsiia* . . . (1962), pp. 158-216.

<sup>156</sup> Kuznets, "Long swings in the growth . . ." (1958). Kuznets further argued that the long swings in population and product were self-perpetuating, since the swings in population growth caused swings in population-sensitive capital formation which resulted in an inverse change in other capital formation and affected *per capita* flow of goods to consumers. For further discussion of long swings in population and economic variables and their relation to international migration, see Kuznets, *Capital in the American Economy* . . . (1961), pp. 316-360; Abramovitz, "The nature and significance of Kuznets cycles" (1961).

<sup>157</sup> Easterlin, "Influences in European overseas migration . . ." (1961). See also O'Leary and Lewis, "Secular swings . . ." (1955).



pre-war nor post-war voluntary emigrations provide evidence of permanent movements on any scale which have clearly continued to move *against* economic forces. Whatever the motive that directly determines the decision to migrate, the final step is usually taken only after some consideration of such matters as job opportunities, wage levels and social service benefits.<sup>158</sup> The best modern example of motivations which had initially little economic basis is probably Israel.<sup>159</sup> Recent movements, already referred to earlier in the present chapter, in which economic motivations seem to be most apparent are the labour movements in Africa, the flight of West Indians to the United Kingdom, and the large-scale emigration of workers from Southern to Northern and Western Europe.

72. The volume and direction of migration have been influenced by a great many other factors. For example, the increasing volume of overseas migration from the middle of the nineteenth century and afterwards was obviously related to the great improvements which took place in transportation facilities.<sup>160</sup> The increasing use of steamships reduced travel time and improved conditions for passengers. The building of a transcontinental railway in the United States, the expansion of railway and river transportation in Europe, and the opening of the Suez and Panama canals were all developments which facilitated migration.<sup>161</sup>

73. The increasing provisions for social security and other social welfare services in certain European countries have tended to deter emigration, since the worker may hesitate to relinquish these rights by moving to a foreign land.<sup>162</sup> In countries of immigration, social welfare measures may be less well developed or they may not apply to immigrants until after a specified period of residence. Some attempts have been made to establish international reciprocity in social insurance schemes and certain bilateral treaties and regional agreements, such as the convention on social security among the Scandinavian countries, have been worked out.<sup>163</sup>

74. Efforts to encourage migration have also been made by employers, transport companies, labour organizations, and other private organizations. In the United States during the nineteenth century, the transcontinental railway companies sought to expedite the settlement of lands along their rights-of-way by offering reduced transportation rates to America, by providing reception homes for immigrants, and by extending liberal credit for the purchase of land.<sup>164</sup> Towards the end of the century transatlantic shipping companies were active in organiz-

ing migration from Europe to America,<sup>165</sup> but such activities were later prohibited in most countries of emigration since they were often not in the best interests of the migrants.<sup>166</sup> The desire of employers for a cheap and ample labour supply was behind the intercontinental migrations of Chinese, Japanese and Indians during the second half of the nineteenth century and the first decades of the twentieth. Transportation and other costs were paid by the employers in return for a contract obligating the immigrant to work for a stated period of years, but this form of indentured or contract labour was later declared illegal in country after country.<sup>167</sup> Labour unions were active in Great Britain during the latter half of the nineteenth century in encouraging workers to emigrate, but these activities subsided as the economic and political position of the unions grew stronger.<sup>168</sup>

## 2. GOVERNMENT POLICIES

75. The Universal Declaration of Human Rights states that "Everyone has the right to leave any country, including his own, and to return to his country".<sup>169</sup> Comparatively few countries, however, formally recognize this right in constitutional laws or by judicial interpretation,<sup>170</sup> and the right is almost everywhere qualified by the possibility of the denial of travel documents on various grounds.<sup>171</sup> An International Labour Office study states that:

"Political and economic reasons have led all countries, including those which remain most attached to principles of economic freedom, to place strict controls on migratory movements with a view to preventing those which they consider undesirable. . . . Such restrictions . . . are concerned far less with emigration, which is generally unopposed, except in a very few cases, than with immigration, which nearly everywhere has given rise to defensive measures."<sup>172</sup>

### (a) Policies concerning emigration

76. Laws restricting emigration have not been uncommon in the past. They were widespread in Europe during the seventeenth and eighteenth centuries. Emigration was illegal in China from 1718 to 1860; in Japan it was

<sup>158</sup> It has been claimed that agents of shipping companies were responsible for much of the emigration from Bulgaria to the United States in the last two decades of the nineteenth century and the beginning of the twentieth. Danailov, *Izsledvaniya vrkhu* . . . (1931), pp. 144-145.

<sup>159</sup> International Labour Office, *The Migration of Workers* (1936), pp. 48-50.

<sup>160</sup> United Nations, "International migrations in the Far East . . ." (1951).

<sup>161</sup> Erickson, "The encouragement of emigration . . ." (1949).

<sup>162</sup> United Nations, *The Universal Declaration* . . . (1958), p. 33. The Declaration was adopted by the General Assembly on 10 December 1948.

<sup>163</sup> United Nations, *Study of Discrimination in Respect of the Right* . . . (1963), pp. 4-5.

<sup>164</sup> *Ibid.*, pp. 13-14.

<sup>165</sup> International Labour Office, *International Migration* . . . (1959), p. 212.

<sup>158</sup> Appleyard, *British Emigration to Australia* (1964), pp. 179-206.

<sup>159</sup> Sicron, "The economics of immigration . . ." (1967), p. 230.

<sup>160</sup> Kirk, *Europe's Population* . . . (1946), pp. 73-74; Fazio, "Sviluppi e caratteri . . ." (1948).

<sup>161</sup> Hansen, *Emigration from Continental Europe* . . . (1940), pp. 185, 195, 299-300.

<sup>162</sup> See, for example, Plant, *Oversea Settlement* . . . (1951), p. 163.

<sup>163</sup> Moles, "Social security for migrant workers" (1964).

<sup>164</sup> Faulkner, *American Economic History* (1943), p. 370.



made legal only in 1885.<sup>173</sup> In Germany and Italy under fascist governments various restrictions were imposed which greatly reduced emigration.<sup>174</sup> Most of the Socialist countries of Eastern Europe and the USSR are among the countries which currently discourage emigration.<sup>175</sup>

77. Governments of certain European countries which have experienced much emigration, most of it beneficial to their economies in the past, had by the 1960s adopted policies aimed at checking the outflow. Measures were taken by Ireland, for example, which were intended to increase the number of families who could be established on the land in economic security. In Greece, the Government aimed to increase employment opportunities so as to encourage also repatriation of Greek workers who had emigrated.<sup>176</sup>

78. Prohibition of emigration or special provisions relating to emigration sometimes apply only to certain categories of residents of a country. For example, the borders of South-West Africa are closed to "non-Europeans" except on production of individual permits.<sup>177</sup> Some Governments have refused to allow the emigration of specified categories of workers, either in order to protect the workers against possible exploitation abroad or because the departure of these workers might be economically undesirable for the country concerned. In 1922, for instance, the Government of India promulgated an Indian Emigration Act, which placed severe restraints on the emigration of unskilled labour.<sup>178</sup> More recently, the control of emigration of unskilled labourers from Angola, Malawi, Mozambique, and Zambia to South Africa has been exercised through the joint activities of the Governments concerned and recruiting organizations.<sup>179</sup> While Governments of many developing countries have misgivings about the emigration of professional and skilled workers and the loss of students who remain in developed countries following completion of their training, few have adopted formal policies to combat such emigration.<sup>180</sup>

79. Britain has been one of the few Governments which at various times has taken concrete measures to encourage emigration. Considerable activity in this respect occurred

around the middle of the nineteenth century when public funds were used to assist indigent emigrants, the dual object being to relieve population pressure in the mother country and at the same time strengthen ties with the colonies. The policy was revived after the First World War.<sup>181</sup>

80. More recently, several Governments have actively encouraged permanent emigration. Malta assists financially those who express a desire to emigrate, and that Government's application for membership in the Intergovernmental Committee for European Migration in 1962 was motivated in part by the wish to gain the maximum co-operation of other Governments in expanding emigration from the country.<sup>182</sup> As mentioned above, the Netherlands officially assisted emigration for a time after 1945. Mauritius also encourages emigration, though no financial assistance is given to prospective emigrants.<sup>183</sup> In Jamaica, the post-independence development plan stated that "it has long been Government's policy not to discourage citizens from migrating, and this Government has already declared its policy of exploring new migration outlets".<sup>184</sup>

81. Following the Second World War, the Italian Government embarked upon an active programme to encourage emigration. Agreements were reached with a number of European and overseas countries for the recruitment of Italian workers and the facilitation of their emigration.<sup>185</sup> Governments of other Southern European countries, including Yugoslavia, have also contracted treaties with Governments of Western European countries relating to the employment of their workers.<sup>186</sup>

82. Ceylon provides an example of a case where a Government has encouraged the emigration of a particular segment of its population. According to an agreement reached with India in 1964, about half of the estimated close to one million persons of Indian origin in Ceylon who were without Ceylonese citizenship were to be repatriated to India over a period of fifteen years.<sup>187</sup>

#### (b) Policies concerning immigration

83. The policies followed in countries of immigration have had on the whole a much greater influence upon modern migrations than the policies of emigration countries. There are few countries which have placed no restrictions on the numbers of immigrants who may enter, or upon the activities of the immigrants after arrival. On the other hand, public authorities have often taken measures to encourage immigration.

<sup>173</sup> Davie, *World Immigration* ... (1947), pp. 10, 305-306, 318; see also Ishii, *Population Pressure* ... (1937), p. 189.

<sup>174</sup> Isaac, *Economics of Migration* (1947), pp. 53-54; Glass, *Population Policies and Movements in Europe* (1940), pp. 221-224.

<sup>175</sup> Bogue, *Principles of Demography* (1969), pp. 801-802.

<sup>176</sup> United Nations, *Inquiry among Governments* ... (1964), p. 39.

<sup>177</sup> United Nations, *Report of the Committee on South West Africa* (1960), pp. 45-46; see also United Nations, *Study of Discrimination in Respect of the Right* ... (1963), pp. 20-23.

<sup>178</sup> Davis, *The Population of India and Pakistan* (1951), p. 106; United Nations, "International migrations in the Far East ..." (1951), pp. 19-20.

<sup>179</sup> Prothero, "Migration in tropical Africa" (1968), p. 254. Recruitment by South African firms was halted in Tanzania after that country's attainment of independence. Prothero, *Migrants and Malaria* (1965), p. 45.

<sup>180</sup> One writer has suggested that the country of emigration should be reimbursed by the country of immigration for the loss sustained by the former for migrants educated at public expense. As an alternative, an obligation could be imposed on students receiving public grants for study abroad to return to their own countries. Thomas, "From the other side ..." (1966).

<sup>181</sup> Isaac, *Economics of Migration* (1947), pp. 51-52.

<sup>182</sup> Zammit, "Malta and migration" (1963).

<sup>183</sup> Caldwell, "Population policy: a survey ..." (1968), p. 370.

<sup>184</sup> Jamaica, Ministry of Development and Welfare, *Five-year Independence Plan, 1963-1968* ... (1963), p. 53.

<sup>185</sup> Eldridge, *Population Policies* ... (1954), p. 82. Australia, Brazil, the Federal Republic of Germany and Switzerland were among the countries with whom agreements were negotiated. Intergovernmental Committee for European Migration, "Italian emigration ..." (1966), pp. 123-124.

<sup>186</sup> Yugoslavia had such agreements with Austria, France and Sweden. Sauvy, "L'émigration yougoslave" (1967), p. 131.

<sup>187</sup> For a summary of the agreement, see Kodikara, *Indo-Ceylon Relations since Independence* (1965), pp. 140-143.

(i) *Prior to the Second World War*

84. The public land policies followed by the Governments of leading countries of immigration in the nineteenth century are an example of measures taken to stimulate immigration. In the United States, the Homestead Act of 1862 made agricultural land available free to settlers under certain conditions,<sup>188</sup> and policies to provide land at little or no cost for immigrants were also adopted by Canada and New Zealand.<sup>189</sup> The Governments of Brazil, Argentina, Australia, New Zealand and some other countries have at various times paid all or part of the cost of transportation for their immigrants, or have loaned them passage money.<sup>190</sup>

85. After the First World War, and particularly during the depression of the 1930s, the policies of countries of immigration shifted in the direction of limiting the inflow of foreigners. In country after country, severely restrictive laws were enacted with the objective of protecting the domestic labour market from the competition of immigrant workers. Some of the restrictive measures adopted were designed simply to reduce the numbers of immigrants, while others were aimed at a selection of groups thought to be more economically and socially desirable. Among the measures adopted were head taxes, annual immigration quotas, requirements as to health, literacy and linguistic abilities, assured employment or means of support, and limitations on the kinds of work in which immigrants could engage.<sup>191</sup> Occupational selection operating through legislation became an increasingly important element in immigration policy beginning in the 1920s, and particularly after the economic crisis in the 1930s.<sup>192</sup>

86. In the United States, legislation passed in 1921 and 1924, established annual quotas for immigrants of each nationality. With worsening economic conditions in the 1930s, immigration was further limited by a strict interpretation of existing legislation which provided for the exclusion of persons likely to become public charges.<sup>193</sup> Under the laws of practically all European countries, the immigration authorities were able to decide which persons should be admitted to the country, and this power was used, particularly during the 1930s, to restrict immigra-

tion and to admit, as a general rule, only those immigrants who were able to support themselves.<sup>194</sup> The laws adopted by the British Dominions favoured Northern and Western European, and especially British immigrants, but even their entry was governed by economic criteria; other immigrants, and particularly Asians, were kept to a minimum by means of dictation tests, prohibitive head taxes, quotas, or direct exclusion clauses.<sup>195</sup> In Latin America, restriction of immigration on the basis of economic considerations, which became general after 1929, was accomplished by such means as setting quotas, raising consular fees, abolishing or reducing exemptions from customs duties, and favouring, directly or indirectly, persons likely to engage in agricultural occupations.<sup>196</sup> In Asia, antagonism towards certain foreign minority groups (for example the Indians and Chinese), aggravated by the depression of the 1930s, has resulted in increasingly restrictive immigration laws in the principal immigrant-receiving countries of that continent. In 1941, Indian emigration to Burma was restricted by an agreement between the two Governments, and a similar agreement was concluded later on between India and Ceylon. In Malaysia (Federation of Malaya), Indian immigrants are now required to apply for entry permits, which are granted to those who can produce a guarantee of employment. Quota systems or other restrictions also limit the volume of immigration into Thailand, Indonesia and the Philippines. The effect of the various measures has been to put a stop to the massive immigration of Indians and Chinese in South-East Asian countries.<sup>197</sup>

(ii) *Following the Second World War*

87. Recent legislation in many of the countries of long-standing immigration has accorded preference to immigrants possessing certain qualifications or skills in short supply among the native labour force. The United States, Canada and Australia—all of which had previously favoured immigrants from Europe, and discriminated against those from other continents, particularly Asia—introduced changes in their immigration legislation which shifted the emphasis away from national origin of the immigrants to the skills which the potential immigrants possess. These changes have occurred partly as a response to various pressures against racial or national-origin discrimination, and partly because of the need for well-defined industrial and professional skills and the disappearance of traditional European sources of skilled workers.<sup>198</sup>

<sup>188</sup> Faulkner, *American Economic History* (1943), pp. 366-368; for a discussion of public land policies in the United States, see Hibbard, *A History of the Public Land Policies* (1965).

<sup>189</sup> Coats, "Canada" (1931), pp. 125-127; Cruickshank, "New Zealand—external migration" (1931), pp. 181-182.

<sup>190</sup> Bunge and Mata, "Argentina" (1931), pp. 148-149; Davie, *World Immigration* ... (1947), pp. 418, 428-429, 432-434, 438; Naylor, "Brazil" (1931), p. 162; Cruickshank, "New Zealand—external migration" (1931), pp. 181-182, 185.

<sup>191</sup> Isaac, *Economics of Migration* (1947), pp. 54-58; National Committee on Immigration Policy, *Economic Aspects* ... (1947), p. 27; Hutchinson, *Current Problems of Immigration Policy* (1949), pp. 25, 33. Detailed information on restrictions in the various countries is given in the International Labour Office, *Migration Laws and Treaties* (1928-1929), vols. 1-3; and in issues of the *Yearbook of Labour Statistics* of the International Labour Office from 1930 to 1940.

<sup>192</sup> United Nations, *Economic Characteristics of International Migrants* ... (1958), pp. 35-38.

<sup>193</sup> Faulkner, *American Economic History* (1943), pp. 636-637; Hutchinson, "Immigration policy since World War I" (1949).

<sup>194</sup> Carr-Saunders, *World Population* ... (1936), pp. 149-150; Isaac, *Economics of Migration* (1947), p. 58.

<sup>195</sup> Davie, *World Immigration* ... (1947), pp. 348-359, 416-443. Borrie, *Immigration, Australia's problems* ... (1949), pp. 65-66.

<sup>196</sup> United Nations, Economic Commission for Latin America, *Immigration in Chile* (1950), pp. 71-74; *Immigration in Brazil* (1950), pp. 50-53; *Immigration in Venezuela* (1950), pp. 22-23; Davis, "Future migration into Latin America" (1947); Signaigo, *Argentine Legislation* ... (1945), pp. 2-3.

<sup>197</sup> United Nations, "International migrations in the Far East ..." (1951); International Labour Office, *International Migration* ... (1959), pp. 227-228.

<sup>198</sup> See, for example, the explanation of the 1962 changes in Canada's immigration regulations given in Fairclough, "Social implications of the new ..." (1962).

88. With the increasing emphasis which the leading countries of immigration have placed on obtaining migrants who possess certain skills and professional and technical qualifications, and the relaxation of racial or ethnic barriers, the outflow of trained personnel from developing countries has become a matter of international concern.<sup>199</sup> Governments are involved in these movements, since employment is frequently offered to these highly qualified personnel by government-controlled organizations and organizations engaged in government-supported research.<sup>200</sup> It has therefore been argued that various measures, both national and international, be considered to reverse the movement or to mitigate its harmful effects.<sup>201</sup>

89. Up to 1962, Canada's immigration regulations restricted unsponsored immigrants to two categories: (a) British subjects by birth or naturalization in the United Kingdom or the old Commonwealth countries, and citizens by birth or naturalization of France, Ireland and the United States; and (b) citizens from Western European countries and refugees from Europe selected by the Department of Immigration for placement in employment or self-establishment in agriculture, business or industry in Canada.<sup>202</sup> The new Canadian immigration regulations of 1962 removed the previous ethnic preferences and, instead, emphasized the education, training, skills or other special qualifications of unsponsored applicants for immigration. Provision is also made for the entry of persons bearing prescribed degrees of relationship to Canadian residents.<sup>203</sup> Further revisions in immigration regulations were made in 1967. A system of point ratings was established whereby potential immigrants who have no close relatives in Canada, can qualify for entry if they obtain a score of 50 points, based on such criteria as education, occupation, skill, age, fluency in English and French, area of intended residence in Canada, and the immigration officer's personal assessment of the applicant's adaptability, motivation and initiative.<sup>204</sup>

90. In the United States, the long-established national-origin basis of quota allocation was abolished by 1965 legislation and, with it, the discriminatory quotas allocated to the so-called Asia-Pacific Triangle. Seven preference categories are established under the new legislation. The first, second, fourth and fifth preference categories pertain

to relatives of citizens or resident aliens, while the seventh refers to refugees. The third preference covers members of the professions, or persons of exceptional ability in the sciences or arts, and the sixth preference to skilled or unskilled persons who are able to fill labour shortages in the United States. The 1965 Act requires as a condition for admission of third and sixth preference immigrants that the Secretary of Labour must find that there are not sufficient workers in the United States who are qualified and willing to perform such work, and that the employment of the immigrants will not seriously affect the wages and working conditions of other workers similarly employed.<sup>205</sup> Brinley Thomas has suggested that one of the results of the basic alteration in the principles of selection of immigrants by the United States will be to intensify "the process of creaming off skills from the poorest areas of the world . . .".<sup>206</sup>

91. Immigration has been an integral part of economic policy in Australia since the Second World War, annual targets being set according to current and prospective demand for labour. For security reasons the Government has wished to attain the maximum population growth which could be effectively absorbed, calculated to average about 2 per cent annually. Natural increase was expected to account for a population growth of 1 per cent, and the remaining 1 per cent became the immigration target.<sup>207</sup>

92. Conditions in the United Kingdom, the traditional source of immigrants to Australia, were not conducive to large-scale emigration in the late 1940s, and Australia had to look elsewhere to attain her immigration target.<sup>208</sup> State-assisted immigration, which before 1946 had been restricted almost entirely to British subjects, was extended to other Europeans, as a result of displaced persons' immigration in 1949-1951. Agreements were also entered into with a number of European Governments. Dutch, German, Greek, Italian and Maltese settlers figured prominently in the non-refugee post-war immigration.<sup>209</sup>

93. The new Australian policy introduced in 1966 permits the admission of some non-European immigrants, who would become eligible for naturalization after five years in the same way as European settlers. Those so admitted are required to be qualified people needed by the Australian community and it is not envisaged that the numbers admitted would be sufficient to affect the homogeneity of the population.<sup>210</sup>

94. In New Zealand, although pre-1920 legislative restrictions were based on ethnic criteria, later legislation gave importance to economic criteria, for example the need for persons possessing specific skills. In actual fact, however, only small numbers of Asians have been admitted for permanent settlement.<sup>211</sup>

<sup>199</sup> See United Nations, *Official Records of the Economic and Social Council, Forty-first Session, Supplement No. 12 (E/4178 and Corr.1)*, pp. 11-12.

<sup>200</sup> Edding and Bodenhoefter, "Movements of intellectuals" (1966), p. 6.

<sup>201</sup> United Nations, *Development and Utilization of Human Resources* . . . (1967), pp. 54-56; International Labour Office, *Advisory Committee on Salaried Employees and Professional Workers* . . . (1968), pp. 48-49; Muir, "Should the brain drain be encouraged? . . ." (1969), p. 48; Sauvy, "The economic and political consequences . . ." (1969), pp. 55-56; Thomas, "From the other side . . ." (1966); Adams and Dirlam, "An agenda for action" (1968).

<sup>202</sup> Fairclough, "Social implications of the new . . ." (1962), p. 61. See also Timlin, "Canada" (1958), pp. 151, 160-162; Corbett, *Canada's Immigration Policy* . . . (1957).

<sup>203</sup> Timlin, "Canadian immigration policy: an analysis" (1965), p. 54.

<sup>204</sup> Kage, "The recent changes . . ." (1968).

<sup>205</sup> Benn, "The new USA immigration law" (1965).

<sup>206</sup> Thomas, "From the other side . . ." (1966), p. 68.

<sup>207</sup> Appleyard, "The economics of immigration into Australia" (1967), pp. 191-192.

<sup>208</sup> *Ibid.*

<sup>209</sup> Borrie and Spencer, *Australia's Population Structure* . . . (1965), pp. 14-18; Price, "Overseas migration . . ." (1962).

<sup>210</sup> Palfreeman, *The Administration of* . . . (1967), p. 134.

<sup>211</sup> Roy, "New Zealand's immigration policy . . ." (1966), pp. 37-38. See also New Zealand Institute of International Affairs, *Immigration into New Zealand* . . . (1950), pp. 15-20.

95. The sharp increase in the number of migrants from the Caribbean, India and Pakistan to the United Kingdom in the 1950s and early 1960s led to the passage of the Commonwealth Immigrants Act of 1962 which imposed restrictions on the volume of migration from the Commonwealth countries for the first time. With the exception of dependants of immigrant workers already resident in the United Kingdom, immigrant vouchers under the new legislation were issued only to those, skilled or unskilled, who had a specific job offer, and to persons with special qualifications or skills such as doctors, nurses and teachers. The number of Commonwealth immigrants allowed to enter each year was left to the discretion of the Home Secretary.<sup>212</sup>

96. In the period between the two world wars, a number of bilateral treaties were concluded between Governments providing for migration under conditions that were considered beneficial to both the countries of immigration and emigration.<sup>213</sup> After the Second World War, the practice of regulating international migration through bilateral agreements increased further. These agreements contained provisions for the selection and placement of the migrant workers by the authorities of the receiving countries and for reducing the administrative formalities of departure and entry.<sup>214</sup> For example, by 1964 France had established missions in Italy, Morocco, Portugal and Spain to facilitate the emigration of workers from those countries to France, and in 1965 accords were concluded with Turkey and Yugoslavia.<sup>215</sup> Similarly, the Federal Republic of Germany signed agreements with Greece (1960), Spain (1960) and Turkey (1961), among others.<sup>216</sup>

97. In the early post-war period, restrictions on the occupations which immigrants could pursue were commonplace in Western Europe. Immigrants were permitted to work only in occupations where the national labour force was insufficient and very often they were prohibited from moving out of these occupations for a specified period of time. Strict control over the employment of foreign workers was made possible by the granting and renewal of work permits. A situation developed in which special advantages were granted to particular nationalities, either as a result of bilateral or multilateral agreements among the Governments concerned, or through the development of various European regional organizations. For example, the treaty establishing the European Coal and Steel Community in 1951 specified that there should be free circulation between member States of workers with recognized qualifications in these industries.<sup>217</sup>

<sup>212</sup> Gish, "Color and skill . . ." (1968), pp. 20-27.

<sup>213</sup> Carr-Saunders, *World Population* . . . (1936), pp. 150-153; Sauvy, "European migrations . . ." (1949).

<sup>214</sup> A survey of bilateral treaties concluded in the immediate post-war period is given in International Labour Office, *Current Trends and Need* . . . (1951).

<sup>215</sup> Tapinos, "L'immigration étrangère . . ." (1965), pp. 684-685.

<sup>216</sup> Reid and Hunter, "Integration and labor mobility" (1967), p. 187.

<sup>217</sup> International Labour Office, *International Migration* . . . (1959), pp. 214-217. As early as 1954, Denmark, Finland, Norway and Sweden had established a common employment market and, since 1960, work permits for employees in private industry have

98. Regulations governing the employment of nationals of member States within the European Economic Community have been progressively liberalized since its establishment in 1957. In October 1968 the Council of the European Communities approved regulations which prohibit discrimination with respect to employment, wages and other conditions of work among nationals of member States, and establish the right of such workers to free movement within the Community for purposes of employment. Machinery was also set up for matching job vacancies and applicants among the member States.<sup>218</sup> It is difficult to assess the effects of the several regional economic integration schemes in operation in Europe, as well as the effects of the various bilateral and multilateral agreements, on the volume of labour mobility among the participating countries.<sup>219</sup>

99. Qualitatively selective immigration has become the goal in Latin America, where neither the general educational system nor the vocational training of adults is sufficient to meet the requirements for the professional and skilled manpower essential for development. Thus, a strong need exists to import such manpower, but attempts to fill these gaps with immigrants from Europe have been to a large degree frustrated by inadequate financial resources and the lack of administrative structures for the recruitment and placement of the desired personnel.<sup>220</sup> Moreover, the Latin American countries have not been able to compete effectively with "the pull of the industrially advanced countries", such as the United States and Canada, in attracting the type of immigrant desired.<sup>221</sup>

100. Israel appears to be the only country in Asia with a positive policy of encouraging immigration. Israel accepts all Jewish immigrants without question, in accordance with her Proclamation of Independence of 14 May 1948. While the Israel Government and the Jewish Agency are prepared, as in the past, to cope with mass immigration in the event of an emergency or a relaxation of restrictions on Jewish emigration from countries where it has been blocked, in recent years increasing attention has been devoted to attracting immigrants from the Western countries, many of whom possess professional and technical skills which are in short supply in Israel.<sup>222</sup> In most countries of Asia the volume of international migration in the post-war period has been small, though

not been necessary for nationals of Benelux countries for work in the other member countries. Reid and Hunter, "Integration and labor mobility" (1967), pp. 190-191.

<sup>218</sup> International Labour Office, "Free movement of workers . . ." (1969).

<sup>219</sup> For a discussion of this subject, see Reid and Hunter, "Integration and labor mobility" (1967).

<sup>220</sup> Maselli, "Immigration as an essential element . . ." (1967). Legislative provisions in certain Latin American countries have given preference to agricultural and other workers in rural industry. In Brazil, for example, immigration legislation requires that 80 per cent of immigrants admitted under the quota system must in principle be farm or rural industry workers. The attraction of agricultural settlers has also been a feature of immigration policy in Argentina. International Labour Office, *International Migration* . . . (1959), p. 223.

<sup>221</sup> Besterman, "Immigration as a means . . ." (1967).

<sup>222</sup> Jewish Agency, *16 Years of Immigration to Israel* (1964).

the import of highly skilled and professional workers on a temporary basis is a feature of official development policy in some countries.<sup>223</sup>

101. In Africa, the appearance of newly independent States has led to some limitations on migration across national boundaries, despite the incompatibility of such restrictions with the ideology of Pan-Africanism. It has been pointed out that controls on immigration may increasingly be imposed both to foster feelings of national consciousness as well as to protect the interests of the native labour force.<sup>224</sup> The South African Government's policy with respect to European immigration changed several times in the period following the Second World War. The United Party actively encouraged immigration from 1946 to 1948; this policy was reversed when the Nationalist Party came to power in 1948, but a few years later the Nationalists dropped their opposition to immigration. In 1961 the Government adopted new measures designed to attract 30,000 white immigrants annually.<sup>225</sup> Preference is given to British subjects of European extraction, but other Europeans who are likely to make economically or socially useful contributions to the community are also admitted. The permanent immigration of persons considered incapable of being integrated into the white population is completely banned.<sup>226</sup>

### C. The effect of immigration and emigration on the growth and structure of populations

#### 1. THE EFFECT ON POPULATION GROWTH

102. Migration exerts a direct effect upon the growth of population which may be large or small depending on the relative size of the migrant and non-migrant populations. It has been customary in many studies to examine the effect of migration by comparing its net volume with natural increase, the other component of population growth. Until the latter part of the nineteenth century, net immigration was the major factor of population growth in some of the overseas countries of European settlement which had small populations. For example, it contributed more than natural increase to total population growth in Australia before 1860 and in New Zealand during most periods before 1875. At the time natural increase replaced net immigration as the major factor of growth, the population of New Zealand was about half a million, while that of Australia had reached about the one million mark. Even though surpassed by natural increase in later years, migration remained an important

element in the growth rates of these countries which for long periods exceeded 2 per cent per annum.<sup>227</sup>

103. In the United States, during each decade 1850-1900, estimates suggest that for every 100 persons added to the population through natural increase, the gain through net migration ranged from twenty to forty persons.<sup>228</sup> Canada, while admitting many new immigrants, has traditionally lost large numbers through emigration. In only five of the ten decades between 1851-1951 was there a net gain through migration, and the ratio of net migration to natural increase was sizable only in the early years of the twentieth century.<sup>229</sup> The seemingly modest contribution of immigration to Canada's population growth is misleading, however, since a considerable proportion of the emigrants from Canada have been Canadian-born.<sup>230</sup> According to one estimate, net immigration during the century 1851-1951 amounted to only 700,000,<sup>231</sup> but the number of foreign-born persons enumerated at the 1951 census was as high as 2.1 million (or one out of seven persons), and had risen to 2.8 million (or almost one out of six persons) at the 1961 census.<sup>232</sup> Net immigration was only a secondary factor in the growth of Brazil's population, amounting to less than 10 per cent of natural increase from 1850 to 1950.<sup>233</sup>

104. High ratios of net immigration to natural increase have been recorded in a number of countries of overseas settlement in the period following the Second World War. During the period 1946-1957, for every population gain of 100 through natural increase, there were gains through net migration of sixty-seven in Australia, forty-one in New Zealand, and thirty in Canada. In the principal countries of immigration in Latin America this ratio was lower; for example, it was twenty-three in Argentina and sixteen in Venezuela. The comparable figure for the

<sup>227</sup> Data on population growth and relative contribution of migration to this growth in various periods are given for New Zealand in Landry, *Traité de démographie* (1949), pp. 65, 433; and for Australia in Borrie, *Population Trends and Policies ...* (1948), p. 38. For Australia, see also Geyl, "A brief history ..." (1963), pp. 157-158.

<sup>228</sup> Computed from data in Willcox, "Immigration into the United States" (1931), pp. 89, 97. The estimates of net migration presented by the author were admittedly crude. Using a method which compared the increases in the foreign-born and total population during intercensal periods, Kuznets and Rubin assessed the immigration factor in total population growth in the United States between 1860 and 1940. Kuznets and Rubin, *Immigration and the Foreign Born* (1954), pp. 4, 44-45.

<sup>229</sup> Keyfitz, "The changing Canadian population" (1961), p. 7; and his "The growth of Canadian population" (1950). For varying estimates of the relative contributions of immigration and natural increase to Canadian population growth, see also McDougall, "Immigration into Canada, 1851-1920" (1961), p. 172; and Camu, Weeks and Sametz, *Economic Geography of Canada ...* (1964), pp. 58-59.

<sup>230</sup> From 1851 to 1951 this proportion was possibly two-fifths. Ryder, "Components of Canadian population growth" (1961), pp. 60, 62. See also Corbett, *Canada's Immigration Policy ...* (1957), p. 121.

<sup>231</sup> Keyfitz, "The changing Canadian population" (1961), p. 8.

<sup>232</sup> United Nations, *Demographic Yearbook, 1956 ...* (1956), p. 189; and ———, *Demographic Yearbook, 1963 ...* (1964), p. 264.

<sup>233</sup> Mortara, "The development and structure ..." (1954), p. 122.

<sup>223</sup> Appleyard, "Immigration policies and economic development ..." (1967).

<sup>224</sup> Wallerstein, "Migration in West Africa ..." (1965), pp. 157-159; Caldwell, "Migration and urbanization" (1967), pp. 119-121, 145; Gil, "Immigration into Ghana ..." (1967).

<sup>225</sup> Richards, "Problems of economic development ..." (1964), p. 277.

<sup>226</sup> International Labour Office, *International Migration ...* (1959), p. 226.

United States was only eight.<sup>234</sup> Israel is unique as a new and almost wholly immigrant country; in the period 1948-1960 the increase in the Jewish population from immigration was more than twice that of natural increase.<sup>235</sup>

105. In the major immigrant countries of Europe, the volume of net immigration in relation to natural increase exceeded that in many of the overseas countries. According to the data presented in table VII.1, the ratio of net immigration per 100 population gain through natural increase was 100 in the Federal Republic of Germany, eighty in Switzerland and thirty-eight in France during 1950-1960. The comparisons with overseas countries are, however, affected by the generally higher level of natural increase in the latter. Average annual net immigration constituted a higher percentage of total population in Australia, Canada and New Zealand (1.0, 0.7 and 0.7, respectively, during 1946-1957) than it did in Switzerland, the Federal Republic of Germany and France (0.6, 0.5 and 0.3, respectively, during 1950-1960).<sup>236</sup>

106. Net emigration had an important effect in moderating the growth rates of certain European countries during the nineteenth and early twentieth centuries. For Europe as a whole, it has been estimated that one fifth of natural population increase was lost through emigration during the nineteenth century.<sup>237</sup> The most striking example is, of course, Ireland, where emigration far exceeded natural increase, and the total population declined from over 5 million in 1851 to less than 3 million in 1926.<sup>238</sup> Losses from emigration amounted to as much as one third of natural increase in the Scandinavian countries from 1861 to 1910.<sup>239</sup> In Germany, between 1841 and 1910, and in the United Kingdom, between 1871 and 1931, net emigration amounted, on average, to about one seventh and one sixth, respectively, of the natural increase, though in certain periods in each country, the proportion was much higher.<sup>240</sup>

107. In recent years, losses of population through emigration have been considerable in Ireland, in the German Democratic Republic and in certain countries of Southern Europe. Between 1959 and 1969, net emigration was two and one-half times the gain through natural increase in the German Democratic Republic, and one and one-half times in Ireland, while Malta lost the

equivalent of 70 per cent of its natural increase, Portugal 60 per cent, Italy 30 per cent, Spain 25 per cent, and Greece and Yugoslavia about 20 per cent.<sup>241</sup> In Greece the net emigration loss was greater in more recent years; for 1960-1965 it has been estimated to amount to nearly three fourths of the natural increase.<sup>242</sup>

108. In the case of certain small populations, emigration has been on a sufficient scale in recent decades to effectively slow the rate of population growth. This has been true, for example, in Barbados and Jamaica, as well as several other small islands in the Caribbean area, and in Gibraltar and Malta in the Mediterranean.<sup>243</sup> The decline in Puerto Rico's population growth rate to 0.6 per cent per annum during 1950-1960 was largely attributable to emigration.<sup>244</sup>

109. Despite the inadequacies of statistical data for most countries of Africa and Asia, it seems probable that migration movements have generally had a less marked effect on population growth in those regions than in areas of European migrations since the movements have generally been small in relation to the total populations of sending and receiving countries. Moreover, they have been to and from countries with high rates of natural increase and have therefore not constituted a large component of population growth. Important exceptions exist, however, in such immigrant countries as Ghana, Rhodesia and South Africa, as well as Manchuria and Hong Kong, as mentioned earlier.

110. Many studies have been concerned, not with just the immediate effects of adding or subtracting a given number of migrants from a country's population, but with the long-term effects of such migration which take into account the permanency of the migration and the natural increase of the migrants. Obviously, immigrants who return to their home countries, taking along any children who may have been born to them during their stay, can have only a transitory influence on population in the area of immigration. The overseas immigration of Europeans has been to a large extent permanent, while much of the migration in Africa and Asia and within Europe during recent times has consisted of workers seeking employment for a period of months or years, and thus has had relatively little influence on population growth. The migrations which were organized in the second half of the nineteenth century and the early decades of the twentieth to provide a low-cost supply of labour in certain areas specializing in the production of raw materials, varied in the extent of their permanence. In some cases, the immigrants remained in sufficient numbers so that they and their descendants formed an

<sup>234</sup> International Labour Office, *International Migration* ... (1959), pp. 308, 312. The fact that the ratio for Argentina surpassed that for Venezuela is related to the latter's higher rate of natural increase. In relation to total population size, net immigration was larger in Venezuela.

<sup>235</sup> Israel, Central Bureau of Statistics, *Statistical Abstract of Israel, 1965* (1965), p. 21. See also Sicron, "The economics of immigration ..." (1967) for data on the contribution of immigration to population growth in Israel.

<sup>236</sup> Percentages computed from data in table VII.1 for European countries and from International Labour Office, *International Migration* ... (1959), pp. 308, 312, for overseas countries.

<sup>237</sup> Citroen, *European Emigration Overseas* ... (1951), p. 3. See also Wander, *The Importance of Emigration* ... (1951), p. 16.

<sup>238</sup> Meenan, "Eire" (1958), pp. 77-78.

<sup>239</sup> Jensen, "Migration statistics of ..." (1931), p. 288.

<sup>240</sup> Burgdörfer, "Migration across the frontiers ..." (1931), p. 316; United Kingdom, Central Statistical Office, *Annual Abstract of Statistics, 1966* (1966), p. 16.

<sup>241</sup> Table VII.1. See also Oblath, "Quelques conséquences démographiques ..." (1959), p. 660.

<sup>242</sup> Zolotas, *International Labor Migration* ... (1966), p. 41. See also Triantis, "Population, emigration and economic development" (1967), pp. 244-245; Agapitidis, "L'émigration de Grèce ..." (1963), vol. 1, pp. 384-385.

<sup>243</sup> Smith, "Demographic aspects of smallness" (1967), pp. 13-14.

<sup>244</sup> Vazquez, *The Demographic Evolution in Puerto Rico* (1964), pp. 130, 132.



important segment of the population, as, for example, the East Indians in the West Indies.<sup>245</sup>

111. Owing to sex-age selectivities, migration often tends to increase population growth rates in the receiving countries. Generally, migrant streams have a high proportion of young persons in the reproductive ages where mortality rates are low. Moreover, the small excess of males which has been typical of many migrations of Europeans has helped to ensure high marriage rates among immigrant women. Where intermarriage is common, a high ratio of males among immigrants may also increase the marriage opportunities of the native women in the receiving country, thus accelerating natural increase. This was the case in France in the 1920s when immigration helped to correct the imbalance of the sexes that had resulted from heavy war losses.<sup>246</sup> If there is little intermarriage, however, a preponderance of male immigrants might result in many of them remaining unmarried, thus tending to reduce the natural increase rate of the immigrant group. A case in point is the migration of Chinese in Asia and the Western Pacific region, since such migrations were predominantly male, and there was relatively little intermarriage between Chinese men and local women.<sup>247</sup> In Malaysia (Federated and Unfederated Malay States and the Straits Settlements), after restrictions were imposed on further Chinese male immigration in 1933 and the sex ratio became more balanced, the crude birth rate increased fairly steadily.<sup>248</sup>

112. The contribution of migrants to population growth also depends on their age-specific birth and death rates.<sup>249</sup> While the immigrants themselves may sustain the fertility patterns of their areas of origin, the subsequent generations tend more and more to conform with the

patterns of the receiving areas.<sup>250</sup> European migrants have frequently gone to settle in areas of higher fertility; in Australia, at least, they appear to have sustained their lower fertility rates.<sup>251</sup>

113. Several studies have been concerned with the total contribution of immigration and the natural increase of immigrants to the growth of population in individual countries. Landry estimated that migrants and their descendants contributed well over one third of the population increase of France from 1801 to 1936.<sup>252</sup> For the century from 1840 to 1940 it has been estimated that immigrants and their natural increase accounted for nearly 60 per cent of population growth in Argentina, 40 per cent in the United States, and only about 20 per cent in Brazil and Canada.<sup>253</sup>

114. Just as migration, because of its sex-age selectivities, tends to raise the proportions of married women and increase population growth rates in the receiving areas, it tends to reduce them in the sending areas. Thus, emigration has been advanced as one of the causes of declining birth rates in recent years in some Southern European countries as well as in Ireland and in Puerto Rico.<sup>254</sup> In Africa, the absence of large numbers of migrant males for extensive periods is sometimes held to have a depressing effect on fertility rates in their home areas, but the question is complicated by traditional attitudes which may condone the wife's having sexual relations with other men during the husband's absence, in the interest of bearing as many children as possible.<sup>255</sup> Emigration from the heavily populated countries of

<sup>245</sup> On the other hand, Davis found evidence of a high return rate for Indian migrants in some areas. According to his estimates, the number of Indians residing in Burma and British Malaya in 1941 was considerably less than the number who migrated there during the previous century. Davis, *The Population of India and Pakistan* (1951), p. 101.

<sup>246</sup> Kirk, *Europe's Population* ... (1946), p. 117. In Australia, the surplus of males among immigrants in the period following the Second World War is believed to have been an important factor in the great increase in the proportion of women married. Borrie and Spencer, *Australia's Population Structure* ... (1965), pp. 21-22.

<sup>247</sup> United Nations, "International migrations in the Far East ..." (1951), p. 19. It was found that the exceedingly high proportion of males among the Chinese-born population in Australia did not result in extensive intermarriage with the white population. Borrie, *Italians and Germans in Australia* ... (1954), pp. 40, 42. On the other hand, there has been at times a considerable intermarriage of Chinese males with local women, as in Hawaii and Sarawak. Taeuber, "International migration ..." (1967), p. 242; Purcell, *The Chinese in Southeast Asia* (1965), p. 366.

<sup>248</sup> Smith, *Population Growth in Malaya* ... (1952), pp. 63, 78. Chinese females were admitted freely until 1938. *Ibid.*, p. 12.

<sup>249</sup> For example, the rapid increase in the Asian population of South Africa between 1921 and 1946 was attributed primarily to relatively low mortality and exceptionally high fertility. Badenhorst, "The future growth of the population ..." (1950), pp. 10-11. Slightly higher age-specific mortality rates for the foreign-born than for the native white population were found in the United States. Thompson and Whelpton, *Population Trends* ... (1933), pp. 246-247; and Davie, *World Immigration* ... (1947), pp. 229-230.

<sup>250</sup> Lorimer and Osborn, *Dynamics of Population* ... (1934), pp. 28, 41-43, 48-54; Thomas, "International migration" (1959), p. 530. In 1920, first-generation Italian women in the United States had a fertility rate about double that of the native-born white American women, but by the mid-1930s, the fertility rates of these groups were nearly identical. Livi Bacci, "Caratteristiche demografiche ed assimilazione ..." (1965), p. 25.

<sup>251</sup> Borrie and Spencer, *Australia's Population Structure* ... (1965), pp. 31, 33.

<sup>252</sup> Landry, *Traité de démographie* (1949), pp. 514-515.

<sup>253</sup> Spengler, "Effects produced in receiving countries ..." (1958), p. 26. Another estimate for Argentina suggests that if there had been no immigration since 1870, the population in 1960 would have been less than one half its actual figure. Recchini de Lattes, "Demographic consequences ..." (1967), p. 212. An estimate for the United States indicates that in 1920, the immigrant stock (defined as immigrants and descendants of immigrants arriving after 1790) outnumbered the descendants of the colonial white population, in spite of the rapid increase of the latter. United States of America, Congress, Senate, *Immigration Quotas* ... (1928), pp. 7-8. Mortara's calculations for Brazil for 1850 to 1950 show that net immigration and the natural increase of immigrants accounted for about 15 per cent of total population growth. Mortara, "The development and structure ..." (1954), p. 122.

<sup>254</sup> International Labour Office, *International Migration* ... (1959), p. 333; Friedlander, *Labor Migration and Economic Growth* ... (1965), pp. 72-73; Vazquez, *The Demographic Evolution* ... (1964), p. 194.

<sup>255</sup> Schapera, "An anthropologist's approach to population growth ..." (1955), pp. 27-28; also his *Migrant Labour and Tribal Life* ... (1947), pp. 187-189. Southall observes that areas in East Africa with the sexes evenly balanced and little migration tend to have higher growth rates than those with imbalance as a result of migration, but he adds that African male emigrants "make very deliberate efforts not to let their wives 'lie fallow' when left at home". Southall, "The demographic and social effects ..." (1967), p. 237.



Asia does not appear to have been sufficiently large to have any great long-term effect upon the growth of population in the countries of origin.<sup>256</sup>

115. Few attempts have been made to estimate how much larger the populations of the principal countries of emigration might have been, had there been no emigration. However, Novitsky and Tolokonsky estimated for Europe as a whole that the 1910 population would have been larger by some 88 million if no emigration had occurred between 1800 and 1910.<sup>257</sup> Skaug calculated for Norway the effects of the decrease in overseas emigration following the First World War.<sup>258</sup>

116. Finally, there is the question of the effect migration may have on the natural increase of the non-immigrant population. Walker's "substitution theory" held that immigration has no effect in the long run on the size of the population since the addition to numbers through immigration is offset by the depressing effect on the fertility of the native born.<sup>259</sup> He maintained that the slowing-down of the rate of natural increase in the United States after 1830 was due to the effects of immigration in lowering, or threatening to lower, the level of living of the native population.<sup>260</sup> The weight of evidence, however, is against Walker's theory. Thompson and Whelpton found that immigration did contribute to the lowering of the birth rate by hastening the processes of urbanization and industrialization, and by facilitating the upward occupational mobility of large numbers of natives. These authors demonstrated, however, that in any 10, 20 or 30-year period between 1830 and 1930 the increase due to immigration exceeded the decline of fertility and thus added materially to population growth.<sup>261</sup> The applicability of the theory to France was challenged on the grounds that the birth rate was low prior to the coming of the immigrants, and that it was low in many depart-

ments with few immigrants.<sup>262</sup> Yet another theory suggested that the increase in wealth resulting from immigration into the United States altered the relation between population and resources, and thus provided the basis for further population expansion.<sup>263</sup> It is now recognized that immigration may have indirect effects on the natural increase of the non-immigrant population, but the nature and extent of these effects vary with the situation and are not subject to generalization.

117. Theories similar to the "substitution theory" have evolved with respect to the effect of emigration on the natural increase of the sending areas. Kulischer, for example, believed that emigration, instead of draining off Europe's population, promoted its unprecedented growth.<sup>264</sup> Such a proposition implies that if emigration had not occurred, the growth of population would have been checked by a severe reduction in the level of living. Isaac, while acknowledging that emigration, when it affords real relief from population pressure, might have a stimulating effect on natural increase by leading to earlier marriages, higher fertility within marriage and a lower infant mortality rate, argued, on the other hand, that by bringing a higher level of living, emigration might lead to an outlook favourable to a lower birth rate. Taking into account the effects of the sex-age selectivities of migration which have been discussed above, he concluded that emigration had tended to reduce population growth in most European countries.<sup>265</sup>

## 2. THE EFFECT ON SEX AND AGE STRUCTURE

118. Ordinarily it has been found that migrants across international boundaries are predominantly young and male. The proportion of young men is usually high at the beginning of large-scale movements, and also in the case of temporary migration. It is likely to be higher in economic-motivated migrations than in movements of refugees. Intercontinental emigrations of Europeans have increasingly had a high proportion of family units so that the ratio of young adult males to other sex-age groups among the migrants has tended to decline. Restrictive legislation of the 1920s in the United States considerably affected the sex-age distribution of immigrants by giving preference to relatives of those who had come earlier. During the depression years of the 1930s the total volume of immigration was low, and the number of migrants going to seek employment declined more than the number going to join relatives. Entry of war brides into the United States was a factor contributing to the low sex ratios in the period after the Second World War. The following figures for three important countries of immigration illustrate how the sex and age structure of immigrants has changed over periods of the recent past.<sup>266</sup>

<sup>256</sup> See, for example, Chen, "Population in modern China" (1946), p. 57; Davis, *The Population of India and Pakistan* (1951), p. 106; United Nations, "International migrations in the Far East ..." (1951).

<sup>257</sup> This figure is based on the estimated number of survivors from the emigrants who left Europe during that period and their descendants who would be living in Europe if no migration had occurred. Novitsky and Tolokonsky, "Vliianie emigratsii na usloviia ..." (1929), pp. 97-98.

<sup>258</sup> Skaug, *Memorandum* ... (1937), pp. 136-154.

<sup>259</sup> Walker, "Immigration and degradation" (1891), and his "Restriction of immigration" (1896). Walker's statement of the theory was a modification of earlier formulations by French and English writers of the eighteenth century (see Landry, *Traité de démographie* (1949), pp. 519-524), and by Franklin, *Observations Concerning the Increase of Mankind* ... (1755; 1918 ed.), pp. 222-224. Franklin restricted his thesis to countries where the population was at a maximum that could be supported under existing economic arrangements (a reservation omitted by Walker), but he applied it both to eighteenth-century England and to colonial America. It was essentially a corollary of the Malthusian theory that population presses constantly on the limit imposed by the means of subsistence.

<sup>260</sup> Walker, "Restriction of immigration" (1896). See also Fairchild, *Immigration* ... (1925), pp. 215-225; and his "Immigration and the population problem" (1930), pp. 8-9. Some French writers felt that immigration would limit natural increase by restricting employment opportunities for the native population. See Bertillon, "Migration" (1873), p. 661.

<sup>261</sup> Thompson and Whelpton, *Population Trends* ... (1933), pp. 305-308.

<sup>262</sup> Gonnard, *Essai sur l'histoire de l'émigration* (1927), pp. 323-324. See also Levasseur, *La population française* ... (1892), vol. 3, pp. 225-226, 493.

<sup>263</sup> Gini, "Los efectos demográficos ..." (1946), pp. 366-367, 378.

<sup>264</sup> Kulischer, *Europe on the Move* ... (1948), p. 28. A similar point of view was presented by Fairchild in "Immigration and the population problem" (1930), pp. 8-9.

<sup>265</sup> Isaac, *Economics of Migration* (1947), pp. 175-176.

<sup>266</sup> Compiled from national statistics.

Percentage of  
males among  
immigrants

Percentage of  
immigrants  
under fifteen  
years of age

Australia .....	1925-1929	61.0	18.1
	1931-1938	54.3	16.8
	1946-1957	56.1	24.2
	1958-1964	52.1	25.9
New Zealand .....	1922-1924	53.6	23.1
	1925-1929	57.1	21.2
	1934-1939	56.7	17.5
	1946-1957	51.8	18.3
	1958-1964	50.4	21.7
United States .....	1920-1924	56.9	18.6
	1925-1929	55.0	16.3
	1931-1938	41.7	17.6
	1946-1957	44.7	20.7
	1958-1964	44.4	23.3

Under sixteen

119. Intracontinental migrations within Europe, Africa and Asia have often been of a temporary nature and hence have had a lower proportion of family units and a larger proportion of young adult males. Not all such movements are marked by high masculinity rates, however. Figures suggest that Ireland has, at certain periods, sent more female emigrants to Britain than males, and that Sweden has received more female than male immigrants.<sup>267</sup>

120. Despite the age selectivities of migration, only movements on a massive scale are likely to produce major changes in the age structure of the population of the receiving country. In Malaya, at the time of the 1931 census, the percentage of population in the age group 20-34 years was disproportionately high (nearly one third of the population) as a result of the past heavy immigration of Indians and Chinese. Immigration later declined and by 1957 the proportion of total population in this age group had fallen to 21 per cent, while there was a rise in the proportion of children and older persons in the population.<sup>268</sup> A typical in its characteristics, the large-scale immigration into Israel between 1949 and 1953 had the effect of raising the proportion of children and elderly people in the population.<sup>269</sup> When the volume is relatively large, immigration, because of its age selectivities, can help to rectify deficits that have occurred in the population structure. Thus, immigration to Sweden in the post-war period has somewhat reduced the deficiency in the young adult population, who were born during a period of low fertility.<sup>270</sup> In France, immigration

has filled the gaps caused by war losses in both world wars, but serious deficits still exist in certain age groups, as a result of fewer children having been born to the generations which suffered the war losses.<sup>271</sup>

121. In overseas countries of immigration, such as Australia, New Zealand and the United States, low birth rates of the 1930s created a situation in the 1950s where the rate of increment to the working ages was small in relation to the rate of total population growth. These deficits were undoubtedly a factor sustaining the demand for immigrant workers, but since these workers were generally accompanied by their families, the growth rates of the young age groups as well as those of the working ages were affected. In Australia immigration had a substantial impact on all age groups up to at least fifty years during the period between 1947 and 1961 when immigration and natural increase to immigrants accounted for half of total population growth. Without any immigration, the population aged 15-64 years would have grown by only 8 per cent, compared with a growth of total population of 19 per cent. Immigration raised the growth of the working-age sector to 27 per cent, and the total population growth rate to 39 per cent.<sup>272</sup> As a result, the ratio of population in the working ages to total population was only slightly higher than it would have been had no immigration occurred.<sup>273</sup> In Argentina, between 1947 and 1952, a higher concentration of immigrants in the young working ages brought the proportion of total population in the 15-44 age group to 49 per cent in 1952 whereas it is estimated that it would have been no more than 47 per cent in the absence of immigration.<sup>274</sup>

122. The converse of the above pattern is that many of the emigrants from Southern European countries in recent years belong to age contingents which are "surplus" in the sense that they are the products of birth rates which were much higher twenty years ago than they are today. By removing some of these surpluses, emigration is believed to have reduced employment problems, particularly in rural areas, in countries with restricted capital for investment.<sup>275</sup> Emigration brought about a substantial ageing of the population of Malta and Ireland in the post-war period, and such an effect, though less pronounced, has also been observed in the populations of Italy and Portugal.<sup>276</sup>

<sup>271</sup> Sauvy, "Besoins et possibilités ..." (1950), pp. 218, 220; France, Ministère de l'économie et des finances, Institut national de la statistique et des études économiques, "La situation démographique en 1965" (1967), p. 7.

<sup>272</sup> Borrie and Spencer, *Australia's Population Structure ...* (1965), pp. 43, 86 (appendix table 1).

<sup>273</sup> *Ibid.*, p. 45.

<sup>274</sup> Computed from data in Pan, "Effects of recent and possible future migration ..." (1955), p. 144.

<sup>275</sup> Organisation for Economic Co-operation and Development, *International Joint Seminar on the Adaptation ...* (1965), pp. 49-59.

<sup>276</sup> International Labour Office, *International Migration ...* (1959), pp. 313-317. Other studies have examined the effects of emigration on age structure by means of population projections calculated on different assumptions concerning the flow of migration. Parenti and Bandettini found, for example, that emigration over a twenty-year period would be likely to reduce the proportion of population of working age only slightly in Italy and the Netherlands, and somewhat more in Portugal and Ireland. Parenti and Bandettini, (Continued on next page).

<sup>267</sup> International Labour Office, *International Migration ...* (1959), pp. 330-331.

<sup>268</sup> Computed from data in Smith, *Population Growth in Malaya ...* (1952), pp. 12-13; and United Nations, *Demographic Yearbook, 1960 ...* (1961), table 5.

<sup>269</sup> During this period the net increase in Jewish population through immigration was estimated at over 600,000 (including the natural increase of migrants), compared with a 1948 population of about 850,000. While the proportion of children under fifteen years of age would have risen from 28.8 to 31.7 per cent through natural growth, as a result of immigration it rose to 32.3 per cent. Sicron, *Immigration to Israel ...* (1957), pp. 58-59. See also Bachi, "Immigration into Israel" (1958), pp. 324-326.

<sup>270</sup> International Labour Office, *International Migration ...* (1959), pp. 318-319.

123. The effects of a large-scale emigration over a considerable period of time upon the age structure of the population is illustrated by a comparison of the age distributions of Ireland for the years 1881, 1946 and 1961. Owing to emigration there was a pronounced "hollow" in the Irish age pyramid from about age 20 to about age 45 both in 1881 and in 1961. In contrast, the age pyramid for 1946 was more regular, because of the lower rate of emigration in the decades preceding that census.<sup>277</sup>

124. In the majority of countries the volume of immigration or emigration has not been sufficient to greatly affect the age structure of the population. The effects of migration on the age structure of populations have been examined in some studies by use of the method of constructing hypothetical models or through illustrative projections of actual populations. The findings of such studies are examined in the following chapter.

#### D. Economic effects of migration

125. Immigration or emigration, through its effect on the size and structure of the population, may influence the growth of the economy and the levels of living in the countries concerned. Only certain aspects of the extensive literature on the economic effects of migration are discussed here. These include: (a) effects on the labour force; (b) effects on employment and unemployment; (c) effects on wage levels; and (d) effects on the balance of payments. In addition, the present chapter summarizes the findings of studies concerned with the economic effects of selected migrations in the period following the Second World War. Other economic aspects of immigration, such as its effects on investment and productivity are discussed in chapter XIII.

##### 1. EFFECTS ON THE LABOUR FORCE

126. Immigration may affect the relative size of the work force in two ways: through its effects on the population's sex-age structure (since as pointed out in section C above, migrant streams very often have a high proportion of males in the young working ages), and through differences in labour-force participation rates between immigrants and non-immigrants in the same sex-age group. In the United States between 1890-1940, these rates were generally higher among foreign-born white men than among native white men, although the opposite tendency was true for women beginning in 1920.<sup>278</sup> When account

is also taken of the favourable age structure of the immigrants, it is clear that the effect of immigration into the United States was to increase the ratio of the economically active to the total population. In Venezuela, the post-war stream of immigrants had an extremely high proportion of workers; the 1961 census data show that about two out of three of the immigrant population were economically active, as compared with about three out of ten in the native population. Variations in age structure between the two groups provide the main explanation for these differences,<sup>279</sup> but higher age-specific activity rates for immigrants appear also to be a factor.<sup>280</sup> In Canada, immigration has increased the relative size of the economically active population almost entirely because of the concentration of the foreign-born in the most productive ages, rather than because of higher age-specific activity rates among them.<sup>281</sup>

127. Not all immigrant streams have contributed more to the active than to the inactive population, however. In particular, migrations motivated by other than economic considerations are less likely to have such an effect. In Israel, for example, immigration during the period immediately after independence tended to lower the ratio of workers to dependants, owing to the higher proportion of immigrants in age groups 15-19 and 45 years and over, where activity rates are lower, and to the extremely low activity rates among female immigrants from Africa and Asia.<sup>282</sup> The expellees in West Germany in 1950 had a slightly higher proportion of their numbers in the working ages than did the remainder of the population; but the unfavourable employment situation of that time tended to limit the labour-force participation of women, older workers, and the self-employed among the expellees, with the result that their economic activity rate was lower than that of the rest of the population.<sup>283</sup>

128. The impact of migration upon the occupational distribution of the labour force is frequently difficult to establish in view of the inadequacy of available statistical information. It is often uncertain whether the occupation reported by an immigrant on his arrival relates to the occupation exercised in the country of origin or to that which he intends to follow in the receiving country.<sup>284</sup> The evidence shows that the occupa-

<sup>279</sup> Venezuela, Oficina Central del Censo, *Noveno censo general de población* . . . , parte A (1966), pp. 45, 140-145.

<sup>280</sup> Venezuela, Oficina Central del Censo, *Noveno censo* . . . (1964), pp. 116-121.

<sup>281</sup> In 1961, nearly half the immigrant population was economically active, compared with only about one third of the Canadian-born population. See Canada, Dominion Bureau of Statistics, *1961 Census of Canada* . . . , bulletin 1.3-4 (1963) and *1961 Census of Canada* . . . , bulletin 3.2-10 (1964). The higher proportions economically active among foreign-born Canadians observed at earlier census dates were also a result of their heavier concentration in the working ages as compared to the native population. See Hurd, *Racial Origins and Nativity* . . . (1937), p. 171.

<sup>282</sup> Sicion, *Immigration to Israel* . . . (1957), pp. 102-108. See also Gil, "The manpower contribution . . ." (1955), p. 389.

<sup>283</sup> International Labour Office, *International Migration* . . . (1959), p. 22. See also Edding, Hornshu, and Wander, *Das deutsche Flüchtlingsproblem* . . . (1949).

<sup>284</sup> United Nations, *Economic Characteristics of International Migrants* . . . (1958), pp. 13, 22.

(Footnote 276 continued)

"Effetti dell'emigrazione . . ." (1955), p. 173. For Greece, where emigration increased in the 1960s, Zolotas calculated projections which showed that emigration, if continued at 1965 levels, would contribute to a progressive ageing of the population. Zolotas, *International Labour Migration* . . . (1966), pp. 44-45. (For other illustrations of the effect of migration on age structure see chapter VIII, section B.)

<sup>277</sup> Ireland, Central Statistics Office, *Statistical Abstract of Ireland, 1963* (1963), p. 27.

<sup>278</sup> Durand, *The Labor Force in the United States* . . . (1948), pp. 210-213. The lower activity rates for foreign-born females were believed to be related to their higher fertility and differences in cultural background. *Ibid.*, p. 53.

tional composition of immigrants varies with their national origins and with the period of migration.<sup>285</sup> The earliest emigrants from Europe were predominantly small farmers and agricultural labourers, but industrial workers took an increasing part in the movement. Among British emigrants in the latter half of the nineteenth century, the number of "labourers" exceeded agricultural workers by large margins.<sup>286</sup>

129. Immigration statistics for the United States for the period 1899-1915 suggest that about one quarter of the immigrants from Eastern and Southern Europe and only about 10 per cent of those from Western and Northern Europe had been engaged in agriculture prior to emigration. On the other hand, roughly one third of the immigrants to Argentina during 1901-1910<sup>287</sup> and to Canada during 1921-1925 were agricultural workers.<sup>288</sup> Immigrants often have not followed the same occupations, in their adopted countries, as before their migration.<sup>289</sup> During the last decade of the nineteenth century over two fifths of all emigrants from Italy were reported to have been farm workers,<sup>290</sup> but relatively few of the Italian-born population in the United States were employed in agriculture. In fact, next to the Hungarians, Italians were the least agricultural of the various immigrant groups living in the United States at the turn of the century. The immigrant population as a whole was relatively lightly represented in agriculture and heavily concentrated in the less skilled occupations in manufacturing and allied industries.<sup>291</sup>

130. The type of occupational opportunities available in the country of immigration appears sometimes to have exercised a strong influence on the occupational type of immigrants attracted. Thus, the occupations listed by overseas immigrants to New Zealand between 1921 and 1924 bore a marked similarity to the occupational distribution of the total population at the 1921 census.<sup>292</sup> In some countries, there has been a tendency for dis-

proportionately large numbers of immigrants to enter "unpleasant" jobs which failed to attract sufficient numbers of the native population.<sup>293</sup>

131. In recent decades, Governments have increasingly practised occupational selection in admitting immigrants and have prevented them from engaging in certain lines of work. More and more the demands have been for skilled rather than unskilled workers and, in this respect, both sending and receiving countries are competitors for a scarce resource.<sup>294</sup> Shortages are partly the result of the low birth rate in the 1930s and war casualties, but they also reflect the revolutionary changes which have taken place in technology, calling for greater skills on the part of the work force.<sup>295</sup>

132. Sometimes the heavy demands for middle and upper classes of manpower have created a situation where there is a rapid upward mobility of the native population, as they acquire education and equip themselves with the necessary skills, and the occupations requiring lower skills are left to immigrants.<sup>296</sup> This substitution effect appears to have been particularly in evidence since the Second World War, when relative stability in the size of the non-immigrant work force, increasing real incomes, technological developments, and greatly increased expenditure on education have combined to accelerate the opportunities for upward mobility of the non-immigrant work force, and at the same time have opened up avenues for employment of immigrants.<sup>297</sup>

133. Overseas emigrants from Europe in the post-war period have included an increasingly larger proportion of skilled persons,<sup>298</sup> partly owing to the highly organized recruitment processes of many of the immigrant coun-

<sup>285</sup> Hutchinson, *Immigrants and Their Children* ... (1956), pp. 68-69.

<sup>286</sup> Ferenczi, "Introduction and notes" (1929), pp. 334-339, 635.

<sup>287</sup> *Ibid.*, pp. 218-221. For detailed statistics on occupations reported by immigrants to the United States in 1899-1910, see United States of America, Congress, Senate, Immigration Commission, *Statistical Review of Immigration* ... (1911), pp. 98-178.

<sup>288</sup> United Nations, *Economic Characteristics of International Migrants* ... (1958), p. 43. Accurate comparisons are not possible in view of the large numbers of persons shown in residual categories in the occupational classifications.

<sup>289</sup> See Bloch, "Occupations of immigrants ..." (1921); Spengler, "Effects produced in receiving countries ..." (1958), pp. 33-34. In Argentina, in the latter half of the nineteenth century, 40 to 50 per cent of immigrants settled in the metropolitan area of Buenos Aires, although three fourths of those with occupations had at the time of arrival declared themselves agricultural workers. Germani, *Política y sociedad en una época de transición* ... (1962), pp. 186, 189-190.

<sup>290</sup> Compiled from Ferenczi, "Introduction and notes" (1929), pp. 824-825. See also Ratti, "Italian migration movements ..." (1931), p. 455.

<sup>291</sup> Hutchinson, *Immigrants and Their Children* ... (1956), pp. 66, 93, 137, 178; Vöchting, *Die heutige italienische* ... (1960), p. 673.

<sup>292</sup> Cruickshank, "New Zealand—external migration" (1931), p. 194.

<sup>293</sup> Spengler, *France Faces Depopulation* (1938), p. 205; Sauvy, "European migrations ..." (1949), p. 23; Fromont, *Démographie économique* ... (1947), p. 191; Stadulis, "The resettlement of ..." (1952), pp. 213-218; Taeuber and Barclay, "Korea and the Koreans ..." (1950), p. 285; Organisation for Economic Co-operation and Development, *International Joint Seminar on the Adaptation* ... (1965), p. 52.

<sup>294</sup> Thomas, "From the other side ..." (1966); and his "The economic resurgence ..." (1962), pp. 82-83; Parenti, "Introduction" (1962), pp. 10-11, 13.

<sup>295</sup> In the United States, between 1940 and 1960, the input of the factors of production increased by only 1.7 per cent per decade, whereas output grew by 29 per cent. This large rise in output has been attributed to the increased skill of the labour force, and to advances in technology, organization and management. Besterman, "Immigration as a means ..." (1967), p. 196.

<sup>296</sup> Spengler, "Effects produced in receiving countries ..." (1958), pp. 29-32; Hutchinson, "Immigrant workers in growing industries ..." (1963), pp. 459-460.

<sup>297</sup> For example, an upward mobility of the native work force has been noted in Switzerland, where a relatively large proportion of foreign workers are unskilled, and have found employment in the less well-paid branches of industry, such as building and construction, hotels and restaurants, and agriculture. Bickel, "Foreign workers and economic growth ..." (1967), p. 56. The proportion of foreign workers engaged in low-status jobs has, however, been declining. Mayer, "Post-war migration to Switzerland" (1965), pp. 128-129. Upward occupational mobility and emigration on the part of native workers has been a factor sustaining the need for Irish labour in British industry in the post-war period. Jackson, *The Irish in Britain* (1963), p. 109.

<sup>298</sup> Nixon, "Occupations of immigrants ..." (1959), pp. 656-657.

tries.<sup>299</sup> They have been replaced by the upwardly mobile non-migrant population, whose former jobs have in turn been filled by immigrants from Southern Europe or, in the case of the United Kingdom, by immigrants from the West Indies and other Commonwealth countries, as well as from Ireland. The majority of intra-European migrants from Southern Europe in recent years are from rural areas, but are finding employment in non-rural occupations.<sup>300</sup>

134. Migratory movements in the developing countries display some of the characteristics of the early phase of European migrations. In Africa, there is still a considerable amount of migration between rural areas. In East Africa, such movements have been stimulated by the development of African entrepreneurial farming and the existence of considerable resources of cultivable land.<sup>301</sup> In Ghana, also, migration for rural employment continues to assume much importance; the census of 1960 shows that nearly one half of the foreign-born from other parts of Africa were enumerated as "farmers, fishermen, etc."<sup>302</sup>

135. European and Asian settlers in Africa, though numerically not very significant, have exerted an important influence on the employment structure. European immigrants with their skills and capital were responsible for the development of certain industries, like mining in the southern part of the continent.<sup>303</sup> Indians have assumed an important position in East Africa where they control a large proportion of the trade, employ many natives on sisal and other plantations, and, in Uganda, own most of the cotton ginneries.<sup>304</sup>

136. The labour requirements of industries introduced and developed by Europeans have drawn an extensive migration of Africans from their tribal homes to centres of industrial activity. The proportion of skilled workers to unskilled in these migrations is very low, and the migrant labour system does not provide the native with much opportunity to acquire or develop skills.<sup>305</sup>

137. An early example of occupational specialization was provided by Chinese immigrants to countries of South-East Asia. Partly as a consequence of discrimination, Chinese immigrants went into commerce in large

numbers; they acted as middlemen and frequently served as liaison between Europeans and natives.<sup>306</sup> Chinese capital was an important factor in the development of certain industries in the receiving countries.<sup>307</sup>

138. In the more recent period, international migration in Asia has consisted mainly of refugee movements and post-war repatriations. The shifts of population which followed the partition of India and Pakistan in 1947 created imbalances in the occupational structure of the labour force, since the Moslems were mainly rural handicraftsmen and peasants, whereas the Hindus included a much higher proportion of professional persons, shopkeepers, government employees and clerical workers.<sup>308</sup> Repatriation of the Japanese caused disruptions in the economies of some countries, notably Korea, where the loss of Japanese technical ability had repercussions on development.<sup>309</sup>

139. Even in overpopulated areas of Asia today, it is considered that the diffusion of skills required for development could be stimulated by carefully controlled small immigrations of skilled manpower and qualified personnel.<sup>310</sup>

140. In their attempts to attract skilled workers in order to promote economic development,<sup>311</sup> some Latin American countries (for example, Brazil and Venezuela) seem to have been more successful than others (for example, Argentina) in the post-war period.<sup>312</sup> There is also evidence in Latin America of some movements between neighbouring countries which consist in part of rural peoples who have settled on the land.<sup>313</sup> The large emigration of professional and technically trained personnel from Cuba following the 1958 revolution in that

<sup>299</sup> Thomas, *International Migration and Economic Development* ... (1961), p. 40.

<sup>300</sup> Organisation for Economic Co-operation and Development, *International Joint Seminar on the Adaptation* ... (1965), pp. 49-58. In England and Wales large numbers of West Indians were employed by the railways, road passenger services and rubber industry, all of which had difficulty attracting non-immigrant labour because of conditions of work or pay. See Peach, "West Indian migration ..." (1967), pp. 43-44.

<sup>301</sup> Southall, "The demographic and social effects ..." (1967), p. 236.

<sup>302</sup> Gil, "Immigration into Ghana ..." (1967), p. 204.

<sup>303</sup> Samuels, "African economic development" (1951), p. 173.

<sup>304</sup> Fitzgerald, *Africa* ... (1961), pp. 237, 246, 262; Church, *Modern Colonization* (1951), pp. 49, 53.

<sup>305</sup> Batten, *Problems of African Development* (1960), part 1, p. 96; International Labour Office, *African Labour Survey* (1958), p. 138; ———, "Interracial wage structure ..." (1958), p. 49; ———, "The development of wage-earning ..." (1956), p. 257. Most of the migrants drawn to Rhodesia and Zambia by the exploitation of mineral resources have gone into unskilled employment. Myburgh, "Migration in relationship ..." (1967).

<sup>306</sup> Chen, *Emigrant Communities in South China* ... (1940), pp. 63-64; Cator, *The Economic Position* ... (1936), pp. 56, 68-72; Jacoby, *Agrarian Unrest in Southeast Asia* (1961), pp. 9, 21, 24; Silcock, "Migration problems of the Far East" (1958), pp. 260-261; Purcell, *The Chinese in Southeast Asia* (1965), pp. 70-71, 127-130, 195-197, 469-470, 540-541, 559; Hayase, "Overseas Chinese in South-East Asia" (1965).

<sup>307</sup> See, for example, Landon, *The Chinese in Thailand* (1941), pp. 124-125, 143; Cator, *The Economic Position* ... (1936), pp. 64, 170-180, 254; Jacoby, *Agrarian Unrest in Southeast Asia* (1961), pp. 116, 152, 238; Simoniia, *Naseleniia kitaiskoi natsionalnosti* ... (1959), pp. 52-53, 85, 96.

<sup>308</sup> Silcock, "Migration problems of the Far East" (1958), p. 265; Brahmananda, "The impact on India ..." (1958), pp. 283-284; International Labour Office, *International Migration* ... (1959), pp. 113-116.

<sup>309</sup> United Nations Korean Reconstruction Agency, *An Economic Programme for Korean Reconstruction* (1954), p. 202.

<sup>310</sup> Silcock, "Migration problems of the Far East" (1958), pp. 268, 270-272.

<sup>311</sup> See, for example, Avila, *Economic Impacts of Immigration* ... (1954), p. 77; and his "Immigration, development and ..." (1961); Beijer, "Scope for Latin America ..." (1965); Mortara, "Population growth and economic difficulties ..." (1962), p. 262.

<sup>312</sup> International Labour Office, *International Migration* ... (1959), pp. 386-388. The shortages of upper level manpower are a particular handicap, since many large-scale industries have installed mechanized, and even automated, plant equipment. See Bouscaren, *International Migrations since 1945* (1963), p. 146.

<sup>313</sup> For example, although statistical information on their numbers are unsatisfactory, there appears to have been a substantial movement of migrants from the rural districts of El Salvador to those of Honduras. Smith, "Migration from one ..." (1959).

country deprived the new régime of badly needed manpower in certain categories of skill.<sup>314</sup>

141. Immigration plays a much less significant role in the economic development of agricultural countries today than it did in the growth of the New World in the nineteenth century.<sup>315</sup> However, the qualitative impact of migration in particular contexts can be considerable.<sup>316</sup> In order to sustain economic growth, the developing countries must ensure a sufficiently rapid growth in the middle and upper levels of manpower relative to the growth of the labour force as a whole.<sup>317</sup> The development of the needed occupational skills can be assisted by migration in several ways: by the temporary emigration of *élites* for training abroad; by short-term immigration of technical experts from developed countries; or by organized programmes for permanent immigration of workers with special skills.<sup>318</sup>

142. Numerous recent studies have been concerned with the fact that in a situation of world-wide shortage of technical and specialized workers, the "pull" of the industrially advanced countries is so strong that qualified workers are being attracted even from the developing countries. This outflow of trained personnel is seen in the very considerable number of scientists and engineers, teachers, doctors and academic persons from developing countries who have taken employment and remained permanently, or for long periods, in the advanced country.<sup>319</sup> Scientists from industrialized countries of Europe have likewise been drawn to the richer countries, particularly the United States, by the promise of greater professional and financial opportunities, but the European countries have been able to offset some of their losses by drawing upon skilled personnel from their former colonies or other developing countries.<sup>320</sup>

<sup>314</sup> MacGaffey and Barnett, *Cuba; Its People, Its Society, Its Culture* (1962), pp. 279, 328.

<sup>315</sup> It has been said that the achievement of rising *per capita* incomes in the less developed countries today depends more on endogenous factors; in so far as it depends on exogenous factors, immigration of labour plays a less important role because of labour-saving processes, the transfer of techniques through equipment, the reduced international flow of capital, and the rapid rates of population increase in the developing countries. Ellis, "Are there preferable alternatives..." (1958), p. 360.

<sup>316</sup> Thomas, *International Migration and Economic Development*... (1961), p. 47.

<sup>317</sup> Besterman, "Immigration as a means..." (1967), p. 196. It has been estimated that these categories must grow two to three times as fast as the total labour force.

<sup>318</sup> See, for example, Pletnev, "Economic development and..." (1967); Thomas, *International Migration and Economic Development*... (1961), p. 43; Silcock, "Migration problems of the Far East" (1958), p. 270.

<sup>319</sup> United Nations, Economic Commission for Europe, "Highly qualified technical manpower..." (1957), p. 63; Thomas, "From the other side..." (1966) and his "Trends in the international migration..." (1961), pp. 16-20; Oteiza, "Emigration of engineers from Argentina..." (1965); Gutiérrez Olivás, "La emigración de recursos humanos..." (1965); Philippines, Bureau of the Census and Statistics, Central Research and Statistical Operation Training Staff, "The 'brain drain' problem in the Philippines" (1967).

<sup>320</sup> Sauvy, "The economic and political consequences..." (1969), p. 53; Beijer, "Brain drain as a burden..." (1969), p. 10.

143. Some controversy has developed over the extent of loss sustained by developing countries as a result of the outflow of trained personnel to more advanced countries. Emphasizing that the benefits of research carried out by the scientists in the country of immigration accrue to all peoples, including those of the country of emigration, Grubel and Scott have argued that only in rather rare circumstances does the outflow of trained personnel adversely affect the welfare of the population of less developed countries.<sup>321</sup> Most writers, however, have stressed the detrimental effects in developing countries resulting from the loss of scarce high-level manpower, and the benefits gained by the country of immigration in acquiring specialists whose educational costs they did not have to bear.<sup>322</sup>

## 2. EFFECTS ON EMPLOYMENT AND UNEMPLOYMENT

144. Because of the common belief that immigration tends to increase unemployment and emigration to reduce it, Governments have imposed limitations on immigration and the employment of immigrants during certain periods, and some Governments have tried to alleviate unemployment by promoting emigration. The timing of migratory movements in relation to business cycles is of much importance, since an influx of immigrant workers during periods of depression would be likely to aggravate the unemployment situation, but empirical studies show that generally the flow of migrants has been greatly curtailed during such periods.<sup>323</sup>

145. The findings of numerous studies suggest that the effects of migration on unemployment are not simple. They are conditioned in part by the fact that the migrants commonly have a distinctive distribution by occupation, industry, and place of residence within the country, so that they are not in full and direct competition with the rest of the labour force. Under some conditions, immigration may reduce unemployment by helping to break bottlenecks due to an insufficient supply of domestic labour in certain occupations or localities, and thus facilitate a general increase in employment.<sup>324</sup> Conversely, the departure of emigrants from particular segments

<sup>321</sup> Grubel and Scott, "The international flow of human capital" (1966), pp. 273-274. See also Johnson, "The economics of the 'brain drain'..." (1965), p. 306.

<sup>322</sup> See, for example, Thomas, "'Modern' migration" (1968), p. 40; Muir, "Should the brain drain be encouraged?..." (1969), pp. 36-37, 47; Patinkin, "A 'nationalist' model" (1968), p. 103.

<sup>323</sup> See, for example, Eckler and Zlotnick, "Immigration and the labor force" (1949), pp. 95-96; Avila, *Economic Impacts of Immigration*... (1954), pp. 50-51; Thomas, "The economic aspect" (1955), p. 171. As noted in section C.2 above, during the depression period of the 1930s in the United States, the number of immigrants coming to seek employment declined more than the number arriving to join relatives.

<sup>324</sup> Isaac, *Economics of Migration* (1947), p. 220. The immigration of refugees to the British Isles in 1933-1938 was found to create employment for British nationals. Walshaw, *Migration to and from*... (1941), p. 93. Through occupational selection of migrants and the direction of displaced persons to specific kinds of employment, Australia was able to ease some of the bottlenecks in her economy after the Second World War. Foxcroft, "Australian migration policy" (1950).



of the labour market may create bottlenecks and increase unemployment.<sup>325</sup>

146. The effect of the arrival of a large number of immigrants on the unemployment level also depends on the volume of investment in productive facilities for their employment, which in turn depends on such factors as the availability of capital, the profits foreseen by prospective investors etc. (see also chapter XIII). In the United States during its period of mass immigration, the immigrants were largely absorbed in industries such as iron and steel and textiles, which were being expanded through heavy investments. This expansion in investment would have been difficult without immigration; on the other hand, when investments lagged, the immigrants tended to replace native workers instead of increasing employment and production.<sup>326</sup>

147. Since migrants are consumers as well as producers, they contribute not only to an increase in the number of job seekers, but also to an increase in the demand for consumer goods and services. Sauvy has, in fact, illustrated some of the principles involved in the argument that a cross-section of immigrants having the same occupational distribution as the general population should not add to unemployment. For example, the physicians and barbers need not fear being displaced by immigrants, since the immigrants will need haircuts and medical care.<sup>327</sup> Writers who have emphasized the role of migrants as consumers have argued that immigration actually tends to reduce unemployment because of the additional employment opportunities likely to be created in response to the immigrants' consumer demands.<sup>328</sup> In fact, if the immigrants have the purchasing power to create effective demand for the many items required for the establishment of their new homes, they may even increase the volume of consumer demand disproportionately.<sup>329</sup> Some time may elapse, however, until the immigrants establish themselves and acquire the needed purchasing power.<sup>330</sup>

148. On the other hand, since migrants typically have a higher proportion of workers than the non-immigrant population, immigration may increase the demand for employment disproportionately to that for consumer goods, thus increasing unemployment. Moreover, the new opportunities for employment created by the arrival

of additional consumers may not be in the same industries and occupations where the immigrants seek employment, resulting in at least some temporary dislocations in the economy.

149. The economic problems of a number of European countries are believed to have been alleviated by emigration during the late nineteenth and early twentieth centuries.<sup>331</sup> This emigration not only improved the employment situation by reducing the labour supply, but it also widened the opportunities for export of consumer goods and investment capital. Much of the unemployment and underemployment which prevailed in Europe during the period between the two world wars was attributed to the slackening of overseas emigration which took place in the 1920s and 1930s.<sup>332</sup> In more recent years, the resumption of overseas emigration contributed to a reduction of unemployment and underemployment in Southern Europe.<sup>333</sup> It has been noted, however, that the improvement in the employment situation has been less in those sectors of the labour force where the surpluses were greatest, namely among agricultural workers and unskilled labourers.<sup>334</sup>

150. The findings of the various studies show that the relationship between immigration and emigration on the one hand, and the levels of employment and unemployment on the other are subject to no simple rules and depend on conditions such as the characteristics of the migrants, the timing of the movement, and various aspects of the economic situation in the countries concerned.

### 3. EFFECTS ON WAGE LEVELS

151. Various authors have been concerned not so much with the possibility that immigration might raise unemployment as with its potential role in lowering wages. A number of studies have considered the theoretical relationships between immigration and wage levels in the receiving countries,<sup>335</sup> and the fear of falling wages has often led labour organizations to favour restrictions on immigration.<sup>336</sup> As in the case of the effects of immigration on unemployment, the relationship between immigration and wages is likely to be complex, since

<sup>331</sup> See, for example, Novitsky and Tolokonsky, "Vliianie emigratsii na usloviia ..." (1929), p. 98.

<sup>332</sup> For example, Boháč, *Mémoire sur le problème démographique* ... (1937), p. 14, advocated a return to free trade and free migration to solve the unemployment problem in Czechoslovakia. See also Skaug, *Memorandum* ... (1937), p. 118.

<sup>333</sup> Kirk, "Major migrations since World War II" (1958), pp. 20-21. Emigration has been urged as a means of combating structural unemployment in Italy. See, for example, Capanna, "Economic problems and reconstruction in Italy: 2" (1951), pp. 31-33; Parenti, "Italy" (1958), pp. 94-95.

<sup>334</sup> International Labour Office, *International Migration* ... (1959), pp. 367, 369.

<sup>335</sup> For a discussion of some of these studies, see Isaac, *Economics of Migration* (1947), pp. 200-209.

<sup>336</sup> Spengler, "Effects produced in receiving countries ..." (1958), p. 42. It has been said that, owing to the influence of trade unions in most industrialized countries, an inflow of foreign labour would not lower wages, but would result in unemployment. Citroen, *Les migrations internationales* ... (1948), pp. 142-143.

<sup>325</sup> During the depression of the 1930s, demands for deportation of alien workers in France were answered by arguments stressing that these workers were engaged in occupations for which the French population could not furnish an adequate supply. Spengler, *France Faces Depopulation* (1938), p. 206; Wlocewski, "Y a-t-il trop de travailleurs ... ?" (1935); Ferenczi, "Contre-migration et politique d'émigration" (1936), pp. 475-476; Mauco, "Alien workers in France" (1936), pp. 186-189.

<sup>326</sup> Timlin, "Economic theory ..." (1950), pp. 213-214.

<sup>327</sup> Sauvy, "Some aspects of ..." (1948), p. 35.

<sup>328</sup> Fromont, for example, advocated liberalization of the immigration law of the United States as a means of increasing investment and employment in that country. Fromont, *Démographie économique* ... (1947), p. 199.

<sup>329</sup> Timlin, *Does Canada Need More People?* (1951), pp. 21-22, 99-109.

<sup>330</sup> Karmel, "The economic effects of immigration" (1953), pp. 85-90.



immigrants, because of their occupational characteristics and settlement patterns, typically compete with only a segment of the native labour force.<sup>337</sup> Very few studies have attempted to isolate the influence of immigration on the wage structure in actual experience. It has been postulated, however, that the decline in real earnings of unskilled labour in the United States between 1900 and 1914 was related to the large volume of immigration of that period.<sup>338</sup>

152. The effect of emigration on wages in the sending country may be more direct than in the receiving country. By reducing the supply of labour in Europe, overseas emigration may account for the more rapid rise in real wages in several countries of Europe than in the United States from 1860 to 1913.<sup>339</sup> The effect of emigration will not necessarily be in the direction of raising wages, however; it may depress wages if the emigrant labour is complementary to non-emigrant labour, just as immigration may help to raise the general wage level if it is complementary to, rather than competitive with, native labour in a rapidly developing country with ample resources.

#### 4. EFFECTS ON THE BALANCE OF PAYMENTS

153. Migration may directly affect the balance of international payments through the funds which the migrants carry with them to the new country and the remittances they send to the home country.<sup>340</sup> According to available statistical evidence, funds brought by immigrants have always been small relative to the amounts brought into countries of immigration in other ways.<sup>341</sup> But immigrants' remittances and funds taken out by returning migrants have in many cases been of great

importance.<sup>342</sup> In seasonal and intracontinental migrations in particular, the migrants typically return a considerable part of their incomes to the country of origin. Exact measurement of the remittances is difficult, but it is estimated that in the early 1960s they amounted to between 1 and 2 per cent of national income in Italy and Spain, 2 and 3 per cent in Portugal, and 3 and 5 per cent in Greece.<sup>343</sup>

154. Where foreign workers constitute a large percentage of the labour force, remittances are said to have sometimes adversely affected the balance of payments for the immigration country. In Ghana, the export of foreign exchange by temporary immigrants created no problems for a time but, with the sharp reduction of foreign exchange reserves by 1963, Ghana limited the allowable remittances of foreign nationals working there.<sup>344</sup> It has been noted that compensation for losses to the immigration countries resulting from remittances may occur, for example, if the immigrants are producing commodities which would otherwise have to be imported.<sup>345</sup> Compensation may also take place if returning migrants create a demand for goods to which they became accustomed while in the immigration country.

#### 5. OTHER ECONOMIC CONSEQUENCES

155. Whether the increase in labour force size resulting from immigration tends to raise productivity and hence contributes to economic growth depends on a number of factors, such as the supply of natural resources and the availability of capital for the absorption of new workers. Some of these aspects are discussed in chapter XIII. The mass immigrations of the past are believed to have stimulated economic development in Australia, New Zealand, Canada, Argentina and Brazil—and in the United

<sup>337</sup> Some authors have discussed the indirect effects on wage levels in occupations not entered by the migrants. See, for example, Isaac, *Economics of Migration* (1947), pp. 203-205; Spengler, "Effects produced in receiving countries . . ." (1958), pp. 19-21.

<sup>338</sup> Douglas, *Real Wages in the United States . . .* (1930), pp. 177-178. In Canada, also, where immigrants furnished cheap labour for manufacturing industries during the early part of the twentieth century, money wages were rising, but perhaps not as rapidly as they might have in the absence of immigration. Corbett, *Canada's Immigration Policy . . .* (1957), p. 132. In São Paulo, where about half of Brazil's immigrants have settled, immigration does not appear to have lowered wage levels. Avila, *Economic Impacts of Immigration . . .* (1954), pp. 89-91. See also his "Brazil" (1958), p. 189. The fear on the part of trade unions that immigrants would deprive native workers of their jobs or lower their living standards by accepting lower rates of pay has not been justified in European countries since the Second World War. Zubrzycki, "Across the frontiers of Europe" (1959), p. 171.

<sup>339</sup> Ellis, "Are there preferable alternatives . . ." (1958), p. 359. See also Phelps-Brown and Hopkins, "The course of wage rates . . ." (1950), p. 236.

<sup>340</sup> United Nations, *Elements of Immigration Policy* (1954), pp. 6, 8.

<sup>341</sup> Isaac, *Economics of Migration* (1947), pp. 233-240. However, Fromont in *Démographie économique . . .* (1947), p. 195, cites statistics showing rather considerable amounts of capital carried by German emigrants. Thomas in *Migration and Economic Growth . . .* (1954), p. 220, refers to the adverse effect on the balance of payments experienced by Britain as a result of capital taken out by emigrants after the Second World War.

<sup>342</sup> For example, Harkness mentioned the large sums of money that Irish emigrants sent home following periods of heavy emigration. Harkness, "Irish emigration" (1931), pp. 269-270. Parenti's analysis for Italy for the period 1861-1940 indicates that remittances accounted for as much as 4.7 per cent of national income during 1901-1910. The author concludes that remittances were an important and perhaps the decisive factor in the economic leap forward which Italy experienced in that decade. Parenti, "The role of emigrants' remittances . . ." (1967). One estimate of the average annual cash remittances of overseas Chinese for twenty or thirty years before the outbreak of the Sino-Japanese War reaches an amount far exceeding the country's unfavourable trade balance. Lasker, *Asia on the Move . . .* (1945), p. 83. As a result of remittances, families of persons who had emigrated from China were economically much better off than non-emigrant families. Chen, *Emigrant Communities in South China . . .* (1940), pp. 87-88. Because emigrants represented only a minute fraction of India's population, the effect of remittances has been rather modest. See Sundaram, "Effects of emigration . . ." (1955), pp. 234-238; Jennings, *The Economy of Ceylon* (1951), pp. 44-45. For other estimates of monetary transfers made in connexion with certain migratory movements, see Citroen, *Les migrations internationales . . .* (1948), pp. 97-98; Isaac, *Economics of Migration* (1947), pp. 244-247; Weber, "The employment of aliens in Germany" (1965), p. 37.

<sup>343</sup> Parenti, "The role of emigrants' remittances . . ." (1967), p. 222.

<sup>344</sup> Gil, "Immigration into Ghana . . ." (1967), p. 205. See also Caldwell, "Migration and urbanization" (1967), pp. 120-121. On effects of remittances in Switzerland and Ceylon, see, respectively, Bickel, "Foreign workers and economic growth . . ." (1967); Hague, "Summary record of the debate" (1958), p. 442.

<sup>345</sup> Bourgeois-Pichat, "Migrations et balance des comptes" (1949).

States until late in the nineteenth century—by bringing into being a better combination of the factors of production and releasing the forces of increasing return.<sup>346</sup>

156. On the other hand, in certain situations emigration is believed to be desirable as a means of raising productivity, for example, in the case of densely populated agricultural countries such as Haiti and Mauritius, and in Greece and Italy where large rural populations are employed at a low level of productivity on relatively small areas of cultivable land.<sup>347</sup> Even in some highly industrialized countries like the Netherlands, emigration has been considered advantageous at certain periods, because of a fairly rapid rate of population growth and a shortage of raw materials.<sup>348</sup>

157. Since migration is usually selective with respect to sex and age characteristics, its effect on the structure as well as the size of population has a bearing on its economic benefits or disadvantages. In those instances where immigration has been on a sufficiently large scale to significantly increase the ratio of workers to dependants, the effect may be economically advantageous to the receiving country provided that other conditions are favourable. The progressive ageing of France's population was offered as an argument for admitting large numbers of immigrants in ages 26 to 35 years after the Second World War, since such an immigration would distribute the dependency burden among a larger number of productive adults.<sup>349</sup> The effect of migration on the population's sex and age structure has been considered of such importance that even in some situations where a reduction in total population size might be considered beneficial from the economic point of view, it is argued that emigration would be undesirable because of the likely disproportionate loss of young adults.<sup>350</sup>

158. Immigration flows which bring in a relatively high proportion of young adult workers are considered advantageous for the receiving countries for other reasons. It is said that the country of immigration derives the benefit, in the form of productive labour, from the investment which the sending country has made in the maintenance

<sup>346</sup> Spengler, "Effects produced in receiving countries . . ." (1958), pp. 38-41.

<sup>347</sup> United Nations Mission of Technical Assistance to the Republic of Haiti, *Mission to Haiti* (1949), p. 34; Mauritius Legislative Council, *Report of the Committee on Population, 1953-54* (1955), pp. 30-31; Oblath, "Considérations sur les besoins . . ." (1955).

<sup>348</sup> Winsemius, "De geografische aspecten . . ." (1949); Steigenga, "Bevolkingsvermeerdering . . ." (1949); Beijer and van den Beld, "Effects of migration on the economic situation . . ." (1955), p. 10. Calculations of the size of the labour force required to maximize real income per head showed that an annual net emigration would be advantageous for the United Kingdom and the Netherlands. Isaac, "Conditions influencing needs . . ." (1955); Isaac and van den Beld, *The Effect of European Migration . . .* (1953), pp. 39-53, 83-95. By the middle of the 1950s favourable trade developments led Hofstee to believe there was no longer a need for emigration from the Netherlands. Hofstee, "Netherlands" (1958), p. 102.

<sup>349</sup> Vincent, "Vieillessement de la population . . ." (1946), pp. 240-244.

<sup>350</sup> Sauvy, *Théorie générale de la population . . .* (1963), vol. 1, p. 97.

and education of these persons during their youth.<sup>351</sup> For example, it has been maintained that the United States was spared the cost of raising to manhood a large fraction of its labour force, and that this cost, borne by the countries of emigration in Europe, represents a great contribution of Europe to the wealth of America.<sup>352</sup>

## 6. ECONOMIC EFFECTS OF SELECTED POST-WAR MIGRATIONS

### (a) *More developed countries*

159. Some studies have examined the effects of migrations occurring in the post-war period on various aspects of the economies of the countries involved. The initial mass immigration into Israel was accompanied by much unemployment, but with heavy government outlays and massive assistance from abroad, only 3 per cent of the civilian labour force remained unemployed by 1963. Immigration has continued to exert strong inflationary pressures, however, particularly since the more recent migrants have a larger average family size and relatively lower levels of skills and productive efficiency, as compared with earlier immigrants. Absorption of the immigrants was possible only because the whole national economy was organized towards this end, and because of the very large transfers of capital from abroad.<sup>353</sup>

160. Though in no other country were the pressures from immigration so severe, or the assistance from abroad so large, some of the same economic features have appeared elsewhere. There were strong inflationary trends in the Australian economy in the late 1940s, arising from the release of demands for goods and services which had been restricted during the war, and refugee immigration into Australia at this time would have greatly intensified these inflationary pressures had it not been for the adoption of policies which directed the immigrants into basic industries where labour shortages existed, and the postponement of large investments in housing by accommodating the immigrants temporarily in old army camps and other wartime buildings. Immigration continued to be favoured by the Government after 1950, and indigenous capital formation, investments from overseas and a favourable balance of payments were adequate to sustain a population growth rate which approximated 2 per

<sup>351</sup> United Nations, *Elements of Immigration Policy* (1954), p. 6; Singer, "The distribution of gains . . ." (1950), p. 483.

<sup>352</sup> Gini, "Apparent and real causes . . ." (1948), pp. 356-361; Vita, "Der kapitalisierte . . ." (1940). Some attempts have been made to estimate the costs of rearing a child to adulthood, but much of the benefit to be derived by the country of immigration depends on the kind of education and training the migrant received, and its relevance to the work he performs in the new country. Isaac, *Economics of Migration* (1947), p. 229. For estimates of the monetary value of human capital that Brazil has obtained through immigration, see Avila, *Economic Impacts of Immigration . . .* (1954), p. 61. See also Mortara, *O custo de produção do homem adulto . . .* (1946), p. 118. It has been estimated that the cost to the United Kingdom of educating and training an emigrant is from £500 to £1,000. Plant, *Overseas Settlement . . .* (1951), p. 3. Clough has calculated the loss to Italy resulting from emigration. Clough, *The Economic History of Modern Italy* (1964), pp. 139-140.

<sup>353</sup> Sicron, "The economics of immigration . . ." (1967). See also International Labour Office, *International Migration . . .* (1959), pp. 85-90.

cent annually, without eroding *per capita* real income. Problems arising from the high demand for non-productive investment—for example, in housing, schools, and public works—which resulted from the emphasis on family immigration, have been contained, perhaps partly because of investment lags, and partly by the careful recruitment of immigrant workers of high productive efficiency possessing skills most needed in the Australian economy.<sup>354</sup>

161. Immigration into Canada in the post-war period, though less planned, appears to have had broadly similar economic consequences. It has augmented the labour supply at a time when its increase was lagging, has supplied new skills, and has been one factor in the marked rise in over-all productivity since 1945. It has been said that "Canada affords a typical example of an economy of rapidly increasing returns, in which there are sufficient material resources and capital available to enable the productivity of labour to increase rapidly; thus the entry of additional workers into the labour force cannot but have made a direct contribution to this trend".<sup>355</sup> While immigration cannot be considered the cause of the post-war investment boom, it may have been indispensable to its realization.<sup>356</sup>

162. Intracontinental migration within Europe in the post-war period has been largely regulated by means of employment permits which authorize foreigners to work for a stated period in certain occupations in which the demand for labour cannot be satisfied in the domestic labour market. Various agreements have been worked out to promote the flow of labour from areas in which it was redundant to areas in which it was in short supply.<sup>357</sup> The rapid rate of economic growth in Western Europe since 1953 permitted the absorption of an increased number of immigrants. This period has been marked by an increase in commodity trade which has brought raw materials into European industrialized countries cheaply enough and in quantities sufficient to enable the manufactured goods to compete on world markets and the industries of these countries to absorb enough immigrant labour to increase their work forces, or to replace labour which had emigrated.<sup>358</sup> The countries of Northern and Western Europe have been able to sustain investment levels high enough to attract immigrants who have gone in greatest numbers into areas where the expansion of the indigenous work force was lowest, owing to demographic factors. The large inflow of foreign workers to Switzerland undoubtedly contributed to an acceleration of that country's economic growth during the 1950s, but the

appearance of inflationary effects on the price level, and other economic disadvantages, led to restrictions on admissions of foreign workers in 1963.<sup>359</sup> At the same time, emigration from Southern European countries has contributed to more effective resource allocation by holding down the labour supply, which might otherwise have exceeded the absorptive capacity of the economy.<sup>360</sup> But the exodus from some of these countries may have reached proportions by the 1960s where it was draining them of manpower essential to their development.<sup>361</sup> In Ireland, too, continued net emigration was considered to have a dampening effect on economic activity.<sup>362</sup>

#### (b) *Less developed countries*

163. In Africa, the migration system, which has furnished employers with the main source of labour supply, has been said to perpetuate the low wage structure, particularly since the worker's family has an alternative means of support in agriculture.<sup>363</sup> There are differences of opinion regarding the efficiency of the system from the point of view of the employer and the economy generally.<sup>364</sup> Some writers have emphasized the instability of the system, whereby the numbers seeking work may vary from year to year, labour turnover is high, and productivity low. Moreover, travel over long distances has had adverse effects on the health of workers.<sup>365</sup> On the other hand, a more favourable view is taken by some writers. It is said that, by creating easy labour supply conditions, the migration system has permitted West Africa to enjoy greater economic growth than otherwise would have been possible. Furthermore, there is an advantageous seasonal

<sup>359</sup> Bickel, "Foreign workers and economic growth ..." (1967), pp. 55-56; United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1964* ... (1965), chap. 2, pp. 35-36.

<sup>360</sup> Kindleberger, "Emigration and economic growth" (1965), p. 253.

<sup>361</sup> Triantis believed that the high rate of emigration experienced by Greece in 1962 and 1963 might be detrimental if continued. Triantis, "Population, emigration and economic development" (1967), p. 247. Emigration from Greece had further accelerated by 1965, and Zolotas cited resultant labour shortages in both the agricultural and non-agricultural sectors which were holding back Greek economic development. Zolotas, *International Labor Migration* ... (1966), pp. 47-51. See also Papelasis, "Les problèmes de la main-d'œuvre de la Grèce ..." (1963), pp. 318-319; Parenti, "Italy" (1958), pp. 94-95. Parenti noted that emigration had made a definite contribution to the country's economic development, except in cases where an excessive outflow created problems in key sectors of the economy.

<sup>362</sup> United Nations, *Economic Planning in Europe* (1965), chap. 2, p. 7; Batten, *Problems of African Development* (1960), part 1, p. 96; more employment opportunities in industry to help reduce emigration and overcome a period of economic stagnation.

<sup>363</sup> United Nations, *Review of Economic Conditions in Africa* (1951), p. 12; Orde Browne, *Labour Conditions in East Africa* (1946), p. 7; Batten, *Problems of African Development* (1960), part 1, p. 96; International Labour Office, *African Labour Survey* (1958), p. 138.

<sup>364</sup> See, for example, Hailey, *An African Survey* ... (1957), pp. 1277-1278.

<sup>365</sup> Some of these unfavourable aspects are noted in International Labour Office, *African Labour Survey* (1958), p. 137; ———, "Inter-territorial migrations ..." (1957), pp. 307-310; Bovill, "Native labour" (1950), pp. 32-33; Orde Browne, *Labour Conditions in East Africa* (1946), pp. 6, 15, 17-18, 24; International Labour Office, "Interracial wage structure in certain parts of Africa" (1958), pp. 48-49; Batten, *Problems of African Development* (1960), part 1, pp. 96, 99-101.

<sup>354</sup> Appleyard, "The economics of immigration into Australia" (1967). See also Copland, "Australian development and immigration" (1951).

<sup>355</sup> International Labour Office, *International Migration* ... (1959), pp. 384-385.

<sup>356</sup> Corbett, *Canada's Immigration Policy* ... (1957), p. 170. See also Timlin, "Canada" (1958), p. 159.

<sup>357</sup> International Labour Office, *International Migration* ... (1959), pp. 214-217; Organisation for Economic Co-operation and Development, *International Joint Seminar on the Adaptation* ... (1965), pp. 51, 60-61.

<sup>358</sup> Thomas, *International Migration and Economic Development* ... (1961), pp. 36-41.

dovetailing, whereby the periods of peak wage labour demand for agricultural export crops coincides with the dry season when the need for men to participate in the cultivation of traditional crops in the villages is at a minimum.<sup>366</sup>

164. Also controversial are the effects of the outflow of migrants on the economies of the tribal village. In many studies it has been maintained that the problem of raising sufficient food to support the population has been aggravated by out-migration, and that the dependency burden of those who do not migrate has been increased.<sup>367</sup> The findings of other studies suggest that, while the villagers have found it necessary to make certain adjustments to compensate for the absent men, the production of traditional crops has not suffered greatly.<sup>368</sup>

165. Owing to the relatively small size of many African nations, efficient use of manpower there may require movements across international boundaries. In Asia, on the other hand, movements motivated by similar economic forces are likely to take place mostly within the great land masses of nations, and thus constitute internal, rather than international, migration. As noted earlier, the principal large-scale migrations in Asia following the Second World War were associated with political events. The absorption of refugees after the partition of India and Pakistan is said to have required the investment of large sums which otherwise could have been invested in the development of the economy.<sup>369</sup>

166. In Latin America, immigration policy, which has traditionally favoured the settlement of immigrants on the land,<sup>370</sup> has presented many problems. Although

large-scale, well-subsidized group settlements have often met with considerable success, while at the same time transmitting their more advanced farming methods to the local population,<sup>371</sup> the isolated immigrant farmer has tended, rather, to adopt the wasteful methods of cultivation characteristic of the region.<sup>372</sup> Moreover, some immigrants admitted for work in agriculture have later migrated to urban areas where they have sought employment in the already saturated tertiary sector of the labour market.<sup>373</sup>

167. Early immigration to Latin America was accompanied by the transfer of sizable amounts of capital—either brought by the immigrants directly or introduced by European investors<sup>374</sup>—which permitted the establishment of many economic enterprises. In more recent years, both European investment and immigration to Latin America have been considerably reduced,<sup>375</sup> and the high rates of return migration<sup>376</sup> partly reflect this lack of sustained and expanding investment to absorb the immigrants.

## E. Social aspects of migration

168. Migration has not been viewed solely in economic terms as the movement of producers and consumers. Much attention has also been given to problems associated with the integration of migrants into the social fabric of the receiving country. Immigrants bring with them their customs, language, religion and political ideas, and are constantly faced with many problems of adjustment to their new environment. This complex process of adjustment has been examined in many studies in recent years, although there has been little attempt at systematic and comparative analysis.<sup>377</sup>

### 1. SOCIAL GOALS OF IMMIGRATION

169. Some writings have been concerned with the proper social goals of immigration: how much cultural diversity should be encouraged, and whether the aim should be to “assimilate” or “integrate” the migrant into

<sup>366</sup> Berg, “The economics of the migrant labor system” (1965), pp. 161-164. See also Skinner, “Labor migration among the Mossi . . .” (1965), pp. 67-70.

<sup>367</sup> Food and Agriculture Organization of the United Nations, *FAO Africa Survey* . . . (1962), p. 18; International Labour Office, “Interracial wage structure . . .” (1958), pp. 48-49; Hailey, *An African Survey* . . . (1957), pp. 1386-1387; Batten, *Problems of African Development* (1960), part 1, p. 33.

<sup>368</sup> Despite the absence of over 40 per cent of adult males, there appeared to be no ill effect on food production among the Esu people of Cameroon (the British Cameroons). Ardener and Ardener, “Migration among two Southern Cameroon tribes . . .” (1960), pp. 217, 227. Subsistence production appeared to be little affected in certain districts of Northern Nigeria where more than a third of the men were absent. Prothero, “Migratory labour from north-western Nigeria” (1957), pp. 255-260. Berg, in “The economics of the migrant labor system” (1965), p. 171, called attention to the existence of co-operative work groups in the villages which helped to keep production from falling. Skinner found no clear evidence that the seasonal migration of men adversely affected the production of basic food crops. Skinner, “Labor migration among the Mossi . . .” (1965), p. 70. See also his “Labour migration and its relationship . . .” (1960), p. 383.

<sup>369</sup> International Labour Office, *International Migration* . . . (1959), pp. 116-120. According to Brahmananda, this migration reduced the average level of earnings in overcrowded occupations in India, and increased inflationary pressures. Brahmananda, “The impact on India . . .” (1958), pp. 290-291.

<sup>370</sup> The need to settle and develop the hinterlands has been much emphasized, but the predominance of large estates in the agricultural organization was not conducive to attracting independent proprietors. See, for example, Smith, *Brazil* . . . (1963), pp. 119-120; Dickmann, *Población e inmigración* (1946), pp. 62-64; Shellenberger, “Argentina’s agricultural future” (1945); Avila, *Economic Impacts of Immigration* . . . (1954), p. 80.

<sup>371</sup> In Mexico, for example, colonies founded by American Mormons and German-Canadian Mennonites, using superior agricultural techniques, serve as demonstration projects to peasants in the vicinity. Whetten, *Rural Mexico* (1948), pp. 158-164. Similarly, the Dutch agricultural settlement of Holambra in Brazil, and the Pedrinhas settlement of Italians, also in Brazil, have disseminated advanced techniques brought from Europe. Besterman, “Immigration as a means . . .” (1967), p. 197. The settlement at Turén, Venezuela, where immigrants were carefully selected and given substantial financial assistance from the Government achieved a much higher standard of production than did other settlements in Venezuela which were not similarly planned and assisted. Unión Panamericana, *Las inmigraciones en Venezuela* . . . (1956), pp. 85-112; Zañartu, “Immigration and development” (1963), pp. 98-99.

<sup>372</sup> Pan American Union, *Immigration in Latin America* (1964), p. 104.

<sup>373</sup> Bouscaren, “Italy’s role in international migration” (1962), p. 84; Zañartu, “Immigration and development” (1963), p. 98.

<sup>374</sup> See, for example, United Nations, Economic Commission for Latin America, *Immigration in Chile* (1950), p. 83.

<sup>375</sup> Thomas, *International Migration and Economic Development* . . . (1961), p. 44.

<sup>376</sup> See Neiva, “International migrations . . .” (1965), p. 128.

<sup>377</sup> Eisenstadt, “Analysis of patterns . . .” (1953), p. 167.

his new society. The predominant view is that the concept of "integration" is to be preferred, since it implies a two-way process, whereby the immigrant is changed by his association with the native group, but he in turn has an impact on the community.<sup>378</sup> Thus, emphasis is placed on the desirability of cultural pluralism within a framework of social unity, a process involving adjustment of the immigrants toward uniformity in certain areas, while preserving cultural differences in others.<sup>379</sup>

170. A UNESCO conference of migration experts, meeting in 1955 to consider the impact of immigration on different spheres of society, concluded that immigrants have generally not fundamentally altered the existing social organization and patterns, though they have contributed to the cultural enrichment of their new society.<sup>380</sup> In such important immigration countries as Australia, Canada and the United States, certain writers have emphasized the economic contributions of migrants, while giving less importance to their role in instituting social change.<sup>381</sup> Immigrants to Brazil are said to have had an important influence on economic development and cultural life, without having much effect on political, organizational and structural patterns.<sup>382</sup> On the other hand, immigration into Argentina, which was on a large scale relative to the size of the native population, played a major role in the modernization of the country and the transformation of its social structure.<sup>383</sup>

## 2. SOCIAL ABSORPTIVE CAPACITY

171. Cultural factors may determine the desirable upper limits of immigration, since it might happen that a country could absorb a larger number of immigrants in purely economic terms, but not without threatening the "community core", that is, the political, cultural and social factors which have come to dominate the life of a nation. The core may permit a considerable degree of ethnic or cultural diversity, and be changed by this, but when it is felt that the rate of change is beyond the core's power of absorption or tolerance, protective measures are invariably taken in the form of restrictive immigration policies.<sup>384</sup> The core thesis implies that immigrant cultures

will remain minority cultures, and the pressures of the majority will exert a strong influence on immigrants—and particularly the descendants of immigrants—to conform.

172. After the First World War, the point was reached in the United States where it was feared that a further large-scale immigration from Southern and Eastern Europe would have undermined the nation's core,<sup>385</sup> and this fear led to restrictive legislation. Concern has recently been felt in Switzerland that immigration was endangering that country's national identity as well as its social, political and religious internal balances.<sup>386</sup>

173. The problems of assimilation in Israel were unique in that they were not those of merging new cultures with an established one, but rather of building a new nation out of diverse elements; these elements, however, had common bonds in their religion, belief in Zionist ideals, and for many, previous persecution.<sup>387</sup>

## 3. FACTORS AFFECTING INTEGRATION

174. The success or failure of the integration process depends on a number of factors, including the attitude and actions of the Government of the country to which the migrant goes, and of the people among whom he lives, as well as the attitudes and culture of the immigrant group itself.<sup>388</sup> In the immigrant country, a social structure which is not too rigid, and which affords immigrants equal opportunities with natives, is an aid to rapid integration. The opportunities afforded to immigrants in nineteenth-century North America to climb the social ladder on a basis of near equality with non-immigrants facilitated integration.<sup>389</sup> The absence of rigid social stratification and racial and religious prejudices has been cited as a factor in the smooth assimilation of immigrants in Brazil.<sup>390</sup> Immigrant groups have varied in their degree of assimilability. Great differences in language, religion, physical appearance, social customs and cultural tradition

<sup>378</sup> Thomas, *International Migration and Economic Development* . . . (1961), pp. 51-53. For examples of the influence of immigrants on the culture of the receiving population, see Price, *Southern Europeans in Australia* (1963), p. 203, and Gini, "Le problème de l'assimilation" (1955), p. 39.

<sup>379</sup> Borrie, *The Cultural Integration of Immigrants* . . . (1959), p. 94. See also Kiser, "Cultural pluralism" (1949), p. 129.

<sup>380</sup> Handlin, "Conclusion" (1955), p. 189.

<sup>381</sup> Handlin and Handlin, "The United States" (1955); Borrie, "Australia" (1955), pp. 113-114; Jones, "Some social consequences . . ." (1967). Other authors have given a greater emphasis to the long-term effects of cultural and ethnic diversity. See, for example, Price, *Southern Europeans in Australia* (1963), p. 295.

<sup>382</sup> Willems, "Brazil" (1955), pp. 145-146.

<sup>383</sup> Germani, *Política y sociedad en una época de transición* . . . (1962), chap. 7; and his *Mass Immigration and Modernization in Argentina* (1966). According to the latter work (p. 166), about 6.5 million foreigners entered Argentina between 1856 and 1930, whereas the local population was estimated at only 1.2 million in 1856.

<sup>384</sup> Borrie, *The Cultural Integration of Immigrants* . . . (1959), pp. 114-115.

<sup>385</sup> *Ibid.*

<sup>386</sup> Kindlerberger, "Emigration and economic growth" (1965), p. 253. At times, further immigration into France has been seen as a threat to French culture. Nourissier and Pillépich, *Enracinement des immigrés* (1951), pp. 15-16. In applying a concept of social absorptive capacity, the Canadian Government has sought to determine how many immigrants Canada can absorb without dislocating the society in terms of religious and ethnic composition, family and social class structure, political organization and ideology. Jones, "Some social consequences . . ." (1967), p. 208. See also Timlin, "Canada" (1958), p. 150.

<sup>387</sup> For studies of the assimilation and adaptation processes in Israel, see, for example, Eisenstadt, *The Absorption of Immigrants: A Comparative Study* . . . (1954); UNESCO, "Cultural assimilation and . . ." (1956); Eisenstadt, "Sociological aspects of the economic adaptation . . ." (1956); and his "Israel: traditional and modern . . ." (1956); Bachi, "Immigration into Israel" (1958), pp. 334-341.

<sup>388</sup> Bunle, "The cultural assimilation of immigrants" (1950).

<sup>389</sup> Mauco, "The assimilation of foreigners in France" (1950), pp. 15-16; Handlin and Handlin, "The United States" (1955), p. 23.

<sup>390</sup> Neiva and Diégues, "The cultural assimilation . . ." (1959), p. 185.

are likely to impede integration.<sup>391</sup> For example, such differences have generally set Chinese and Indian immigrant communities apart from the populations of the countries in which they have settled, making these groups somewhat resistant to assimilation.<sup>392</sup>

175. Economic absorption of the immigrants has often been referred to as a prerequisite for cultural integration, though the latter does not automatically follow from the former.<sup>393</sup> Moreover, acceptance of the immigrants by the local community is sometimes impeded by the types of economic activity which they pursue.<sup>394</sup> In order to avoid competition for employment between immigrants and the native population in post-war Australia, migrants were carefully selected for industries where there was an acute labour shortage. There was similarly careful planning in the encouragement of particular classes of immigrants to Canada, and the selection of immigrants for rural settlement in Venezuela.<sup>395</sup>

176. While immigration of the family unit is held to be a desirable goal, it is not certain that such migration is an aid to cultural integration. The immigrant family may bring with them patterns of family relationships which differ considerably from those in the country of settlement, and while integration in the new community on an economic level may be relatively easy, integration at the social and cultural level may be long delayed.<sup>396</sup>

<sup>391</sup> The role of religion in contributing to the persistence of cultural values incompatible with complete integration is especially great where the immigrant community is large enough to have its own church where services are conducted in the mother tongue of the immigrants. Zubrzycki, "Across the frontiers of Europe" (1959), p. 178. The Irish immigrants in Boston were set apart by religion and culture from the local community, and as a result their assimilation lagged behind that of other immigrants. Handlin, *Boston's Immigrants, 1790-1865* ... (1941), chap. 5.

<sup>392</sup> See, for example, Davis, *The Population of India and Pakistan* (1951), p. 104; Berry, *Race and Ethnic Relations* (1958), pp. 208-210; Thompson and Adloff, *Minority Problems in Southeast Asia* (1955), pp. 9, 64.

<sup>393</sup> Borrie, *The Cultural Integration of Immigrants* ... (1959), pp. 101-102. The Germans who settled in South Australia in the nineteenth century and the Japanese immigrants to Brazil in the twentieth century are examples of groups which remained culturally isolated, though economically absorbed. Borrie, *Italians and Germans in Australia* (1954), pp. 217-218. Smith, *Brazil* ... (1963), pp. 130, 316-317.

<sup>394</sup> The hostility towards Chinese and Indian migrants in South-East Asia has been closely related to their economic functions, whether it be the wage-depressing competition of coolie labour, the shrewd business practices of merchants or bankers, or the monopolistic control over vital industries. See, for example, Pillai, *Labour in South-East Asia* ... (1947), pp. 123-128; Lasker, *Peoples of Southeast Asia* (1944), pp. 133-137; Cator, *The Economic Position* ... (1936), pp. 63-67, 115; Jacoby, *Agrarian Unrest in Southeast Asia* (1961), pp. 21, 24, 39, 152; Landon, *The Chinese in Thailand* (1941), p. 130. Little objection has been raised to Japanese immigrants in Brazil, who are mostly occupied on plantations and farms, but there has been considerable resentment against the same ethnic group in Peru, where the majority are engaged in commerce. Bradley, *Trans-Pacific Relations* ... (1942), pp. 57-60.

<sup>395</sup> Borrie, *The Cultural Integration of Immigrants* ... (1959), pp. 104-105.

<sup>396</sup> Borrie, *The Cultural Integration of Immigrants* ... (1959), pp. 124-125. Some problems of adjustment encountered by pre-1946 immigrants in Canada were related to the hierarchical family structure which was typical of the rural areas of their native countries. Jones, "Some social consequences ..." (1967), p. 208. The autocratic position of the father in immigrant families from some

177. The facility with which integration takes place also seems to be related to the settlement pattern of immigrants. Adjustment appears to proceed most rapidly when the immigrant has numerous relationships with members of the non-migrant community, while not being cut off entirely from his own ethnic group.<sup>397</sup> Thus, an urban setting is more likely to be conducive to integration than a rural one. In Australia, the ready assimilation of Scandinavian immigrants, in contrast with the Germans, is believed to be partly due to the geographic dispersion of the former, and their economic absorption into a wide range of occupations.<sup>398</sup>

178. Granting to immigrant workers and their families equal access to the social services and benefits enjoyed by natives is an effective means of facilitating adjustment and protecting immigrants from various hazards which lead to indigence and dependency.<sup>399</sup> Other factors of importance include the opportunity for occupational advancement and the freedom to change occupations.<sup>400</sup>

#### 4. SOCIAL PROBLEMS ARISING FROM MIGRATION

179. The frustrations which immigrants experience cause some to reject the new society and engage in crime or other forms of anti-social behaviour, the moral controls of the previous environment having been weakened. In many cases, however, cultural values carried over from the native country are sufficiently strong to sustain the immigrants themselves, and the manifestations of conflict resulting in cultural disintegration and crime appear with greater intensity in the second generation. The children are pulled in two directions; what is learned at school and outside the home is often in conflict with what is learned within the family circle. There is a consequent tendency for this generation to be less law-abiding than their parents.<sup>401</sup>

parts of the Middle East often led to severe conflicts in Israel, where the predominant pattern encourages uninhibited development of children. Isaac, "Israel—a new melting pot?" (1959), p. 250. The low incidence of family migration in said to have contributed to the rapid assimilation of Scandinavians in Australia. Borrie, "Australia" (1955), p. 95. On the other hand, some authors have considered that assimilation has been handicapped when immigrants have included a high proportion of workers without their families. Langrod, "Social problems of absorption ..." (1958), p. 307.

<sup>397</sup> Petersen, *Planned Migration* ... (1955), pp. 184-185. The long retention of certain aspects of Old World culture among the German immigrants in Brazil is believed to be due to their secluded areas of settlement from the outset. On the other hand, the placement of Italian immigrants in the coffee plantations of São Paulo where they had daily contacts with Brazilians stimulated assimilation. Neiva and Diégués, "The cultural assimilation ..." (1959), p. 217. See also Willems, "Brazil" (1955), pp. 122, 134.

<sup>398</sup> Borrie, "Australia" (1955), pp. 94-95.

<sup>399</sup> The equality given to refugees under Britain's social assistance and insurance scheme in the post-war period was an important factor in their successful resettlement. Bülbring and Nagy, "The receiving community in Great Britain" (1955), p. 122.

<sup>400</sup> Zubrzycki, "Across the frontiers of Europe" (1959), p. 168. The refugee population in post-war Austria made great progress toward integration, once restrictions against their employment outside agriculture were lifted. International Labour Office, *International Migration* ... (1959), p. 55; see also pp. 405-408.

<sup>401</sup> MacIver, *The Web of Government* (1947), pp. 77-78; Woolston, "The process of assimilation" (1945), p. 419.



180. Mental disorders are another frequent product of the severe strains to which individual immigrants are sometimes subjected. Suicide and mental hospitalization rates have been found to be higher among immigrants than among the native population,<sup>402</sup> and such evidence as is available suggests that, among refugee groups, rates of mental breakdown are considerably higher than among other migrants.<sup>403</sup> A study of Polish immigrants in Britain suggested a relationship between discrimination in employment and the incidence of mental disorders.<sup>404</sup> In France, a study of Poles who were detained for criminality or mental deficiency showed that the individuals concerned were predominantly agricultural labourers who had been sent to work on isolated farms in conditions which gave them almost no opportunities for contact with other human beings.<sup>405</sup>

181. In Africa, serious social problems have been associated with detribalization resulting from the migration of agricultural workers from a highly regulated tribal life to the freedom of the urban environment where they seek paid employment in industry, mining and commerce.<sup>406</sup> The greater the distance of the migration,

the greater is the likelihood that international boundaries will be crossed and that changes in language, climate and diet will call for adjustment on the migrant's part. In these circumstances, it is not likely that the migrant's former values, his religious beliefs and loyalty to the tribal chief will remain intact, and he is apt to take on new material values.<sup>407</sup> Since the migrants are largely males, a severe strain on the institution of marriage and family organization results.<sup>408</sup> Tensions have risen in the urban areas where there has been a large influx of migrants. There have been serious shortages of suitable housing, resulting in the growth of "squatters' camps" and "shanty towns",<sup>409</sup> and the large preponderance of males has led to prostitution and venereal disease.<sup>410</sup> An increasing tendency for women to leave the tribal community, either for employment or to join their husbands, has been noted, and this is a factor operating to loosen the ties of men with their tribes, and to transform shifting labour migrants into long-term or permanent urban dwellers.<sup>411</sup>

<sup>407</sup> Westermann, *The African Today and Tomorrow* (1949), pp. 141-142.

<sup>408</sup> *Ibid.*, pp. 140-141; Schapera, *Migrant Labour and Tribal Life ...* (1947), pp. 183-187; International Labour Office, *African Labour Survey* (1958), p. 138; Skinner, "Labor migration among the Mossi ..." (1965), pp. 73-74; Batten, *Problems of African Development* (1960), part 1, p. 95.

<sup>409</sup> Hailey, *An African Survey ...* (1957), p. 571. See also Balandier, *Sociologie des Brazzavilles noires* (1955), pp. 59-60, 87-88.

<sup>410</sup> Schapera, *Migrant Labour and Tribal Life ...* (1947), pp. 174-175; Hailey, *An African Survey ...* (1957), p. 1386.

<sup>411</sup> See, for example, International Labour Office, "Interracial wage structure ..." (1958), p. 48; Schapera, *Migrant Labour and Tribal Life ...* (1947), pp. 71-72; Wilson, *An Essay on the Economics ...*, part 1 (1941), pp. 46, 54-55.

<sup>402</sup> See, for example, Murphy, "The extent of the problem" (1955), p. 11; Malzberg, "Race and mental disease ..." (1935), p. 538.

<sup>403</sup> Murphy, "Refugee psychoses in Great Britain ..." (1955), p. 175.

<sup>404</sup> Zubrzycki, *Polish Immigrants in Britain ...* (1956), p. 183.

<sup>405</sup> Mauco, "The assimilation of foreigners in France" (1950), p. 19.

<sup>406</sup> International Labour Office, *African Labour Survey* (1958), pp. 84-85; Steel, "The towns of tropical Africa" (1961), pp. 273-274.



## SEX AND AGE STRUCTURE

1. The sex and age structure of a population has many important implications, the most fundamental being to define the limits of the society's reproductive potential. This structure is also the basic demographic determinant of a nation's manpower supply and it influences requirements for various essential goods and services. The incidence of school attendance and economic activity and of such events as household formation varies markedly at different ages. Therefore, fluctuations in the numbers of persons attaining particular ages can have significant repercussions—for example, in producing short-term pressures on schools, employment opportunities, and needs for new housing units.

2. The sex-age structure of a population at any time is the result of past trends in fertility, mortality and migration. It, in turn, influences the current levels of crude vital rates and the rate of population growth, since births, deaths and migration occur with unequal frequency at different ages. Because of its significant demographic, economic and social implications, the dynamics of a population's sex and age structure constitutes a central subject in demographic analysis.

3. This chapter presents, in section A, an analysis of current sex and age patterns in different regions of the world and changes in these patterns over time. Section B is concerned with the factors determining sex and age structure and section C with the effects of sex and age structure on other demographic variables. In section D, some of the social and economic implications of a population's sex and age composition are examined.

## A. Patterns of sex and age structure

## 1. SEX STRUCTURE

4. The sex composition of a population is the most basic of all demographic characteristics and it affects directly the incidence of births, deaths and marriages. Migration rates, occupational structure and virtually all other population characteristics may be influenced by the ratio between the sexes. Sex structure is conveniently described by a series of "sex ratios" at various ages, most commonly by the number of males per 100 females in the same age group (the "masculinity ratio").<sup>1</sup> This ratio at birth is most commonly around 105 in countries having reasonably good statistics, and varies

only within a fairly narrow range from country to country, and within a given country from year to year (see section B). However, since age-specific mortality rates are usually greater among males than among females at every age,<sup>2</sup> this ratio tends to be gradually reduced with age, eventually falling below 100. The age at which equality between the number of males and females is attained depends upon the particular schedule of mortality.<sup>3</sup> Beyond this age, the number of females begins to exceed the number of males, and the excess grows larger with advancing age. Deviations from the pattern described above, when they occur, are usually caused by atypical patterns of mortality or large-scale selective migration. Some examples of such deviations are discussed further on.

5. Table VIII.1 presents masculinity ratios for three broad age groups and the total population, for regions of the world in 1965.<sup>4</sup> It is seen that, as expected, the sex ratio generally decreases with increasing age. Such a pattern is observed in all regions of Europe, in Latin America, Northern America and the Soviet Union, as well as in parts of Africa and Asia. In Australia and New Zealand, the high masculinity ratio at ages 15-64 years is probably due in great part to the consistently higher percentage of males among the migrants to those countries (see chapter VII, section C).<sup>5</sup> This immigration has in turn contributed to the male deficit in the countries from which the immigrants have been drawn.

6. In contrast with prevailing patterns, unusually high sex ratios are found in Middle South Asia, and at ages 15-64 years the sex ratio is higher than for the group under 15 years. These deviations are believed to be due primarily to the fact that in several countries of this region, namely Ceylon, India and Pakistan, female mortality appears to exceed that of males during childhood and the reproductive period.<sup>6</sup>

<sup>2</sup> Available data for a number of developing countries show higher mortality for females than for males, particularly in the child-bearing ages (see chapter V, section B).

<sup>3</sup> In the United States of America, for example, it is found to be around the age of fifty, based on 1950 mortality rates. Stern, *Principles of Human Genetics* (1960), pp. 427-428.

<sup>4</sup> For a discussion of variations in sex ratios in selected countries, see Desai, *Size and Sex Composition of Population ...* (1969), pp. 3-5.

<sup>5</sup> Borrie and Spencer, *Australia's Population Structure ...* (1965), pp. 21, 23, 43.

<sup>6</sup> Although a greater underenumeration of females than of males during censuses contributes to these patterns, this particular factor does not appear to be of major importance. See El-Badry, "Higher female than male mortality ..." (1969). See also Visaria, "The sex ratio of the population of India ..." (1967).

<sup>1</sup> Sometimes sex ratios are presented as "femininity ratios", i.e., the number of females per 100 males. See, for example, Desai, *Size and Sex Composition of the Population of India ...* (1969).

TABLE VIII.1. ESTIMATED SEX RATIOS OF POPULATION FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965

(Males per 100 females)

Major areas and regions	Under 15 years	15-64 years	65 years and over	Total
World total .....	103.5	98.9	74.8	99.2
Developing regions .....	103.2	102.3	87.8	102.2
More developed regions .....	104.3	92.8	65.6	93.0
Africa .....	100.3	99.6	82.6	99.4
Western Africa .....	99.5	102.9	84.8	100.9
Eastern Africa .....	99.3	96.9	79.1	97.4
Middle Africa .....	97.8	93.6	77.7	94.8
Northern Africa .....	103.6	100.8	88.1	101.6
Southern Africa .....	99.4	102.4	78.8	100.2
Asia (excluding the USSR)				
East Asia .....	102.8	100.2	80.9	100.3
Mainland region .....	102.7	100.9	82.1	100.8
Japan .....	103.7	95.6	78.6	96.4
Other East Asia .....	103.3	101.1	70.8	100.9
South Asia .....	104.6	104.8	95.7	104.4
Middle South Asia .....	105.5	107.2	103.2	106.3
South-East Asia .....	102.0	98.7	81.3	99.6
South-West Asia .....	104.6	105.4	80.5	104.1
Europe (excluding the USSR)				
Western Europe .....	104.8	95.3	66.6	94.1
Southern Europe .....	104.5	96.0	63.7	93.4
Eastern Europe .....	105.0	93.8	71.8	94.4
Northern Europe .....	104.7	93.2	66.6	93.2
Northern Europe .....	105.1	99.4	65.9	96.0
Latin America .....	103.0	99.4	89.2	100.5
Tropical South America .....	102.3	99.9	86.9	100.5
Middle America (mainland) .....	104.4	97.8	93.4	100.7
Temperate South America .....	103.1	99.9	87.7	100.2
Caribbean .....	102.7	99.0	93.7	100.3
Northern America .....	103.8	97.6	78.4	97.5
Oceania .....	105.3	105.5	74.6	102.8
Australia and New Zealand .....	104.9	104.3	72.5	101.4
Melanesia .....	107.1	112.3	105.7	109.9
Polynesia and Micronesia .....	105.4	108.2	107.7	106.9
USSR .....	104.2	81.3	45.1	84.3

SOURCE: Compiled from data in United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

7. Numerous censuses and surveys in Africa south of the Sahara have recorded unusually low masculinity ratios, for which the reasons are not yet clearly determined. It is known that certain African countries have sustained considerable emigration, particularly of men, but male surpluses recorded in the countries of immigration are insufficient to account for the full extent of the male deficits in other countries. The low masculinity ratios of less than 100 reported at ages under 15 for each of the four regions south of the Sahara are unique among the regions of the world. While the slightly lower sex ratio at birth, which has been consistently observed among populations of African origin, may provide a partial explanation, other factors, as yet not ascertained, must also be involved. Both Western and Southern Africa show higher masculinity ratios at ages 15-64 than among children, a pattern possibly explained by the fact that important foci of migrant labour are located in these

regions. However, much of the migrant labour is drawn from neighbouring countries, and to the extent that this is so, regional sex ratios ought not to be affected. It is possible that owing to the high mobility of men, their enumeration during censuses has often been less complete than that of women. But the insufficiency of data by which these suppositions can be checked leaves doubt as to the principal causes.<sup>7</sup>

8. The table also shows that the variation in sex ratios among the world's regions becomes progressively greater with age. Excluding the small populations of two sub-regions of Oceania which have a very large excess of males, the ratio ranged from 98 in Middle Africa to almost 106 in Middle South Asia for ages under 15 years; from 81 (Soviet Union) to 107 (Middle South Asia) for ages 15-64 years and from 45 in the Soviet Union to more

<sup>7</sup> See United Nations, *Population Bulletin* ... (1965), pp. 15, 18.

than twice as much (103) in Middle South Asia for the group 65 years and over.

9. The final column of the table shows that the sex ratio in the total population averages 93 in the more developed regions and 102 in the less developed regions. Differences in age structure are an important factor in this wide gap, since the developed regions have a much higher proportion of their population in the older ages, where sex ratios are low. The unusually low sex ratio of 84 in the Soviet Union reflects the high human costs of wars which have ravaged that country. The effects of war are also reflected in the low masculinity ratios of a number of European countries. On the other hand, the very high sex ratio of 106 in Middle South Asia appears to be greatly influenced by the prevailing sex differences in mortality, as mentioned earlier.

## 2. AGE STRUCTURE

10. Data on a population's age structure, in combination with a distinction by sex, furnish the basis for many types of demographic analyses. Although the concept of chronological age is precise and unambiguous, census reports on age are subject to errors arising from a variety of causes; these include deliberate mis-statement, a tendency to report ages ending in certain preferred digits and to avoid others, exaggeration of age at the older ages, carelessness in reporting, and ignorance of correct age.<sup>8</sup> Misreporting of age occurs in all populations, though it is more frequent where literacy levels are not high and a large proportion of the population may not know their exact ages. Before age data can be subjected to worthwhile analysis, various smoothing and adjustment techniques may have to be applied in order to eliminate at least some of the effects of faulty age reporting.<sup>9</sup>

11. It is customary to compare the age structure of different populations by means of percentage distributions of the numbers in broad age groups, though other measures are sometimes used to summarize a population's age distribution.<sup>10</sup> Several different indices have also been devised to measure the aging of populations.<sup>11</sup>

<sup>8</sup> See, for example, United Nations, *Methods of Appraisal of Quality* ... (1955), chap. 3; ———, *Demographic Yearbook, 1969* ... (1970), pp. 8-9. Various tests which may be used in assessing the accuracy of age data are discussed in these sources.

<sup>9</sup> For a description of such techniques, see United Nations, *Methods for Population Projections* ... (1956).

<sup>10</sup> See, for example, the discussion in Hauser and Vargas, "Population structure and trends" (1960), p. 29. The median and mean age, though frequently used, are crude and do not take into account the detailed age structure of the population. It has been shown that two populations can vary greatly with respect to their age distributions, yet have the same mean age. Daric, *Viellissement de la population* ... (1948), p. 15; Landry, *Traité de démographie* (1949), p. 142.

<sup>11</sup> Most frequently used is the ratio of persons defined as "old" to total population, although sometimes the number of old persons is related to the working-age population. See Sauvy, "Demographic ageing" (1963), pp. 355-356; his *Les limites de la vie humaine* (1961), chap. 9; and his *Théorie générale de la population*, vol. 1 ... (1966), pp. 49-50. Since changes in the proportion of young at the base of the age pyramid and the old at its summit can take place simultaneously, some analysts have preferred to use an index which shows the ratio between the old and young age groups. See, for example, Valaoras, "Patterns of aging of human populations"

A population's age structure is depicted graphically by a population "pyramid", or histogram, showing the relative frequencies of each sex at the different ages.<sup>12</sup>

12. At the beginning of the twentieth century, Sundbärg observed certain empirical relationships between age structure and the rate of population growth. He identified three types of populations: (a) progressive, having a high proportion of children and a high rate of growth; (b) stationary, having moderate proportions of children and aged persons with slow growth or stationary numbers; and (c) regressive, having a high proportion of aged persons and declining numbers. The following modal proportions in three broad age groups were suggested by the author's analyses.<sup>13</sup>

	Percentage of population		
	Under 15 years	15-49 years	50 years and over
Progressive .....	40	50	10
Stationary .....	26.5	50.5	23
Regressive .....	20	50	30

### (a) Regional variations

13. According to 1965 estimates, the world's less developed regions had about 42 per cent of their populations under 15 years of age, 47 per cent between 15 and 49 years, and 11 per cent 50 years and over. On the other hand, the more developed regions showed proportions in the same three age groups of 28 per cent, 48 per cent and 24 per cent, respectively.<sup>14</sup> These age structures are thus roughly similar to Sundbärg's "progressive" and "stationary" models described above. The "regressive" type of age structure, which implies declining numbers, does not appear in any of the world's regions.

14. In recent studies, it has been common to compare the age structures of different populations in terms of three broad age groups which identify the population of working age (usually defined as 15-59 or 15-64 years), children under working age and persons beyond retirement age. Such an age distribution is shown in table VIII.2 for the various regions. It is seen that, on an average, the more developed regions have 63 per cent of their population in the age group 15-64 years, as compared with only 55 per cent in the developing regions. The latter regions are characterized by a much higher proportion of children and a much lower proportion of old people, reflecting their higher fertility and higher population growth rates.

(1950), pp. 69, 78; Rosset, *Proces starzenia się ludności* ... (1959), pp. 22 ff. The aging of population has sometimes been studied with reference to the female population alone, since the latter is less affected by wars and migration. See Sauvy, *Théorie générale de la population*, vol. 2 ... (1966), p. 52.

<sup>13</sup> See, for example, the discussion of population pyramids in Landry, *Traité de démographie* (1949), pp. 120-124. See also Hollingsworth, *Historical Demography* (1969), pp. 15-19.

<sup>14</sup> Sundbärg, "Sur la répartition de la population ..." (1900), p. 92; and his *Bevölkerungssstatistik Schwedens, 1750-1900* (1907), pp. 4-5. For a comprehensive analysis of different types of age structure, see also Rosset, *Proces starzenia się ludności* ... (1959), pp. 59-77.

<sup>15</sup> United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

TABLE VIII.2. ESTIMATED AGE DISTRIBUTION AND DEPENDENCY RATIOS OF THE POPULATION OF MAJOR AREAS AND REGIONS OF THE WORLD, 1965

Major areas and regions	Percentage distribution by age			Dependency ratio (number of persons in dependent age groups per 100 aged 15-64 years)		
	Under 15 years	15-64 years	65 years and over	Total (under 15 plus 65 and over)	Under 15 years	65 years and over
World total .....	37.4	57.6	5.0	73.5	64.8	8.7
Developing regions .....	41.6	55.1	3.3	81.3	75.4	5.9
More developed regions .....	28.1	63.0	8.9	58.8	44.6	14.2
Africa .....	43.5	53.7	2.8	86.2	81.0	5.2
Western Africa .....	44.3	53.3	2.4	87.5	83.1	4.4
Eastern Africa .....	43.6	53.6	2.8	86.4	81.2	5.2
Middle Africa .....	41.7	55.3	3.1	80.9	75.4	5.5
Northern Africa .....	44.2	52.7	3.0	89.6	83.9	5.7
Southern Africa .....	39.8	56.5	3.7	77.1	70.5	6.6
Asia (excluding the USSR)						
East Asia .....	36.9	59.0	4.1	69.4	62.5	6.9
Mainland region .....	37.9	58.3	3.8	71.6	65.0	6.6
Japan .....	25.8	68.0	6.3	47.2	38.0	9.2
Other East Asia .....	44.2	52.6	3.3	90.3	84.1	6.2
South Asia .....	43.0	54.0	3.0	85.0	79.5	5.5
Middle South Asia .....	42.7	54.3	3.0	84.4	78.8	5.6
South-East Asia .....	43.5	53.8	2.8	86.0	80.9	5.1
South-West Asia .....	43.1	53.3	3.6	87.6	80.9	6.7
Europe (excluding the USSR)	25.4	64.1	10.5	55.9	39.6	16.3
Western Europe .....	24.1	63.9	11.8	56.2	37.7	18.5
Southern Europe .....	26.9	64.2	8.9	55.9	42.0	13.9
Eastern Europe .....	26.8	63.9	9.3	56.3	41.8	14.5
Northern Europe .....	23.6	64.7	11.8	54.8	36.6	18.2
Latin America .....	42.5	53.9	3.6	85.7	78.9	6.8
Tropical South America ...	43.8	53.2	3.1	88.2	82.3	5.9
Middle America (mainland)	46.3	50.5	3.2	98.1	91.7	6.4
Temperate South America ..	33.3	60.8	5.9	64.4	54.7	9.7
Caribbean .....	40.7	55.2	4.0	81.0	73.7	7.3
Northern America .....	31.0	59.8	9.2	67.2	51.9	15.3
Oceania .....	32.8	59.9	7.3	66.9	54.7	12.2
Australia and New Zealand	30.2	61.4	8.4	62.9	49.2	13.7
Melanesia .....	41.6	55.5	2.9	80.4	75.1	5.3
Polynesia and Micronesia ..	46.5	50.8	2.6	97.0	91.8	5.2
USSR .....	30.5	62.1	7.4	61.1	49.2	11.9

SOURCE: Compiled from data in United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

15. While not all persons in the so-called working ages actually participate in economic activities, and not all persons outside these ages are dependants, the ratio of persons in dependent age groups to those of working age provides a useful approximation of a population's dependency burden. As shown in table VIII.2, the average dependency ratio in the developing regions is about 81, compared with 59 in the more developed regions. The higher dependency burden of the developing regions places them at an economic disadvantage in relation to the world's more developed regions.<sup>15</sup> The contrast between

<sup>15</sup> However, by taking into account the inequality of consumption requirements at different ages, Kleiman showed that international differences in the dependency burden were considerably less than the unweighted indices of age structure suggest. Kleiman, "A standardized dependency ratio" (1967).

the developing and developed regions is brought out sharply when youth and old-age dependency are examined separately. The youth dependency ratio was about twice as high in Africa, South Asia and Latin America, where there were approximately four young dependants for every five persons of working age, as in Europe, where the corresponding ratio was only two to five. On the other hand, the populations of Northern and Western Europe are seen to have old-age dependency ratios over three times as high as that for developing regions.

16. Age data for the various subregions given in table VIII.2 show that there is no overlap whatsoever between the more developed and less developed regions in the range of percentages in the three broad age groups. Among the more developed regions, the proportion of

population under 15 years of age ranges from 24 per cent in Northern and Western Europe to 33 per cent in Temperate South America, whereas among the developing regions it ranges from 38 per cent in Mainland East Asia to 46 per cent in Middle America, Polynesia and Micronesia. The percentage range for the 15-64 age group is from about 60 to 68 in the more developed regions and 50 to 58 in the less developed regions, while the percentage of old persons ranges from about 6 to 12 in the developed regions and from 2.4 to 4.0 in the less developed regions.

17. The regions having the lowest proportion of children (24 per cent) and the highest percentage of aged persons (12 per cent) in their populations are those of Northern and Western Europe, where fertility decline took place relatively early and birth rates have been at low levels for some time. In Southern and Eastern Europe and the Soviet Union the long-term decline in fertility began later, and it is only recently that birth rate levels in these regions have fallen to levels approaching those in Northern and Western Europe (see chapter IV, section A). The aging process is thus not so far advanced in the former regions, which, on an average, have 7-9 per cent of their populations in the age group 65 years and over, and 27-31 per cent under 15 years. Also within these ranges are the age structures of Australia and New Zealand, and Northern America, where fertility levels since the Second World War have remained somewhat above those in Northern and Western Europe. Japan occupies a unique position in that as a result of the recent rapid fall of fertility in that country, the population structure combines a low percentage of children (26 per cent) with a low percentage of old people (6 per cent) and an unusually high proportion in the working ages (68 per cent).

18. Among the subregions of Africa, the percentage of children in the population varies from about 40 per cent in Southern Africa to 44 per cent in the Northern, Eastern and Western regions. While the latter regions are estimated to have the highest fertility levels currently existing in the world, the relatively high mortality levels still prevailing have a moderating effect on the proportion of young children in the population, with the result that the percentage under fifteen years is no higher, if as high, as that in Tropical South America and Middle America, where both fertility and mortality are lower. South Asia, with 43 per cent of its population under fifteen years of age, has a considerably younger population than does East Asia. Owing to the estimated moderate fertility level of China, the mainland region of East Asia is shown to have about 38 per cent of its population under fifteen years of age. The estimated percentage in the working ages (58 per cent) is higher than that of any other developing region.

19. Figure I shows population age pyramids or histograms for six selected countries, depicting different types of age structure. The pyramids for Mexico and the Philippines are typical of the populations of many developing countries where fertility is high and fairly constant. These pyramids have broad bases and steeply sloping sides, illustrating the large numbers of children and young people, and the small percentage of old people in the

population. At the other extreme are the age structures of two populations of long-standing low fertility, those of Sweden and the United Kingdom. Their histograms are almost rectangular in shape, with a slight sloping at the oldest age groups. Both show indentations at ages 25 to 35 reflecting depressed birth rates of the 1930s, and enlarged cohorts at ages 15-19 as a result of the higher birth rates following soon after the Second World War. The two other pyramids shown in figure I represent transitional populations where fertility has declined more recently. In Japan, where fertility has been falling for several decades, the large cohorts born when fertility was much higher have moved progressively into older age groups creating a bulge. (See section B below.) The shape of this type of pyramid has been variously described as "bee-hive", "Chinese lantern" or "barrel". In Singapore, fertility decline has been very recent and is reflected only in a narrowing at the base of the pyramid.

### (b) Trends

20. It has been estimated that until some two hundred years ago, most of the world's populations had fairly similar age structures, not very different from those of today's developing countries. Since then, and especially over the past fifty to one hundred years, substantial changes in age structure have occurred in the present developed countries as the proportion of children declined markedly, while that in the middle and older age groups increased.<sup>16</sup> Around 1850, the proportion of the population aged sixty-five years and over in Western European countries was about 5 per cent,<sup>17</sup> whereas by 1965 this proportion had reached nearly 12 per cent (table VIII.2). The age pyramids for Sweden and the United Kingdom (Great Britain), for example, which, as seen below, were almost rectangular in shape in 1965, were, around 1850, truly pyramid-shaped, owing to the relatively large numbers of persons in the younger age groups and the progressive attrition from mortality with advancing age.<sup>18</sup>

21. The evolution of the present age structure of the populations of today's developed countries is exemplified by the data for Sweden for various dates since 1750, which appear in table VIII.3. Throughout the period covered by the table there was a steady reduction of mortality; fertility declined sharply between the 1870s and the 1930s, and there was heavy emigration from about 1860 to 1910.<sup>19</sup> These trends are reflected in the population's changing age structure.

22. Children under fifteen years of age constituted about one third of the Swedish population during the period 1750-1800, and this proportion did not change much until after 1900, though there is evidence of a slight increase between the last half of the eighteenth century and the first half of the nineteenth, possibly due to declin-

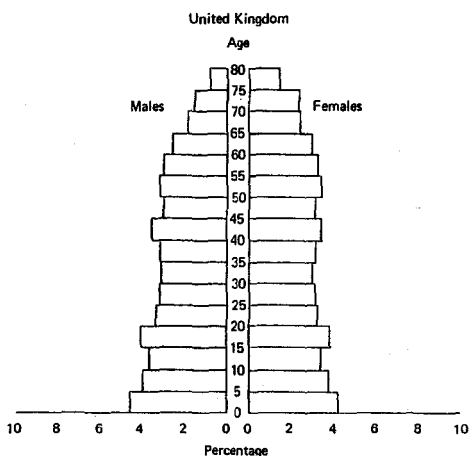
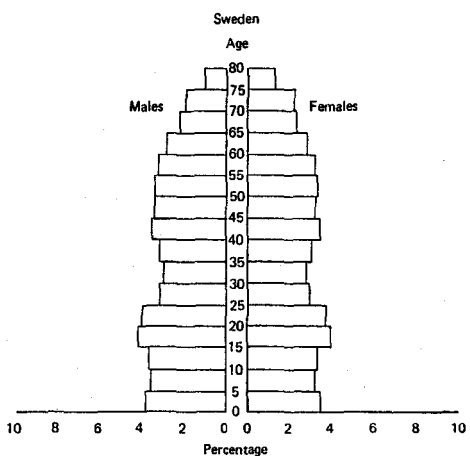
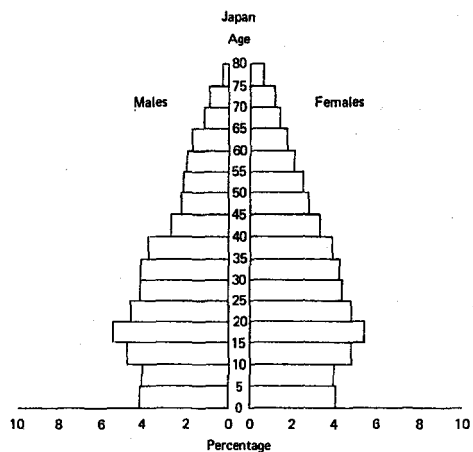
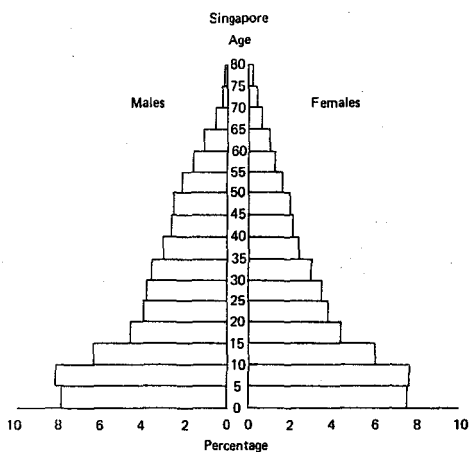
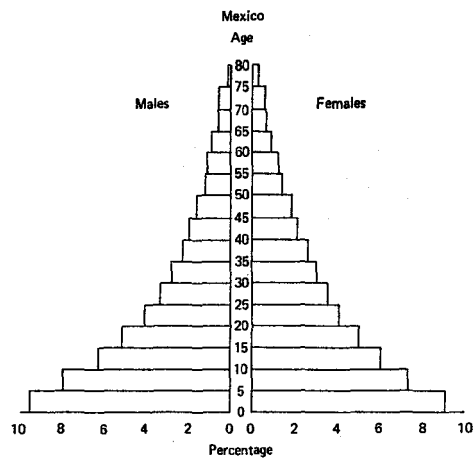
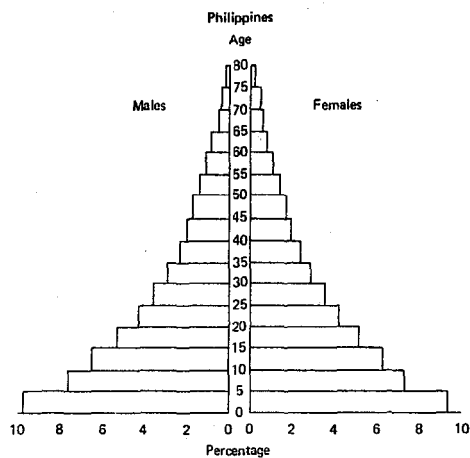
<sup>16</sup> Coale, "How a population ages or grows younger" (1964), pp. 48, 55; United Nations, *The Aging of Populations ...* (1956), pp. 12, 15.

<sup>17</sup> United Nations, *The Aging of Populations ...* (1956), p. 11.

<sup>18</sup> Sheldon, "The changing demographic profile" (1960), pp. 30-31.

<sup>19</sup> For a summary of these trends, see Thomas, *Social and Economic Aspects of Swedish ...* (1941), pp. 34-38.

Figure I. Age pyramids for six selected countries, 1965



Source: Data compiled by the United Nations Population Division.

TABLE VIII.3. AGE DISTRIBUTION OF THE POPULATION OF SWEDEN, 1750-1965

(Percentage distribution)

Age	1750-1800	1800-1850	1860	1900	1930	1950	1960	1965
All ages .....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Under 15 years .....	32.6	33.2	33.5	32.5	24.8	23.4	21.9	21.0
Under 5 .....	12.4	12.4	13.3	11.5	7.4	8.6	6.7	7.2
5-9 .....	10.5	10.8	10.6	10.7	8.5	8.4	7.1	6.8
10-14 .....	9.7	10.0	9.6	10.3	8.9	6.4	8.1	7.0
15-64 years .....	61.9	61.6	61.3	59.1	66.0	66.3	66.1	66.3
15-19 .....	9.1	9.3	9.2	9.4	9.1	5.9	7.9	8.1
20-24 .....	8.5	8.6	8.1	8.3	9.1	6.5	6.2	7.7
25-29 .....	7.9	7.8	7.9	6.9	8.2	7.6	5.8	6.1
30-34 .....	7.2	7.0	7.4	5.9	7.5	7.7	6.3	5.7
35-39 .....	6.6	6.4	7.4	6.0	6.9	7.7	7.1	6.1
40-44 .....	5.9	5.8	6.0	5.6	6.3	7.7	7.2	7.0
45-49 .....	5.2	5.2	4.9	4.9	5.7	6.9	7.1	6.7
50-54 .....	4.5	4.6	3.9	4.5	5.2	6.2	7.0	6.8
55-59 .....	3.8	3.8	3.5	4.1	4.4	5.4	6.2	6.5
60-64 .....	3.2	3.1	3.0	3.5	3.6	4.7	5.3	5.6
65 years and over .....	5.5	5.2	5.2	8.4	9.2	10.2	11.9	12.7
65-69 .....	2.4	2.3	2.4	3.2	3.4	3.8	4.3	4.6
70-74 .....	1.6	1.5	1.5	2.4	2.7	3.0	3.4	3.5
75-79 .....	0.9	0.9	0.8	1.7	1.7	1.9	2.3	2.5
80 and over .....	0.6	0.5	0.5	1.1	1.4	1.5	1.9	2.1

SOURCES: Figures for 1750-1930 from Thomas, *Social and Economic Aspects of Swedish ...* (1941), p. 39. Figures for later years from United Nations, *Demographic Yearbook, 1954* (1954), table 3; —, 1961 ... (1961), table 5; —, 1966 ... (1967), table 5.

ing infant and childhood mortality rates. The first major alteration in age structure was a remarkable increase, between 1860 and 1900, in the proportion of persons aged 65 and over, which rose from 5.2 to 8.4 per cent of the total population. This increase was due in part to the heavy emigration between 1860 and 1900, which depleted the ranks of young adults and left the country peopled to an increasing extent by the older generations. After 1900, the increase in the percentage of aged continued, while the proportion of children in the population entered a decline, reflecting the fall of the birth rate. By 1965 children under 15 years of age had declined to 21 per cent of the total population. While the trend in this age group has been consistently downward, the percentage under five years of age in 1950 shows an increase over the 1930 level, as a result of the post-war upswing in the birth rate. By 1965 this cohort had passed into the working-age group.

23. The proportion of adults 15-64 years of age in the Swedish population dropped slightly between 1860 and 1900 owing to the emigration mentioned above. After 1900 it rose sharply as emigration slackened and fertility declined. Since 1930 the proportion in this age group has remained stable at about two-thirds. There has been a considerable aging within the group, however, as the proportion under age 40 has fallen and that age 40 and above has risen. At the same time a steady rise has occurred in the proportion aged 65 and over—from 9 per cent in 1930 to 13 per cent in 1965.

24. The history of changes in the Swedish age structure is repeated in broad outlines, though with many differences in details, in the records for other European countries. In the United Kingdom (Great Britain) the aging

of the population became evident in the early part of the twentieth century. Between 1901 and 1951, the percentage of population aged 65 years and over rose from about 5 per cent to 11 per cent; at the same time the proportion of children under 15 years of age declined from 33 to 22 per cent.<sup>20</sup> In France, the aging of the population began much earlier—in the first half of the nineteenth century, if not before—but it advanced more slowly than in Sweden or the United Kingdom (Great Britain) (see table VIII.4). Already by 1851 over 6 per cent of the population was in the age group 65 years old and above, and children under 15 years made up only 27 per cent of the total. The latter figure remained substantially unchanged, falling only slightly until after 1911; by 1950 it had dropped to 22 per cent.<sup>21</sup> The earlier beginning of aging in France is related to the decline of the birth rate in that country long before the last quarter of the nineteenth century, when the secular decline of fertility became evident in Sweden, the United Kingdom (Great Britain) and many other countries of Northern and Western Europe. (See chapter IV, section A.) Since 1900, the

<sup>20</sup> United Nations, *The Aging of Populations ...* (1956), pp. 9, 11, 141. See also the estimates of age distribution for England and Wales from 1695 to 1841 in Glass, "Gregory King's estimates of the population ..." (1950), pp. 369-370, and those for Great Britain, 1851 to 1947, in United Kingdom, Royal Commission on Population, *Report* (1949), p. 88. On changes in the age structure of Europe's ruling families from the seventeenth to the nineteenth centuries, see Peller, "Births and deaths among Europe's ruling families ..." (1965), p. 97.

<sup>21</sup> United Nations, *The Aging of Populations ...* (1956), p. 132. See also Landry's presentation of estimates and census data on the French age distribution from 1778 onward, in his *Traité de démographie* (1949), p. 126.



median age of the population has risen from 24 to 36 years in England, and from 23 to 30 in the United States.<sup>22</sup> Only 4 per cent of the United States population was aged 65 years and over in 1900, but this percentage doubled during the next half century. In both Canada and the United States, the proportion of young children in the population, which had declined from 1900 to 1940, showed a rise in the ensuing decade,<sup>23</sup> owing to the post-war recovery of the birth rate.

TABLE VIII.4. TRENDS IN AGING OF POPULATIONS OF SELECTED COUNTRIES, 1788-1961

Percentage of total population 60 years and over	Approximate year of attainment of specified percentage		
	France	Sweden	United Kingdom (Great Britain)
8 .....	1788	1860	1910
10 .....	1850	1882	1925
12 .....	1870	1912	1931
14 .....	1931	1948	1938
16 .....	1947	1956	1952
17 .....	1961	1959	1961

SOURCE: Sauvy, *Théorie générale de la population*, vol. 2 ... (1966), p. 53.

25. When these changes in age distribution are translated into dependency ratios, it is found that the fall in fertility in industrialized countries was followed immediately by a decline in the total dependency burden which was sustained for many decades, even after the proportion of old-age dependants began to rise. Eventually, however, the increase in old age dependency outpaced the decline in youth dependency, causing an increase in the total dependency burden.<sup>24</sup> Moreover, as noted above, the upturn in the birth rate in many industrialized countries following the Second World War caused a temporary rise in the youth dependency ratio. The data presented in table VIII.5 show that in France, where the aging process began very early, declines in the total dependency ratio from the mid-nineteenth to mid-twentieth century were modest in comparison with those in the United States.<sup>25</sup>

26. In most countries of Southern and Eastern Europe, where the decline of the birth rate is a relatively recent development, the aging of population has been marked

<sup>22</sup> Coale, "How a population ages or grows younger" (1964), p. 48. The median age in the United States was around 17 years in 1820. Shryock, "The changing age profile of the population" (1950), p. 2.

<sup>23</sup> United Nations, *The Aging of Populations* ... (1956), pp. 96, 99.

<sup>24</sup> Investigating population trends in Europe, Notestein and his associates distinguished three stages of dependency among populations affected by aging: (1) "heavy youth dependency" at the beginning of the aging process, when the proportion of children is high and the proportion of aged persons low; (2) "light dependency", when the ratio of young people to producers has fallen considerably, but without yet being balanced by an increase in the share of aged dependants; and (3) "heavy old-age dependency" in the advanced stages of aging, when the ratio of the aged to the producers is mounting at a rate no longer balanced by the decline in the ratio of children. Notestein *et al.*, *The Future Population of Europe and the Soviet Union* ... (1944), p. 155.

<sup>25</sup> For trends in Belgium, see André, *Le vieillissement de la Belgique* (1969), p. 8.

only in recent decades. Thus, in Portugal, only about 6 per cent of the population was aged 65 years and over at each census from 1890 to 1930, but this proportion rose more rapidly after 1930 and reached 8.6 per cent in 1967. In Italy, a slow aging of the population seems to have been under way from the latter part of the nineteenth century onward. Between 1861 and 1961, the percentage of persons aged 65 years and over increased steadily from 4.0 per cent to 9.5 per cent. The proportion under 15 years of age, on the other hand, fluctuated around 34 per cent between 1861 and 1911, before beginning a steady downward trend, reaching about 25 per cent in 1961. In Bulgaria, where high birth rates were maintained well into the twentieth century, little aging of the population was observed until after 1934. The proportion of old people in the population rose from 5.2 to 8.6 per cent between 1934 and 1965, while during the same period the proportion of children declined from 36 to 24 per cent.<sup>26</sup> In Spain, an aging of the population is observed throughout the twentieth century, except that in 1920 the proportion of persons aged 65 years and over was less than that at the preceding census (1910), possibly owing to the high mortality during the influenza epidemic in 1918,<sup>27</sup> which affected older persons disproportionately.

TABLE VIII.5. TRENDS IN DEPENDENCY RATIOS FOR FRANCE AND THE UNITED STATES OF AMERICA, AROUND 1850 TO AROUND 1955

Year	Number of persons in dependent age groups per 100 aged 20-64 years		
	Total (under 20 years plus 65 and over)	Under 20 years	65 years and over
<i>France</i>			
1851 .....	82.4	70.3	12.1
1881 .....	78.8	64.6	14.2
1911 .....	72.8	58.4	14.4
1921 .....	68.6	53.3	15.3
1931 .....	65.9	50.4	15.5
1936 .....	66.9	50.4	16.4
1946 .....	68.9	50.5	18.5
1956 .....	74.2	53.3	20.9
<i>United States</i>			
1850 .....	122.4	116.7	5.8
1870 .....	111.4	105.1	6.3
1900 .....	94.2	86.2	8.0
1920 .....	83.5	74.9	8.6
1930 .....	79.1	69.4	9.7
1940 .....	70.4	58.6	11.8
1950 .....	72.7	58.5	14.2
1955 .....	81.3	65.8	15.5

SOURCES: Compiled from Sauvy, *Théorie générale de la population*, vol. 2 ... (1966), p. 53; Bogue, *The Population of the United States* ... (1959), p. 102.

<sup>26</sup> United Nations, *The Aging of Populations* ... (1956), pp. 126, 144, 153; ———, *Demographic Yearbook, 1968* ... (1969), table 5. Regarding Italy, see also Somogyi, "Evoluzione della popolazione attraverso il tempo" (1965), pp. 28-31; Vinot, "La situazione demografica dell'Italia ..." (1965). Concerning Poland, see Holzer, *Demografia* (1970), pp. 126-127. For trends in aging in different regions of the Soviet Union, see Sachuk, "Ob osobennostiakh starenia ..." (1966), pp. 284-298.

<sup>27</sup> Díez Nicolás, "Estructura por sexo y edades ..." (1969), pp. 15, 18.

27. From the beginning of Japan's modernization, around 1872, to the Second World War, the population showed a clear trend towards rejuvenation. The sharp decline in fertility which followed the war, however, brought about a sudden aging of the population,<sup>28</sup> with the 65 years and over group increasing from 4.9 per cent in 1950<sup>29</sup> to 6.3 in 1965 (table VIII.2). Few Western countries have good statistics which date back to the early stages of their demographic transition, but in Sweden, where such statistics exist, a rejuvenation effect has been observed between the mid-eighteenth and mid-nineteenth centuries, when only mortality was falling. (See table VIII.3 above.)

28. The period since the end of the Second World War has seen opposing trends in the age distribution of the population of different developed regions. In Australia, New Zealand and Northern America, the proportion of young children in the population was greater in the mid-1960s than it had been just after the war owing to the higher post-war birth rates which were maintained in these areas for a time. On the other hand, birth rates generally continued their long-term downward trends in Southern and Eastern Europe with the result that, in most countries of these regions, the proportions of young children in the population were further lowered.

29. The available statistics for most developing countries show little change in age structure from one census to another, except where immigration has occurred on a large scale. The pattern of high percentages of children and low percentages both of adults of working age and aged dependants appears to have persisted throughout the period for which any information is available. Where there is evidence that the age distributions of populations of developing countries have undergone some change, they have, if anything, become somewhat younger. In Taiwan, for example, the median age decreased from 21 to 18 years between 1915 and around 1960.<sup>30</sup> The factors responsible for changes in age structure in some developing countries are discussed in section B below.

## B. Determinants of sex and age structure

### 1. FACTORS DETERMINING SEX STRUCTURE

#### (a) Sex ratio at birth

30. In most diploid forms of life, sex is genetically determined, either at the gene level without visible differentiation of sex chromosomes, or with the evolution of two kinds of sex chromosomes. The latter mechanism operates among human beings. All mature eggs produced by a woman are alike in having one X-chromosome, whereas a man produces two kinds of sperm—those with an X-chromosome and those with a Y-chromosome. Any egg fertilized by an "X sperm" develops into a female

(XX), while fertilization by a "Y sperm" leads to a male (XY). Sex is, therefore, determined at the moment of fertilization.<sup>31</sup>

31. While the discovery early in this century of the chromosome differences between males and females is essential for an understanding of sex determination in human beings, some important questions still remain to be answered. Two of these relate to the sex ratio at conception (primary sex ratio) and the sex ratio at birth (secondary sex ratio). Male and female babies are not born in exactly a one-to-one ratio, the masculinity ratio at birth being most commonly around 105, as previously mentioned. Although this ratio varies relatively little from one population to another, a study by Visaria has found it to be consistently lower among populations of African or negroid origin.<sup>32</sup> The extent to which the excess masculinity of the sex ratio at birth and observed variations in this ratio are due to genetic, biological or socio-environmental factors is not known.

32. It has been observed that in the past the sex ratio was higher among legitimate than among illegitimate babies, and that this difference has lessened in recent times. Also, the often reported higher sex ratio at birth for rural, as compared to urban, populations now appears to have virtually disappeared.<sup>33</sup>

33. Moore has shown that the trend in the sex ratio at birth in England and Wales over a period of some fifty years (1901-1954) was slowly, but rather consistently rising, from about 103 to about 106. This change, according to Moore, could have been due to changes in the average age of the mothers. Examining data for 1947-1952, he found a definite drop in the sex ratio at birth with the increasing age of the mother (the sex ratio was almost 108 for mothers aged 15-19, dropped to 106 for mothers aged 20-24, and remained about 105 for mothers of more advanced ages).<sup>34</sup>

34. The sex ratio has been shown to vary also with the order of birth. In many populations, the sex ratio is highest at the first births and tends to decrease with successive births. Analysing data for whites in the United States of America for 1947-1952, Novitski and Sandler found that the sex ratio dropped from 106.6 for first births to somewhat less than 105 for births of the orders of seven and above.<sup>35</sup> Lejeune and Turpin found that the sex ratio diminished linearly with the increasing age of the father and to a lesser degree, with the increasing age

<sup>31</sup> See Stern, *Principles of Human Genetics* (1960), p. 400; Srb, Owen and Edgar, *General Genetics* (1965), chap. 2. Also, Fisher, *The Genetical Theory of Natural Selection* (1958), p. 158; Hamilton, "Extraordinary sex ratios" (1967).

<sup>32</sup> Visaria, "Sex ratio at birth in territories ..." (1967), pp. 136-139.

<sup>33</sup> For a discussion of these and other fluctuations in the sex ratio at birth, see Stern, *Principles of Human Genetics* (1960), p. 430. Earlier studies by William Farr, R. Mayo-Smith and others are discussed in Knibbs, *The Mathematical Theory of Population* ... (1917), pp. 136-137. See also Colombo, "On the sex ratio in man" (1957).

<sup>34</sup> Moore, "Variations in the sex-ratio at birth" (1958).

<sup>35</sup> Novitski and Sandler, "The relationship between parental age, birth order ..." (1956), p. 124.

<sup>28</sup> Tachi, "Wagakuni saikin no shussho to shibo ..." (1955); and his "Nihon jinko-kihonkozo no hendo ..." (1956).

<sup>29</sup> United Nations, *The Aging of Populations* ... (1956), p. 12.

<sup>30</sup> Coale, "How a population ages or grows younger" (1964), p. 48.

of the mother.<sup>36</sup> Such correlations can be the result of various components. They may be directly related to birth order itself, to the age of the parents, or to a more complex system of causes.<sup>37</sup>

35. The sex ratio of stillbirths is much higher than the sex ratio at birth,<sup>38</sup> and therefore an inverse relation of the sex ratio at birth and the frequency of pregnancy wastage might be expected. However, Visaria did not find a statistically significant correlation between these two variables.<sup>39</sup> Another implication of the high masculinity of foetal deaths is the possibility that the sex ratio at conception may be still higher than the sex ratio at birth. The inference is a subject of dispute, however, because the size and direction of sex-selective foetal mortality in the early weeks after conception, if such a mortality differential does exist, is highly uncertain, as much early pregnancy loss escapes observation and, in any event, sex is not identified.<sup>40</sup>

36. A difference in sex ratios at birth between negroid and other populations was shown in a study by Visaria, which found that in forty-nine of sixty-three populations, not including a large proportion of population classified as negroid, black or African, the sex ratio lay between 104.0 and 107.0. On the other hand, in fifteen of seventeen countries or territories where the population of negroid origin made up more than one third of the total, the sex ratio at birth fell below 104.0. This evidence, together with the persistent difference between the sex ratio at birth in the white and non-white populations of the United States (which continues despite improvements in the completeness of birth registration and reductions in pre-natal mortality), led the author to conclude that the slightly lower ratio for negroid populations may have a genetic basis.<sup>41</sup> It is possible that in other parts of the world for which accurate observations are still lacking, sex ratios at birth may also differ significantly from those most commonly recorded.

37. An increase in the sex ratio at birth during and immediately following the First World War was noted by Savorgnan, both in warring and neutral countries. Mackenroth made similar observations regarding the Second World War.<sup>42</sup> In the Soviet Union, where the sex ratio at birth used to fluctuate around 105-106, it rose to

107.4 in 1944 and to 109.1 in 1945.<sup>43</sup> In the United States, however, McMahan showed that the sex ratio was not appreciably altered during and after the years of the two world wars.<sup>44</sup> Although it is now generally admitted that there is no evidence that the masculinity of births is directly affected by war, war can cause shifts in the ages of parents or in the orders of births which occur most frequently. It is also possible that war-time conditions produce more early foetal loss. All of these factors may affect the sex ratio at birth.

#### (b) Sex differences in mortality

38. As shown in chapter V, in most countries with good statistics mortality rates are higher for males than for females, although some deviations from this pattern have been observed in certain age groups.<sup>45</sup> Under usual mortality conditions, as pointed out above, the sex ratio of somewhat more than 100 at birth tends to be gradually reduced with advancing age, eventually falling below 100.

39. Abnormal mortality conditions, especially war casualties, can cause wider discrepancies in the numbers of men and women surviving. Severe deficits in men, relative to the numbers of women, are noted in the Soviet Union, where according to the 1959 census there were 21 million fewer males than females.<sup>46</sup> The effects of war are also reflected in the low masculinity ratios for a number of European countries. Notestein and his colleagues showed that the expected sex ratio for Germany in 1925, had the First World War not occurred, was 98.8, whereas the actual ratio was 93.9. They further estimated that the population of England and Wales in 1926 was about one million smaller than it would have been without the war, and that four-fifths of this deficit was concentrated among males.<sup>47</sup>

40. The effects of the two world wars on the balance of the sexes in a few selected countries can be seen in table VIII.6. For three of the four countries, the data for around 1920 show particularly low sex ratios in the 20-44 age group, which includes the survivors from the cohorts who were of military age during the First World War. Japan, which was not involved in the hostilities, is an exception. By 1950 these cohorts had moved into the older ages, and low ratios are observed in the age group 45-64 years. The effects of the Second World War on

<sup>36</sup> See Lejeune and Turpin, *Influence de l'âge des parents* ... (1957).

<sup>37</sup> For a review of recent literature, see United Nations, *Report of the United Nations Scientific Committee* ... (1958), p. 184. See also Stern, *Principles of Human Genetics* (1960), p. 431; Novitski and Kimball, "Birth order, parental ages and sex of offspring" (1958); and Renkonen, Mäkelä and Lehtovaara, "Factors affecting the human sex ratio" (1962).

<sup>38</sup> See United Nations, *Foetal, Infant and Early Childhood Mortality*, vol. 1 ... (1954), pp. 26-27.

<sup>39</sup> Visaria, "Sex ratio at birth in territories ..." (1967).

<sup>40</sup> For a comprehensive summary of findings of recent studies on the sex ratio, both at birth and at other ages, on the basis of official statistics, see Colombo, "On the sex ratio in man" (1957).

<sup>41</sup> Visaria, "Sex ratio at birth in territories ..." (1967).

<sup>42</sup> See Savorgnan, "L'aumento delle nascite maschili ..." (1921); and Mackenroth, *Bevölkerungslehre; Theorie, Soziologie* ... (1953), pp. 40-50.

<sup>43</sup> Urlanis, *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 56-57.

<sup>44</sup> McMahan, "An empirical test of three hypotheses ..." (1951), p. 288.

<sup>45</sup> The cause of this differential is not well understood in spite of various attempts to explain it in terms of environmental and genetic factors. For a genetic cause, see Stern, *Principles of Human Genetics* (1960), pp. 427-428. There are populations in which the usual relation is reversed and the expectation of life for males is greater than for females. As mentioned above, this is apparently true for India.

<sup>46</sup> Urlanis, *Dinamika i struktura naseleniia SSSR* ... (1964), pp. 11-12; Selegen, "The first report on the recent ..." (1960), pp. 20-21. For an analysis of the effects of the First World War on mortality and sex structure, see Urlanis, *Voiny i narodonaselenie Evropy* (1960), pp. 482-494.

<sup>47</sup> Notestein et al., *The Future Population of Europe and the Soviet Union* ... (1944), pp. 98-99.

TABLE VIII.6. SEX STRUCTURE OF THE POPULATION BY AGE FOR SELECTED COUNTRIES, AROUND 1920 AND AROUND 1950  
(Males per 100 females)

Age (in years)	France		Japan		Poland		United Kingdom (England and Wales)	
	1921	1950	1920	1950	1921	1950	1921	1951
All ages .....	90.6	92.9	100.5	96.3	93.5	88.4	91.2	92.4
0-19 .....	101.0	102.9	102.2	102.8	98.3	102.1	100.3	102.8
20-44 .....	84.8	102.0	102.4	90.3	86.6	82.6	85.4	96.8
45-64 .....	92.8	84.8	99.3	100.1	94.3	81.0	92.1	86.6
65 and over .....	76.4	65.3	79.7	72.6	94.9	65.0	74.8	69.1

SOURCES: Computed from data in Bunle, *Le mouvement naturel de la population* ... (1954), pp. 110-121; Japan, Bureau of Statistics, *Showa 35-nen kokusei* ... (1964), vol. I, pp. 138-139; United Nations, *Demographic Yearbook*, 1960 ... (1960), table 5.

sex ratios are visible in the data for around 1950. The heavy war casualties suffered by Poland and Japan are reflected in their low sex ratios for the 20-44-year age group. In France and the United Kingdom (England and Wales), the sex ratio was affected to a lesser degree by the Second World War than by the First, due to lighter military losses. Moreover, France's war-caused male deficit had been filled in by post-war immigration so that by 1950 males outnumbered females in the 20-44-year age group.<sup>48</sup>

#### (c) Sex-selective migration

41. While international migration is ordinarily sex-selective, in most countries the volume of immigration or emigration is not sufficient in relation to the total population to have much noticeable effect on its sex composition. Since migrants are generally concentrated in the young working ages, however, the effect on the sex structure at these ages is usually more noticeable than in the population as a whole. As noted in chapter VII, section C, variations and exceptions to the predominant sex and age structure of migrants are not uncommon, and among intercontinental European migrants the proportion of family units has been increasing.

42. Argentina was one of the countries in the Western Hemisphere most affected by immigration late in the nineteenth century and early in the twentieth century. In 1914, when 30 per cent of its population was foreign-born and the latter had a sex ratio of 171, the sex ratio of the total population reached 116.<sup>49</sup> In 1950 in Brazil, the sex ratio of the native-born population was 98.7, while that of the foreign-born population was 127.3, giving the total population of the country a sex ratio of 99.3.<sup>50</sup>

<sup>48</sup> For an analysis of changes in the sex ratio in Japan, see Taeuber, *The Population of Japan* (1958), p. 76. For Poland, see Rosset, *Ludzie starzy* ... (1967), pp. 65 ff. For France, see Chevalier, *Démographie générale* (1951), p. 106; and Landry, *Traité de démographie* (1949), p. 130. For Yugoslavia, see Yugoslavia, Federal Statistical Office, *Konačni rezultati popisa stanovništva od 15 marta 1948 godine, knjiga 2* ... (1951), pp. xxvii-xxix. See also Notestein et al., *The Future Population of Europe and the Soviet Union* ... (1944), p. 75; Frumkin, *Population Changes in Europe Since 1939* ... (1951), pp. 62, 145-147; and Sauvy, "Besoins et possibilités ..." (1950), pp. 219-220.

<sup>49</sup> Germani, *Política y sociedad en una época de transición* ... (1962), pp. 185, 188.

<sup>50</sup> Mortara, "The development and structure of Brazil's population" (1954), p. 124.

43. In the United States until 1910, immigrants from abroad were predominantly males, especially in the flood-tide of immigration around the turn of the century when the proportion of the foreign-born attained almost 15 per cent of the total population. As a result, the sex ratios among the foreign-born increased from 123.8 in 1850 to 129.2 in 1910. In more recent years the flow of immigrants was notably reduced; furthermore, the number of female immigrants came to equal, even to surpass slightly, that of males. The Negro sex ratio, on the other hand, has been consistently below that of the native-born white population. Nevertheless, the weight of immigrants has been such that the combined total population had consistently higher sex ratios than the native white. Only by 1950, as a result of reduced immigration, and a greater sex balance among the immigrants, did the sex ratios of the total and of the native white population come into a coincidence.<sup>51</sup>

44. Singapore provides a more detailed example of the influence of sex-selective immigration on the sex structure. Sex ratios for each of the main ethnic groups—Chinese, Malaysians, Indians, Pakistanis, Europeans—have undergone considerable fluctuations which reflect to a large extent the varied rates of inflow of migrants. During the nineteenth century all of the above-mentioned groups had exceedingly high sex ratios, but the Malaysians, with a large indigenous component, had considerably lower ratios than the others. In each of these groups, a downward trend extending to the most recent census is noted (see table VIII.7). The non-immigrant character of the Eurasian population is reflected in its low sex ratio throughout the period.<sup>52</sup>

45. Internal migration is also usually selective with respect to sex and, wherever its volume is considerable, it can produce substantial differences in the sex composition of different sectors or regions of a country. This was true of the United States of America in the nineteenth century, for example. In 1850, sex ratios in the north-eastern and southern states were relatively low (slightly

<sup>51</sup> Bogue, *The Population of the United States* ... (1959), pp. 124, 152-153, 156; see also Thompson and Whelpton, *Population Trends in the United States* (1933).

<sup>52</sup> Neville, "Singapore: recent trends ..." (1963), p. 101. For a discussion of the effects of immigration on the sex ratio of different ethnic communities in Brunei, Sabah and Sarawak, see Jones, *The Population of Borneo* ... (1966), pp. 50-51, 112-113.

TABLE VIII.7. SEX STRUCTURE OF THE POPULATION OF SINGAPORE BY ETHNIC GROUPS, 1871-1957 CENSUSES  
(Males per 100 females)

Year	Total	Chinese	Malayans	Indians/ Pakistanis	Eurasians	Europeans	Others*
1871 .....	326.6	630.7	126.8	484.4	96.5	365.6	181.6
1881 .....	308.9	511.2	128.1	394.3	95.2	181.2	180.5
1891 .....	320.9	468.0	138.3	421.6	96.7	166.4	119.4
1901 .....	295.1	387.1	127.9	412.9	95.7	154.5	93.9
1911 .....	245.3	279.0	117.2	491.4	93.5	252.5	97.1
1921 .....	204.4	212.3	123.0	502.1	93.9	200.9	151.2
1931 .....	171.3	165.6	116.1	537.2	92.6	192.6	134.9
1947 .....	121.7	113.2	120.8	299.8	95.3	124.0	115.7
1957 .....	111.7	102.9	110.1	225.7	99.5	114.0	115.3

SOURCE: Neville, "Singapore: recent trends ..." (1963), p. 102.

\* Including Ceylonese.

above 100), while those in the western regions were extremely high (about 280).<sup>53</sup> The prevalence of males in newly settled territories appears to account for most of these differences.

46. Statistical data indicate that in many parts of the world the sex ratio is lower in urban areas than in rural areas—that is, women outnumber men in the urban areas—with the result that the sex ratio remains high in the rural areas. In Europe and regions of overseas European settlement, including most parts of Latin America, this pattern of low urban sex ratios is prevalent; however, among African and Asian populations, where males predominate in rural-to-urban migrations, the opposite is usually observed.<sup>54</sup> In the United States of America, the urban population has had more women than men since 1920, while in both rural non-farm and rural farm areas men have exceeded women in number. In 1950, the sex ratio for rural farm areas was 110 and that for rural non-farm areas was 104, while the urban sex ratio was only 95.<sup>55</sup> In Sweden, urban and rural sex ratios in 1960 were 95 and 113, respectively. This pattern of higher masculinity ratios in rural areas has been observed in some developing countries as well. In Mexico and Costa Rica, for example, the urban sex ratios in 1950 were 90 and 87, respectively, while the corresponding rural ratios for the two countries were 103 and 107. In contrast, the sex ratios in India in 1951 were 116 in urban areas and 104 in rural areas, while the corresponding ratios for Turkey in 1950 were 108 and 99.<sup>56</sup>

<sup>53</sup> Bogue, *The Population of the United States* ... (1959), pp. 162-165.

<sup>54</sup> See, among others, United Nations, *Report on the World Social Situation, 1957* (1957), pp. 118-120; Southall, "Population movements in East Africa" (1961), p. 191; and Prothero, "Characteristics of rural-urban migration and the effects ..." (1967). See also United Nations, *Growth of the World's Urban and Rural Population* ... (1969).

<sup>55</sup> Bogue, *The Population of the United States* ... (1959), pp. 158-159.

<sup>56</sup> United Nations, Economic Commission for Latin America, "The demographic situation in Latin America" (1961), pp. 37-38. Swedish data for 1960 computed from United Nations, *Demographic Yearbook, 1963* ... (1964), table 5. In India, the pattern of high masculinity in urban areas has remained consistent in all census years since 1891. The sex ratio increased during 1891-1941, from 112.2 to 122.8 in urban and from 103.7 to 104.8 in rural areas. See Davis, *The Population of India and Pakistan* (1951), p. 139.

#### (d) Age composition

47. The sex ratio of the total population is affected by the population's age structure, as mentioned in section A. Because masculinity ratios are usually relatively high among the young age groups, populations which have a large proportion of young people have higher over-all masculinity ratios than older populations. In the latter, the cumulative effects of unfavourable male mortality in the relatively large older-age contingents contribute to a lowering of the over-all masculinity ratio.

### 2. FACTORS DETERMINING AGE STRUCTURE

48. As stated in section A, the age structure of a population is mathematically determined by the levels of fertility, mortality and migration, or, in cases where the latter factor is negligible, by the first two alone. Until fairly recently, the effects of changes in these variables on age structure were not very well understood, but the pioneering work on the development of demographic models, which began in the early 1950s, has led to a greatly improved knowledge of these relationships. Two methods may be applied for studying the effects of different levels of fertility and mortality upon a population's age structure. If given levels of fertility and mortality prevail for an indefinite period of time, admittedly a hypothetical situation, a population of constant age structure results, known as a "stable population".<sup>57</sup> Given the assumed levels of fertility and mortality, one can estimate the corresponding age structure that would result from their indefinite continuance. The comparison of stable population models differing in assumed fertility levels, mortality levels, or both, permits an inference of the long-run effects of such levels upon the age structure.

49. If, on the other hand, the effects on a population's age structure of variations over time in the fertility level, mortality level, or both, are to be deduced, models may be calculated, using the "component method" technique of population projection (see chapter XV).

<sup>57</sup> See the discussion of stable population in chapter III, section G. The theory of stable population and the interrelations of demographic variables and their role in determining age structure was developed by Lotka. See particularly his *Théorie analytique des associations biologiques* (1939), vol. 2.

TABLE VIII.8. AGE DISTRIBUTION OF MODEL STABLE POPULATIONS CORRESPONDING TO DIFFERENT LEVELS OF FERTILITY AND MORTALITY

Gross reproduction rate	Percentage of population			Gross reproduction rate	Percentage of population		
	0-14 years	15-59 years	60 years and over		0-14 years	15-59 years	60 years and over
<i>Expectation of life at birth: 20 years</i>				<i>Expectation of life at birth: 50 years</i>			
1.0	14.8	68.3	16.9	1.0	17.8	60.7	21.5
2.0	28.9	64.0	7.1	2.0	34.2	57.2	8.6
3.0	38.5	57.6	3.9	3.0	44.6	50.9	4.5
4.0	45.2	52.4	2.4	4.0	51.5	45.8	2.7
<i>Expectation of life at birth: 30 years</i>				<i>Expectation of life at birth: 60.4 years</i>			
1.0	16.3	65.0	18.7	1.0	18.7	59.4	21.9
2.0	31.4	60.9	7.7	2.0	35.6	55.8	8.6
3.0	41.3	54.5	4.1	3.0	46.0	49.6	4.4
4.0	48.2	49.2	2.6	4.0	52.9	44.4	2.7
<i>Expectation of life at birth: 40 years</i>				<i>Expectation of life at birth: 70.2 years</i>			
1.0	17.0	62.6	20.4	1.0	19.5	58.6	21.9
2.0	32.9	58.8	8.3	2.0	36.8	54.7	8.5
3.0	43.1	52.5	4.4	3.0	47.3	48.4	4.3
4.0	50.0	47.3	2.7	4.0	54.1	43.3	2.6

SOURCE: United Nations, *The Aging of Populations* ... (1956), p. 27.

Since different assumptions can be introduced regarding the timing and extent of changes in the fertility and mortality levels, this procedure is somewhat more complicated than a systematic comparison of stable populations, where only two factors can vary (namely, a constant fertility level and a constant mortality level). The projection method is highly useful, however, in illustrating the demographic consequences of particular fertility or mortality assumptions over a short period of time.

50. In either of the two methods described above, a third demographic variable—migration—may be introduced. Thus, stable age distributions can be calculated assuming a constant rate of immigration or emigration continuing indefinitely, in addition to fixed fertility and mortality rates.<sup>58</sup> Also, in calculating population projections, assumptions concerning future migration can be included, along with the fertility and mortality assumptions, thus adding to the possible number of variants.

51. Most projections designed to illustrate the influence of demographic trends upon age composition have been calculated with reference to populations which have actually been observed, past changes therein, or future changes which can be envisaged as likely. In those which concern a past period, the object is often to determine the population that would have resulted had one or another demographic factor followed a different trend. Other projections are made into the future with selected assumptions in order to examine the consequences of varying assumptions. Numerous projections of this kind have been calculated by various authors. In each instance the variation of one factor (fertility, mortality, migration) has an effect on the population's rate of growth, on the size it attains at particular points in time, and on its age composition. The findings of some of these analyses with respect to the last-named effect are discussed below.

#### (a) *The effects of mortality*

52. Table VIII.8 shows the structures of twenty-four stable population models constructed according to different levels of mortality and fertility. Mortality levels are expressed in terms of expectation of life at birth by means of corresponding life tables.<sup>59</sup> Fertility levels are expressed in terms of gross reproduction rates, with assumed average age patterns of birth frequencies to women in reproductive ages. For simplicity, only three broad age groups are shown: 0-14 years, 15-59 years, and 60 years and over. Both in respect to mortality and fertility, an extreme range is covered, namely expectation of life at birth from 20 to 70 years, and gross reproduction rates from 1.0 to 4.0. Some of the combinations, admittedly, will hardly ever be approximated by an actual population.

53. If populations of identical fertility, but different mortality, are compared from this system of models, the observed differences in age structure are directly attributable to the difference in mortality levels. With very low fertility ( $GRR = 1.0$ ) and very high mortality ( $e_0 = 20$ ), for instance, 14.8 per cent of the population is aged 0-14 years, 68.3 per cent 15-59 years, and 16.9 per cent 60 years and over. With equally low fertility, but with very low mortality ( $e_0 = 70.2$ ), the three percentages are 19.5, 58.6 and 21.9, respectively. Generally speaking, with fertility levels equal, the populations of lower mortality will have larger percentages in childhood ages, larger percentages in the most advanced ages, and consequently reduced percentages in the middle-age group.

54. The effect of differences in mortality levels on age structure diminishes at the higher expectations of life. For example, when stable populations with  $GRR = 1.0$ ,

<sup>58</sup> See Hyrenius, "Reproduction and replacement rates" (1955).

<sup>59</sup> United Nations, *Age and Sex Patterns of Mortality* ... (1955); *Methods for Population Projections by Sex and Age* (1956). Population models of much greater detail, and separately for each sex, have been elaborated by Coale and Demeny in their *Regional Model Life Tables* ... (1966).

and life expectations of 20, 40, 60.4 and 70.2 years are compared, it is seen that the difference in age structure is greater between life expectancies of 20 and 40 years than between 40 and 60.4 years, and that the age structure of the stable population having an expectation of life of 70.2 years differs little from that where life expectation is 60.4 years. Similar observations can be made for stable populations of higher fertility levels.

55. Aside from the effect of differing mortality levels on age structure under stable population conditions, much interest has attached to the effects of changes in mortality levels over time. The effect of mortality decline on age structure depends on the pattern of change in survival rates for the different age groups. If the probability of surviving a fixed number of years increases in the same proportion at all ages, the age structure of the population remains unchanged.<sup>60</sup> On the other hand, greater percentage improvements at the older ages raise the proportion of older persons in the population, while a larger percentage rise in survival ratios at infancy and early childhood has the same effect as an increase in fertility, namely to raise the proportion of children in the population.

56. Since, in actual populations, the death risks have been greatest at the two extremes of life, there has been a wider scope for mortality improvement in early childhood and at advanced age than in adolescence and early adulthood. Thus, the result of mortality change alone would be to increase the proportions of young and old in the population at the expense of the intermediate age groups. In most of the industrialized countries during the past century the greatest improvements in mortality have occurred at the young ages. From an examination of mortality records for selected countries from the latter half of the nineteenth century to the 1950s, Coale found that, in the absence of fertility change, mortality decline would have lowered the median age of the population in 40 of 44 cases.<sup>61</sup> Keyfitz found similar trends in his analysis of long-term data for Sweden and the United Kingdom (England and Wales). More recent trends in these countries, as well as in Australia, Canada, and the United States, however, indicated that mortality change had increased the mean age of population.<sup>62</sup> In populations like those of the above-mentioned countries, which have already attained a high expectation of life, there is not room for further large increases in survival ratios at infancy and early childhood. Therefore, the most significant future mortality reductions in such populations may

come at the advanced ages, causing a rise in the proportion of older persons in the population.<sup>63</sup>

57. As mentioned above, population projections have often been calculated to examine what the demographic effects would have been in a particular country if mortality had followed a different trend from that observed. The findings have generally shown that the resulting age structure would have been modified to only a modest extent, assuming that changes in other demographic variables occurred as they actually did.

58. For example, Valaoras's projections of the population of the United States from 1900 to 1945 under different assumptions showed that, given actual fertility trends, the ratio of old persons to children in the population would have been somewhat greater had mortality remained constant throughout this period rather than declining as it did. The reason for this finding was that mortality rates declined proportionately much more at the ages of infancy and childhood than at the older ages.<sup>64</sup> Hermalin extended Valaoras's work by projecting the United States population from 1900 to 2000 in two segments (1900-1960, and 1960-2000). He showed that during the first period, mortality decline, although affecting age structure only slightly, appears to have produced a somewhat younger population. Mortality improvement during the second period, on the other hand, is expected to make the population somewhat older.<sup>65</sup>

59. The small effect of changes in mortality on age distribution was shown by Coale in his projections of the female population in Sweden from 1860 to 1950, on several assumptions. The results showed that if mortality had remained at its 1860 level throughout the period, the resulting age distribution in 1950 would have been similar to the actual.<sup>66</sup>

60. Although moderate mortality changes have only slight effects on population age structure, large and rapid mortality declines, such as those experienced in recent years by certain developing countries, can modify age structure noticeably as a result of disproportionately high mortality reductions in the younger age groups. In Latin America, for example, the increase of life expectancy by over 30 per cent between the 1930s and 1960s had the effect of reducing the mean age of the population. Among ten Latin American countries studied by Arriaga, the mortality reductions during this period were estimated to have rejuvenated the populations by 0.7 years on average, the reduction in mean age ranging from 0.5 years

<sup>60</sup> Stolnitz, "Mortality declines and age distribution" (1956), p. 182; Hermalin, "The effect of changes in mortality rates ..." (1966), p. 451; Coale, "The effects of changes in mortality ..." (1956), pp. 94-97.

<sup>61</sup> Coale, "The effect of declines in mortality on age distribution" (1956), p. 130; his "The effects of changes in mortality ..." (1956), pp. 79-114; and his "How the age distribution of a human population is determined" (1957), pp. 84-85. See also Stolnitz, "Mortality declines and age distribution" (1956); Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche ...* (1960), pp. 177-178; Rosset, *Proces starzenie się ludności ...* (1959), p. 501.

<sup>62</sup> Keyfitz, "Changing vital rates and age distributions" (1968).

<sup>63</sup> See Stolnitz, "Mortality decline and age distribution" (1956), p. 213; and his "A century of international mortality trends: II" (1956), p. 40.

<sup>64</sup> Valaoras, "Patterns of aging of human populations" (1950).

<sup>65</sup> Hermalin, "The effect of changes in mortality rates ..." (1966). Notestein studied developments between 1930 and 1955 in the female population of the United States, and found that reductions in mortality in the period, while saving many lives, had very little effect on the age distribution. Notestein, "Mortality, fertility, the size-age distribution ..." (1960), pp. 271-272.

<sup>66</sup> He also found that if mortality had been at the 1950 level throughout the 90-year period, the 1950 age distribution would have been nearly identical with the actual. Coale, "How the age distribution of a human population is determined" (1957), pp. 87-88. See also his "The effects of changes in mortality ..." (1956), p. 94.



in Brazil to 1.3 years in Venezuela. During the same period, the percentage of the population under 15 years was estimated to have increased from 41.5 to 44.8 per cent.<sup>67</sup> In seven of eight developing countries studied by Keyfitz, actual mortality declines in recent years would have lowered the mean age of the populations, in the absence of any counterbalancing changes in fertility.<sup>68</sup> It has been pointed out, however, that under conditions of high fertility the effects even of drastic mortality change upon age structure are limited. For example, in a population with a gross reproduction rate of 3 and a life expectancy of 70 years, the proportion of persons over 60 would increase from 4.3 to only 9.1 per cent under conditions of immortality, i.e., if death were wholly avoided.<sup>69</sup>

61. The noteworthy observation has been made that a population in which fertility has remained relatively constant while mortality has declined, has an age structure very similar to that which would result if the same current mortality levels had prevailed throughout an indefinite past period, instead of only recently. This is so because of certain compensating effects of the varying mortality levels to which the different cohorts were subjected throughout their life span. The age structure resulting from constant fertility and diminishing risks of mortality has been labelled "quasi-stable". The resemblance of such populations to stable populations has been utilized in recent years to estimate demographic characteristics (e.g. fertility levels) for a number of developing countries having inadequate statistical data.<sup>70</sup>

62. This practical application is possible since the populations of countries in Africa, Asia and Latin America meet the criteria of quasi-stable populations. Rather recently it has become clear that the age structure of a population which has experienced declining mortality may differ enough from the stable to produce errors of some consequence in the demographic measures obtained by applying the usual techniques of stable population analysis.<sup>71</sup>

#### (b) *The effects of fertility*

63. From the models presented in table VIII.8, it is seen that far more extreme differences in age structure occur between stable populations having similar mortality, but different fertility levels, than in the reverse case examined above. For example, if expectation of life at birth is assumed to be 50 years, the population with a gross reproduction rate of only 1.0 will consist of 17.8 per

cent in the age group 0-14 years, 60.7 per cent in the age group 15-59 years, and 21.5 per cent aged 60 and over. With a gross reproduction rate of 4.0, the three percentages become 51.5, 45.8 and 2.7 respectively. Comparisons made at other mortality levels show similar differences. It is thus clear that compared to the minor variations of age structure associated with different mortality levels, the variations of age structure resulting from different fertility levels are indeed enormous.

64. The models also show that for any given mortality level, the differences in age structure become greater as fertility declines. Passing from a gross reproduction rate of 4.0, to 3.0, 2.0 and 1.0, respectively, the percentage of the population aged 0-14 years is seen to decline by increasing amounts, while the proportion aged 60 and over rises by increasing amounts.

65. The effects of changing fertility on age structure within a given population are more complex than the effects of constant differences in fertility between populations, and have not been studied so systematically, except for isolated attempts.<sup>72</sup> The relation between fertility decrease and population aging became an important subject of demographic analysis in the early 1950s. Before that time, it was generally believed that declines in both mortality and fertility, which were characteristic of Western countries, had worked together to bring about an aging of the population: while declines in fertility eroded the base of the age pyramid, it was thought that declines in mortality which permitted people to live longer raised the proportions in the older age groups. Later works, however, demonstrated unambiguously that the past changes in the age structure of the populations of Western countries and of Japan have resulted primarily from declines in fertility. In his study of aging in the United States, Valaoras found that declining fertility was the decisive factor, and that both immigration and declining mortality had a retarding effect on the process of aging between 1900 and 1945.<sup>73</sup> Bourgeois-Pichat calculated that if fertility had remained constant in France from 1776 to 1951 while mortality declined according to its actual pattern, the population would have remained a youthful one, with only 3.6 per cent aged 65 years and over in 1951, compared to 4.3 per cent in 1776; the actual proportion in the 65 and over age group in 1951 was 11.5.<sup>74</sup>

66. The term "transitional" population has sometimes been used to describe the shape of an age pyramid formed

<sup>67</sup> Arriaga, *Mortality Decline and its Demographic Effects* ... (1970), pp. 92-104.

<sup>68</sup> Keyfitz, "Changing vital rates and age distributions" (1968), p. 250.

<sup>69</sup> Coale, "Increases in expectation of life ..." (1959). On the effects of immortality on mean age in Mexico, see Keyfitz, "Changing vital rates and age distributions" (1968), p. 246.

<sup>70</sup> For a development of the concept of the "quasi-stable" population, see Bourgeois-Pichat, "Utilisation de la notion de population stable ..." (1958); and United Nations, *The Future Growth of World Population* (1958), pp. 43-44.

<sup>71</sup> See Coale, "Estimates of various demographic measures ..." (1963); Demeny, "Estimation of vital rates ..." (1965); and United Nations, *Methods of Estimating Basic Demographic* ... (1967), pp. 25-28.

<sup>72</sup> See, for example, Winkler, "Types and models in demography" (1963), p. 362; and his *Typenlehre der Demographie* ... (1952).

<sup>73</sup> Valaoras, "Patterns of aging of human populations" (1950), pp. 78-79.

<sup>74</sup> Bourgeois-Pichat, "Evolution générale de la population française ..." (1951), pp. 655-656. Other studies concerned with the determinants of age structure include Bourgeois-Pichat, "Charges de la population active" (1950); United Nations, "Some quantitative aspects ..." (1951); ———, "Dynamics of age structure ..." (1951); Notestein, "Some demographic aspects of aging" (1954); Sauvy, "Le vieillissement des populations ..." (1954); United Nations, *The Aging of Populations* ... (1956); Tachi, "Wagakuni saikin no shusho to shibo ..." (1955); and Ueda, "Wagakuni jinko konenka ..." (1957).

TABLE VIII.9. CHANGES IN PERCENTAGE AGE COMPOSITION CALCULATED IN A POPULATION PROJECTION FOR JAPAN, 1960-2000

Age (years)	1960	1965	1970	1975	1980	2000
All ages .....	100.0	100.0	100.0	100.0	100.0	100.0
0-4 .....	8.4	7.9	7.5	8.0	8.0	6.4
5-14 .....	21.5	17.2	15.2	14.3	14.4	12.6
15-24 .....	19.2	20.8	19.6	15.7	13.8	14.1
25-44 .....	28.6	30.6	32.5	34.1	33.2	25.1
45-64 .....	16.6	17.2	18.3	20.1	22.0	28.1
65 and over .....	5.7	6.3	6.9	7.8	8.6	13.7

SOURCE: United Nations, *World Population Prospects as Assessed in 1963* (1966), p. 128. The example cited is a modification of a projection first published by Japan, Institute of Population Problems, *Future Population Estimates for Japan by Sex and Age* (1960).

under the influence of declining fertility.<sup>75</sup> In actuality, age pyramids of populations undergoing fertility decline vary depending on the speed and extent of the decline. Moreover, irregularities in an age structure may occur, for example, as a result of war-time conditions, when military casualties and separation of husbands from their wives depress fertility. On the other hand, a recovery of fertility from previously lower levels may occur during post-war periods or following improved economic conditions.

67. The temporary "bulging" of the population which often occurs at intermediate age groups during or after a period of fertility decline is an important phenomenon. When the birth rate declines, cohorts of older children may be larger than those born more recently. As time progresses and the relatively large cohort of children advances in age, a "bulge" results first at young adult ages and later at mature and more advanced ages. A recent population projection prepared for Japan provides an example of such a development (see table VIII.9). An exceptionally rapid decrease in fertility occurred in Japan between 1947 and 1957 and by the latter 1950s the gross reproduction rate had reached the very low level of about 1.0. As a result of these trends, 8.4 per cent of the population were 0-4 years old in 1960. According to the projection, this proportion would fall further to 7.9 per cent in 1965 and 7.5 in 1970, but was expected to rise again to 8.0 per cent in 1975 and 1980, partly owing to the increased proportion of population in the reproductive ages. The cohort born in the late 1940s when fertility was still moderately high can be expected to reach the peak child-bearing ages during the early 1970s. The projections show the proportion in the 25-44, year age group reaching a peak of 34 per cent in 1975. By the end of the century, however, the large cohorts would have passed into the older age groups and the proportions both in the reproductive ages and in early childhood might be considerably smaller than at present. This progression of a large cohort through the age pyramid has repercussions on the crude birth and death rates, as discussed in section C below.

<sup>75</sup> Notestein et al., *The Future Population of Europe and the Soviet Union* ... (1944), p. 109.

68. Because of the relationship between age composition and the previous trend in the birth rate, methods have also been developed to utilize the former in estimating past trends in births. Such techniques may be used either because birth data are lacking or unreliable, or for checking the consistency between recorded births in past periods and the numbers currently in particular age groups.<sup>76</sup>

#### (c) The effects of migration

69. At least in theory, a stable age structure can also result in a population affected by emigration or immigration. As mentioned earlier, this would happen when migration occurs at a rate in fixed proportion to the size of every age group in either the sending or receiving countries at each moment of time.<sup>77</sup> Populations affected by the action of mortality and fertility only are considered to be "closed" populations, while those also influenced by migration are "open". While migration at continuing rates can maintain a stable age structure in an "open" population, a discontinued migratory flow can cause an age structure to be progressively deformed as the former migrants advance in age.<sup>78</sup>

70. Since the volume of migration often fluctuates appreciably over time, it is difficult to generalize about its impact on age structure. Moreover, the ratio of net migration to a country's population is seldom large enough to affect its age structure significantly. Net immigration tends to decelerate the process of aging if it increases the younger age groups by a larger fraction than it adds to the older age groups, particularly if the young immigrants also add proportionately to the flow of births. If, on the other hand, net immigration contributes mainly to the increase of those in their late 30s and beyond, it tends to accelerate the aging process, since the immigrants themselves move into the older age groups without

<sup>76</sup> See, for example, Coale and Zelnik, *New Estimates of Fertility* ... (1963), pp. 82-89; Keyfitz, Nagnur and Sharma, "On the interpretation of age distributions" (1967).

<sup>77</sup> For a theoretical treatment of the migration ratio as a function of age and time, see Knibbs, *The Mathematical Theory of Population* ... (1917), pp. 18-25, 431-439.

<sup>78</sup> See, for example, Spengler, "Aging populations: mechanics, historical emergence, impact" (1963), pp. 31-32.

having increased the flow of births significantly.<sup>79</sup> The opposite observations apply to countries of emigration.

71. As pointed out in chapter VII, section C, international migrants are often highly concentrated in the young adult age groups. According to a grouping made by Sauvy of nearly one million immigrants to Australia, Canada, the Federal Republic of Germany and the United States of America in 1961, about 60 per cent of the total number were between 20 and 40 years of age, while in two European populations with age structures relatively unaffected by wars—those of Bulgaria and Sweden—the percentage of persons in these age groups was only 32.<sup>80</sup> The primary effect of a flow of emigration is likely to be a reduction in the proportion of persons in the 20 to 40 age group. In sum, the effect on age structure of migrations extended over a period of time depends on the size of the migratory flow, whether it is increasing or decreasing, and the age structure of the migrants.

72. There are also secondary effects on the age structure in so far as migration influences the birth rate by changing either the sex ratio or the proportion of population in the reproductive ages. A sizable immigration tends to create a noticeable “bulge”, and emigration a “hollow”, in the age structure of the population, phenomena which in the short run tend to offset or to accentuate any excess or deficiency in the working-age population, and in the long run tend to increase (immigration) or to decrease (emigration) the process of aging. Writing in 1950, Sauvy calculated that, assuming constant fertility, a net immigration of at least 100,000 persons per year would be required in France to prevent a fall in the ratio of productive to dependent age groups.<sup>81</sup>

73. Population projections prepared for a number of countries which have taken migration into account have shown that the effects of immigration or emigration on age structure would not be significant. This was the case, for example, with projections prepared for the United Kingdom<sup>82</sup> and the United States of America.<sup>83</sup> Also, where future migratory movements were taken into account in the population projections prepared by the Organisation for Economic Co-operation and Development (OECD) for its member countries, the effects upon age structure were found to be relatively small.<sup>84</sup>

74. Hypothetical studies have also been made on this subject. A United Nations study which examined the effects on age structure of a hypothetical flow of migrants

continuing over a thirty-year period and amounting annually to 1 per cent of the population found that an emigration at this rather high rate would result in an increased old-age dependency burden. With net immigration, on the other hand, old-age dependency was shown to decline. But the ratio of children to young adults was found to rise some time after the onset of immigration, as the young immigrants produced new families. These effects occurred only so long as the migration continued. After immigration ceased, this ratio declined and the ratio of the aged population to young adults, which had increased slowly during the period of immigration, rose rapidly.<sup>85</sup> Few countries in recent years have experienced emigration or immigration of the magnitude assumed in these models.

75. Internal migration also is selective with respect to sex and age and can have much bearing on the structure of population of a given area. Rural-urban migration has contributed substantially to the rather high proportion of young and middle-aged people often found in cities and towns. The exodus from the countryside then tends to generate marked differences between the age structures of urban and rural populations. Rural areas often contain a higher proportion of aged persons than do the urban areas. In Sweden, the percentage of total population aged 65 years and over was 9.0 in rural areas and 6.0 in urban areas in 1900. By 1945 these proportions had increased to 11.0 and 8.4, respectively. Moreover, as table VIII.10 shows, the difference was greater among males than females. The urban-rural differences followed a very regular pattern in France at the time of the 1946 census: the proportion of the population at ages 65 and over was highest in the rural areas (12.8 per cent), and tapered off with increasing size of locality to 10.7 per cent in urban areas with less than 5,000 inhabitants, 9.8 in towns with between 5,000 and 10,000 inhabitants, 9.4 for communities with 10,000 to 50,000 inhabitants, and 8.6 for communities of 50,000 or more inhabitants. Again, as in Sweden, the differences were greater among males than among females.<sup>86</sup>

#### (d) *The effects of war*

76. The effects of war upon a population's age structure are not confined to direct losses attributable to mortality. Fertility is also affected, both during the war when men are separated from their wives, in the immediate post-war periods when there is often a recovery of births deferred during the war, and in subsequent generations when the smaller cohorts born during a war enter the reproductive ages and produce, in turn, relatively smaller cohorts of infants and young children. The effects of war can thus send ripples, or even waves, through the age structure of several future generations.<sup>87</sup>

<sup>79</sup> *Ibid.*  
<sup>80</sup> Sauvy, *Théorie générale de la population*, vol. 2 ... (1966), p. 261.

<sup>81</sup> Sauvy, “Besoins et possibilités ...” (1950), pp. 220-222, 228.

<sup>82</sup> Percentage distributions of the population by three broad functional age groups were virtually the same in projections for 1980 prepared recently for the United Kingdom, regardless of whether migration was taken into account. Projections with an assumption for migration appear in United Kingdom, Central Statistical Office, *Monthly Digest of Statistics, April 1968* (1968), p. 15; unpublished projections which assume no migration were provided by the United Kingdom Central Statistical Office.

<sup>83</sup> United States of America, Bureau of the Census, *Population Estimates; Projections ...* (1967), pp. 112-113.

<sup>84</sup> Organisation for Economic Co-operation and Development, *Demographic Trends in Western Europe ...* (1966), p. 51.

<sup>85</sup> United Nations, “Some quantitative aspects ...” (1951). See also United Nations, *The Population of South America, 1950-1980* (1955), pp. 109-139.

<sup>86</sup> United Nations, *The Aging of Populations ...* (1956), p. 19.

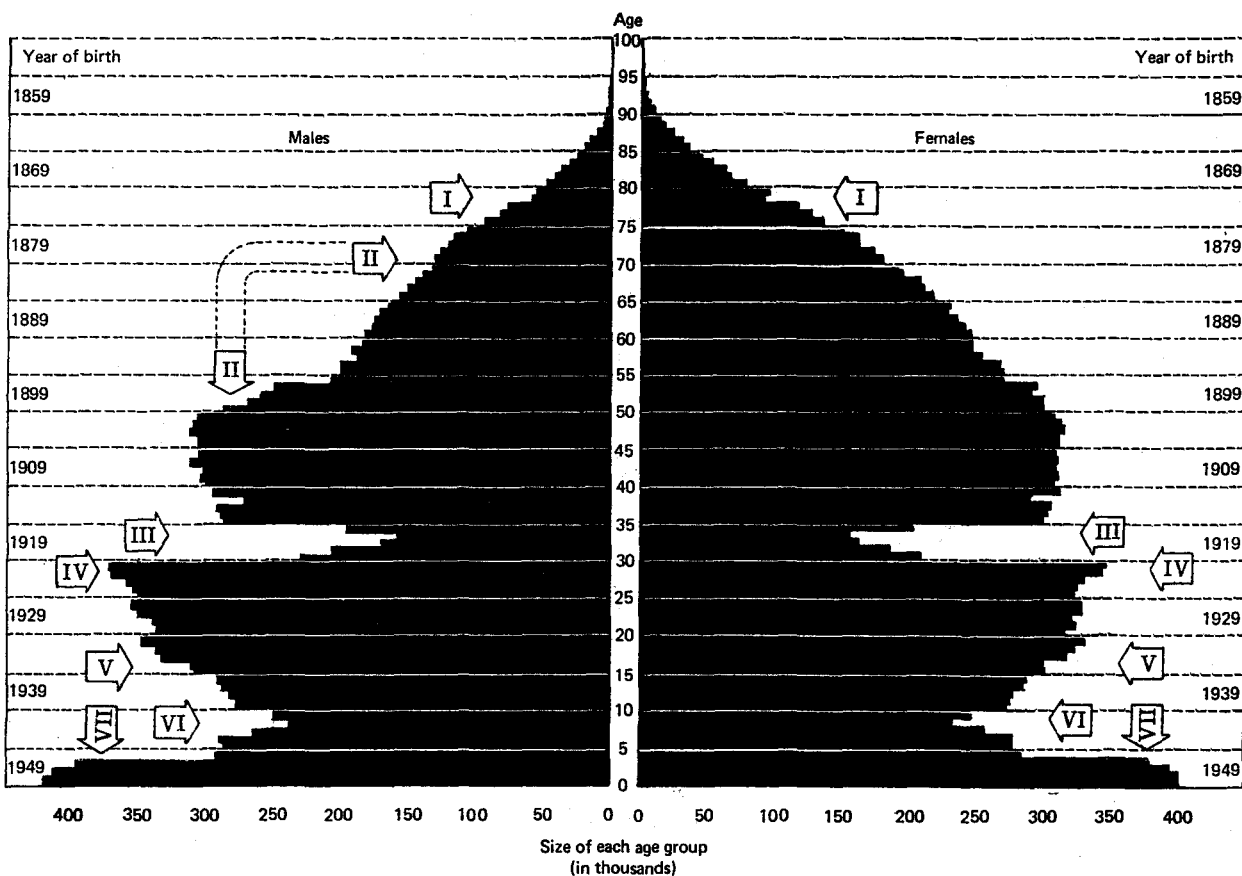
<sup>87</sup> It has been said that “the influence of the Napoleonic wars on the population of France persists to this day, and if one had the patience and the statistics, it might be possible to trace it through”. Notestein *et al.*, *The Future Population of Europe and the Soviet Union ...* (1944), p. 74.

TABLE VIII.10. PERCENTAGE OF POPULATION AGED 65 AND OVER BY SEX AND URBAN-RURAL RESIDENCE  
IN SWEDEN: 1900, 1930 AND 1945

Year	Both sexes		Males		Females	
	Country	Town	Country	Town	Country	Town
1900 .....	9.0	6.0	8.4	4.5	9.6	7.3
1930 .....	9.9	7.7	9.3	6.4	10.6	8.8
1945 .....	11.0	8.4	10.5	7.4	11.6	9.3

SOURCE: United Nations, *The Aging of Populations* ... (1956), p. 19.

Figure II. Sex and age structure of the population of France, 1 January 1950



- I. Birth deficit (war of 1870-1871).
- II. Military losses of the First World War.
- III. Birth deficit due to the First World War ("hollowed" age groups).
- IV. Recovery of births deferred by the First World War.
- V. Passing of "hollowed" age groups into the reproductive ages.
- VI. Birth deficit (Second World War).
- VII. Recovery of births deferred by the Second World War.

Source: Sauvy, "Besoins et possibilités ..." (1950), p. 219.

TABLE VIII.11. AGE DISTRIBUTION AND CRUDE VITAL RATES OF SELECTED MODEL STABLE POPULATIONS CORRESPONDING TO DIFFERENT LEVELS OF FERTILITY AND MORTALITY

		Expectation of life at birth (years)				
		30	40	50	60.4	70.2
Gross reproduction rate: 3.00						
Age (in years)		Percentage distribution				
All ages	100	100	100	100	100	100
0-14 years	41.3	43.1	44.6	46.0	47.3	
15-44 years	45.0	43.4	42.3	41.5	40.7	
45-59 years	9.5	9.1	8.6	8.1	7.7	
60 years and over	4.1	4.4	4.5	4.4	4.3	
Crude vital rates		Per 1,000 population				
Birth rate	47.7	46.0	44.9	43.8	42.9	
Death rate	33.7	23.3	15.8	9.6	4.8	
Rate of natural increase	14.0	22.7	29.1	34.2	38.1	
Gross reproduction rate: 2.00						
Age (in years)		Percentage distribution				
All ages	100	100	100	100	100	
0-14 years	31.4	32.9	34.2	35.6	36.8	
15-44 years	46.8	45.3	44.3	43.6	43.1	
45-59 years	14.1	13.5	12.9	12.2	11.6	
60 years and over	7.7	8.3	8.6	8.6	8.5	
Crude vital rates		Per 1,000 population				
Birth rate	32.7	31.7	31.1	30.6	30.1	
Death rate	33.6	23.7	16.8	11.1	6.8	
Rate of natural increase	-0.9	8.0	14.3	19.5	23.3	
Gross reproduction rate: 1.00						
Age (in years)		Percentage distribution				
All ages	100	100	100	100	100	
0-14 years	16.3	17.0	17.8	18.7	19.5	
15-44 years	42.5	41.0	40.0	39.6	39.5	
45-59 years	22.5	21.6	20.7	19.8	19.1	
60 years and over	18.7	20.4	21.5	21.9	21.9	
Crude vital rates		Per 1,000 population				
Birth rate	14.0	13.6	13.4	13.3	13.3	
Death rate	39.9	30.9	23.3	19.0	15.1	
Rate of natural increase	-25.9	-17.3	-10.9	-5.7	-1.8	

SOURCES: United Nations, *The Aging of Populations* ... (1956), p. 27; ———, *The Concept of a Stable Population* ... (1968), pp. 179-181.

population in the reproductive ages. The table shows that for any given level of the gross reproduction rate, the proportion of total population in the age group between 15 and 44 years declines as expectation of life at birth rises.<sup>96</sup>

84. As compared with the variations in crude death rates which can occur at a given level of fertility, the variations in crude birth rates among stable populations of the same mortality level are much greater. Table VIII.11 shows that crude death rates are generally much higher in low-fertility populations owing to the much higher proportion of older persons in the population. For example, in stable populations with a life expectancy at

birth of 70.2 years, the crude death rate is 15.1 where the gross reproduction rate is 1.0, but only 4.8 where the gross reproduction rate is 3.0. The percentage of persons 60 years and over in the two populations is 21.9 and 4.3, respectively. At higher mortality levels, however, the effects of differing age structures on crude death rates are not as great, since high infant and childhood death rates produce some compensating effect.<sup>97</sup> Thus, where expectation of life at birth is only 30 years, a stable population with a gross reproduction rate of 1.0 has a crude death rate of 39.9, whereas one with a gross reproduction rate of 3.0 has a crude death rate of 33.7. The relationships observed in these "stable" populations also hold true approximately in "quasi-stable" populations, which describe current conditions where mortality has declined.

<sup>96</sup> See also Coale and Zelnik, *New Estimates of Fertility* ... (1963), pp. 78, 80-82. The age distribution within the child-bearing span is also of some importance, since, given a set of age-specific birth rates, the crude birth rate will be higher in a population having the highest proportion at the peak ages of child-bearing. *Ibid.*, p. 70.

<sup>97</sup> See Coale, "Birth rates, death rates, and rates of growth ..." (1965), p. 261.

TABLE VIII.12. COMPARISON OF AGE DISTRIBUTION OF THE POPULATION AND CRUDE AND STANDARDIZED VITAL RATES IN THE UNITED KINGDOM (ENGLAND AND WALES), 1961, AND MEXICO, 1960

	United Kingdom (England and Wales) 1961	Mexico 1960
<i>Age (in years)</i>	<i>Percentage distribution</i>	
All ages .....	100.0	100.0
0-14 years .....	22.9	44.4
15-64 years .....	65.1	52.2
65 years and over .....	12.0	3.4
<i>Fertility and mortality indicators</i>	<i>Value</i>	
Gross reproduction rate .....	1.347	3.142
Expectation of life at birth (years):		
Males .....	68.1	55.6
Females .....	74.0	58.6
<i>Crude vital rates (per 1,000 population)</i>		
Birth rate .....	17.6	46.1
Death rate .....	11.8	11.3
Rate of natural increase .....	5.8	34.8
<i>Standardized vital rates (per 1,000 population)</i>		
Age composition of England and Wales:		
Birth rate .....	17.6	41.5
Death rate .....	11.8	16.8
Rate of natural increase .....	5.8	24.7
Age composition of Mexico:		
Birth rate .....	21.0	46.1
Death rate .....	4.8	11.3
Rate of natural increase .....	16.2	34.8

SOURCE: Compiled from Keyfitz and Flieger, *World Population ...* (1968), pp. 118-119, 536-537.

85. A way of illustrating the effect of age structure on the vital rates of actual populations is to calculate what those rates would be, given the age structure of another population. The results of such a standardization procedure for Mexico and the United Kingdom (England and Wales), drawn from a recent systematic analysis of demographic indicators for many countries of the world,<sup>98</sup> are presented in table VIII.12. The two populations selected are seen to differ greatly with respect to fertility and mortality levels. The greater effect of age structure on the crude death rate than on the crude birth rate is seen by comparing the actual birth and death rates of Mexico with those which would have resulted if the population had had the same age structure as that of the United Kingdom (England and Wales). Given the age structure of the latter, the Mexican death rate would have been 16.8 instead of 11.3, while the crude birth rate would have been 41.5 instead of 46.1. Since the substitution of the older population of England and Wales would have the effect of lowering the birth rate and raising the death rate, the rate of natural increase would be significantly lowered. Under such conditions, the crude rate of natural increase would be only 24.7 instead of the actual rate of 34.8.

<sup>98</sup> See Keyfitz and Flieger, *World Population ...* (1968).

86. The table also shows what the crude vital rates of England and Wales would be if that country had the same age structure as Mexico. With such an age structure, the crude birth rate would be 21.0 instead of 17.6, the crude death rate 4.8 instead of 11.8, and the crude rate of natural increase 16.2, instead of 5.8. When differences in age structure between the two countries are eliminated by standardization, no matter which population is used as the standard, the birth rates and rates of natural increase are found to move closer together and the death rates further apart. It can also be seen from the table that if Mexico's age-specific fertility and mortality rates were suddenly to drop to the levels of those in England and Wales, Mexico's age structure would cause the crude death rate to be lower and the crude birth rate and rate of natural increase to be higher than those prevailing in England and Wales.<sup>99</sup>

87. Investigating the limits of vital rates which might be attained in human populations, Coale found that a birth rate of 63 would result from the age structure of a stable population which combined the very high fertility schedule of the Cocos-Keeling Islands with very high mortality, viz. an expectation of life at birth of 20 years. A minimum crude death rate of about 2.5 was obtained in a hypothetical stable population which combined the Cocos Islands fertility schedule and a recent Swedish mortality schedule. The latter combination of high fertility and low mortality (gross reproduction rate 4.17 and expectation of life at birth of 75 years) would yield a rate of increase of about 5 per cent per year.<sup>100</sup>

88. The effect on vital rates of "transitional" age structures resulting from declining fertility is more complex. As shown by the data for Japan in table VIII.9 above, a fertility decline for a time produces a high proportion of persons in the reproductive ages. As a result, the decrease in the crude birth rate may be slowed down despite declining fertility rates. Moreover, since mortality risks are comparatively slight in the reproductive ages, such an age structure tends to accelerate the fall of the crude death rate. In general, during the transition from a fairly stable population with high fertility, the crude birth rate tends to be above, and the crude death rate below, the "intrinsic" rates that would eventually result from the current fertility and survival values. Therefore, the current rate of natural increase under these conditions tends to be above that which would eventually result from a continuation of the current fertility and mortality levels.

89. Examining the dynamics of age structure during demographic transition, Lorimer calculated the hypothetical populations which would result after thirty years from an initial population of high fertility and high mortality on two different assumptions: (A) if fertility remained constant while mortality declined substantially; and (B) if mortality declined as in hypothesis A and fertility

<sup>99</sup> A decline in Mexico's fertility would, of course, bring about a gradual change in that country's age structure, but it is certain that the rate of natural increase would remain for some decades at a higher level than that found in populations where fertility had long been low. The effect of transitional age structure on crude vital rates is discussed below.

<sup>100</sup> Coale, "Birth rates, death rates and rates of growth ..." (1965), pp. 263-264.

declined in such a way that the net reproduction rate remained constant. The results showed that, even under hypothesis B, the crude rate of natural increase rose throughout the projection period. Although the mortality assumptions in the two hypotheses were the same, the crude death rate declined more rapidly under the conditions of hypothesis B, owing to the declining proportion of infants in the population.<sup>101</sup>

90. In a recent analysis of the contribution of age composition to population growth, Preston showed that the present age structures of the populations of many high-fertility countries constitute an important factor in their growth, and that with fertility decline, as age structures become more middle-heavy, they will contribute even more to population growth in the future. He calculated that if age-specific fertility rates for Venezuela declined by 2 per cent annually, while mortality rates remained constant, the changing age distribution would be more favourable to growth for a period of seventy years than was the initial age distribution. Moreover, the age distribution's depressing effect on the crude death rate was found to be more important quantitatively than its stimulating effect on the crude birth rate in contributing to continued population growth.<sup>102</sup>

91. In addition to the direct influence that age structure exerts on crude vital rates, it also may create certain economic and social conditions which in turn affect mortality and fertility levels. The relative prevalence of younger or older persons in a population may give rise to optimistic or pessimistic attitudes which influence the frequencies of marriage and childbirth.<sup>103</sup> Disproportionate numbers of young adults unable to find productive employment, or of inadequately cared for older persons may cause such groups to be prone to nervous diseases, suicide, alcoholism, or drug addiction, thus tending to increase mortality rates. Excessive numbers of children may result in their neglect, with consequent higher infant mortality.

92. The availability of suitable mates for men and women of reproductive age obviously has a bearing on nuptiality and fertility. Where there have been heavy war casualties, for instance, the shortage of marriageable males may result in many women remaining unmarried, or marrying only late in life, with consequent depressing effects on fertility. Marriage opportunities for women in the Soviet Union, for example, were severely restricted as a result of heavy losses of young men in the two world wars.<sup>104</sup> Despite France's considerable losses of men in the First World War, Henry found that the proportion of women remaining single in the cohorts most affected

were not nearly as great as might have been expected. He attributed this to a reduction in the customary age difference between spouses, a higher than usual marriage rate among surviving males in the affected cohorts, and to immigration.<sup>105</sup>

93. In the period following the Second World War, significant reductions in the proportions of persons remaining single occurred in a number of European countries which had experienced no fighting on their soil. This trend was more evident for women than for men, owing to recent changes in the sex-age composition of the population which had been brought about by the cessation of large-scale emigration of males, the wearing off of the effects of the First World War, and the trend towards an older population.<sup>106</sup>

94. Since wives customarily are somewhat younger than their husbands, sharp fluctuations in the annual number of births can produce an imbalance in the numbers of men and women of marrying age some twenty years later. In the United States of America, for example, the long-term trend towards earlier marriage was reversed in the 1960s, and the proportion of single women marrying declined. These developments have been traced to disproportions between the numbers of men and women at the prime marriage ages, which appeared as the large cohort of female survivors of the post-war baby boom reached marriageable age.<sup>107</sup> Similar imbalances can be expected in rapidly growing populations, such as those of many developing countries having high fertility and sharply falling mortality. In Malaysia, where a considerable age difference exists between husbands and wives in all major ethnic groups, a surplus of marriageable females began to appear in the early 1960s, as the first female survivors of larger post-war birth cohorts reached marriageable age.<sup>108</sup> The opposite kind of imbalance will occur where there has been a rapid fertility decline, since cohorts of women reaching marriageable age will be too few in number to match the male cohorts with whom they would normally marry.

95. Various writers have been concerned with cyclical fluctuations in birth rates which occur over a period of twenty or twenty-five years and their consequent effects on the age structure.<sup>109</sup> For example, Lösch, writing mainly of German experience, noted that declines in the birth rate during war and subsequent increases in post-war periods create waves in the age structure which

<sup>101</sup> Lorimer, "Dynamic aspects of the relation . . ." (1951), pp. 249-254.

<sup>102</sup> Preston, "Empirical analysis of the contribution . . ." (1970).

<sup>103</sup> It has been suggested that the increasing burden of old-age dependency may cause individuals to restrict their fertility—a development which in turn leads to a further aging of the population. Darc, *Vieillessement de la population* . . . (1948), p. 38.

<sup>104</sup> United Nations, *Population Bulletin* . . . (1965), pp. 99-100. See also Uralis, *Rozhdaemost i prodolzhitel'nost zhizni v SSSR* (1963), pp. 55-57; Piskunov and Steshenko, "Nekotorye osobennosti vosproizvodstva . . ." (1967), pp. 68-71.

<sup>105</sup> Henry, "Perturbations de la nuptialité . . ." (1966), pp. 311-312.

<sup>106</sup> Hajnal, "Age at marriage and proportions marrying" (1953), pp. 121-122. For an analysis of the demographic factors which have operated to improve the marriage chances of spinsters in England and Wales, see Benjamin, "Changes in marriage incidence in Western society . . ." (1963), pp. 128-129.

<sup>107</sup> Akers, "On measuring the marriage squeeze" (1967), pp. 907-908. On the situation in Britain see Cox, "The demographic characteristics of Britain to-day . . ." (1967), p. 227.

<sup>108</sup> Caldwell, "Fertility decline and female chances . . ." (1963). On female marriage probabilities in stable populations of differing growth rates, see Karmel, "The relations between male and female nuptiality . . ." (1948).

<sup>109</sup> One author has applied complex time-series analysis to trends in the birth rate and their effect on age structure. Coale, "The use of Fourier analysis . . ." (1970).



result in new fluctuations in the birth rate when the affected cohorts reach the age of highest fertility.<sup>110</sup> Studying age data of the Burmese population at successive censuses, Bernardelli found evidence of "population waves", and observed the high frequencies of children which occurred when the female survivors of large cohorts reached reproductive age.<sup>111</sup> Other writers have examined the possibility of a reciprocal relationship between population and economic conditions, whereby fluctuations in age structure have economic effects which in turn influence the birth rate and set off a new round of demographic fluctuations. It has been pointed out that the slowdown of the rate of entry into the labour market in the United States of America during the 1940s, as a result of past demographic trends, was associated with a period of prosperity when job security and good prospects for advancement appear to have encouraged earlier marriage and an upswing in the birth rate. On the other hand, a quite different situation developed in the late 1950s as the survivors of larger birth cohorts began to reach working age and labour supply became more plentiful in relation to aggregate demand.<sup>112</sup>

96. The population's structure may also exert an influence on the rate of migration. For example, after the Second World War, shortages of persons in the productive adult ages in certain European countries led to an encouragement of immigration as a means of redressing structural imbalances in the population. France sought, through immigration, to attain a ratio of workers to dependants more similar to that in neighbouring countries.<sup>113</sup> The relative scarcity of young adult workers in the Federal Republic of Germany and their relative surplus in Italy<sup>114</sup> was undoubtedly a factor in the heavy migration from the latter country to the former in the post-war period.

#### D. Economic and social implications of sex and age structure

97. Throughout history, males and females of different ages have performed different functions in society, have been accorded different status, and have had different

needs. These differences vary widely from one society to another, and are sometimes reinforced by symbolic acts, such as the initiation ceremonies which may mark the transition from childhood to adulthood.<sup>115</sup> While some of these distinctions are biologically determined—for example, by the different reproductive roles of men and women—the economic, institutional and cultural patterns peculiar to each society constitute the predominant force. In the political realm, for example, women have generally played a negligible role,<sup>116</sup> but this appears to be the result of cultural conditioning, rather than of a "natural" disinclination on their part.<sup>117</sup> In certain societies the elderly have been accorded a privileged status because of the knowledge, wisdom, and judgement gained through long experience,<sup>118</sup> but this status has been declining in many parts of the world, while what has been termed a "youth culture" has recently emerged in a number of developed countries.

98. A society's sex and age structure assumes particular importance for the functioning of the economy, since these two attributes constitute the main criteria for determining the division of labour. Taeuber has pointed out that males between the ages of 15 and 59 years of age bear the main responsibility for maintenance of the family and engage in some form of productive work. The activities of women at these ages are more diverse, since they may include childbearing, childrearing and home-making, as well as economic activity.<sup>119</sup> Boserup, on the other hand, has emphasized the very different economic roles played by women in different parts of the world's developing regions, calling attention to the fact that in certain societies it is women rather than men who are chiefly responsible for food production, and what are considered "natural" roles for men and women in one society may be quite different in another society.<sup>120</sup>

99. In view of the diversity of roles and needs, as established in each society, variations in the composition of a population by sex and age can have far-reaching economic, social and political implications. The study of these implications, which requires the expertise of both demographers and anthropologists, has as yet received insufficient attention.

<sup>110</sup> Lösch, *Bevölkerungswellen und Wechsellagen* (1936); and his "Population cycles as a cause . . ." (1937).

<sup>111</sup> Bernardelli, "Population waves" (1941).

<sup>112</sup> Grauman, "Comment . . ." (1960), pp. 281-282; Easterlin, "Economic-demographic interactions and long swings . . ." (1966), pp. 1083-1087. Easterlin's detailed analysis of demographic and economic trends in the United States of America led him to conclude that it was the concurrence of several circumstances—an expansion in the economy, restricted immigration and a low rate of labour force entry—that created exceptionally favourable labour market conditions in the late 1940s and 1950s and led to higher fertility. See his *Population, Labor Force and Long Swings* . . . (1968), particularly pp. 108-109. The author also implied that age composition of the population might have some bearing on cyclical movements in migration. He stated that "Labor demand conditions in the United States were the systematic factor initiating an upsurge [in immigration], though the amplitude and composition of the response depended upon the particular supply conditions prevailing at the time." *Ibid.*, pp. 35-36.

<sup>113</sup> See Sauvy, "Besoins et possibilités . . ." (1950), pp. 216-218.

<sup>114</sup> See the comparisons given in Sauvy, "La population de l'Europe occidentale . . ." (1951), p. 387.

<sup>115</sup> See Piddington, *An Introduction to Social Anthropology* (1952), vol. 1, p. 175.

<sup>116</sup> It may be noted that in mankind's long history, women have received the right to vote relatively recently and that this right is not yet universal. See United Nations, Commission on the Status of Women, *Constitutions, Electoral Laws and Other Legal Instruments* . . . (1968).

<sup>117</sup> On the strong societal forces which have shaped women's "nature", see Mill, *The Subjection of Women* (1869, 1970 ed.).

<sup>118</sup> In many primitive societies, important community affairs are regulated by councils of elders, a system which has been termed "gerontocracy". Piddington, *An Introduction to Social Anthropology* (1952), vol. 1, p. 75. See also Lips, "Government" (1938), pp. 496-497. It has been pointed out, however, that treatment of the aged varies among primitive societies and, in some, old age is looked down upon. Reichard, "Social life" (1938), p. 422.

<sup>119</sup> Taeuber, "Population growth in underdeveloped areas" (1963), p. 39.

<sup>120</sup> Boserup, *Women's Role in Economic Development* (1970), pp. 15-16; see also Lowie, "Subsistence" (1938), p. 319; Bunzel, "The economic organization of primitive peoples" (1938), pp. 336, 369 ff.

TABLE VIII.13. MAIN FUNCTIONAL AGE GROUPS FOR MAJOR AREAS OF THE WORLD, 1950 AND 1965

	World total	Developing regions	More developed regions	Africa	East Asia	South Asia	Europe (excluding the USSR)	Latin America	Northern America	Oceania	USSR
Total population (millions)											
1950 .....	2,486	1,628	858	217	657	698	392	162	166	13	180
1965 .....	3,289	2,252	1,037	303	852	981	445	246	214	18	231
Increase, 1950-1965											
Number (millions) .....	803	624	180	86	195	283	53	84	48	5	50
Percentage .....	32.3	38.3	20.9	39.5	29.7	40.5	13.4	51.4	29.1	39.3	28.0
Pre-school population (0-4 years) (millions)											
1950 .....	349	260	88	38	98	112	36	26	18	2	19
1965 .....	457	358	99	54	110	165	39	41	23	2	23
Increase, 1950-1965											
Number (millions) .....	108	98	11	16	12	54	3	14	5	1	5
Percentage .....	31.1	37.5	12.0	41.5	12.0	48.1	7.9	54.6	25.8	36.4	24.6
School-age population (5-14 years) (millions)											
1950 .....	550	399	151	55	156	170	64	40	27	2	35
1965 .....	771	578	193	78	204	256	74	64	44	4	47
Increase, 1950-1965											
Number (millions) .....	221	179	41	23	48	86	11	24	17	1	12
Percentage .....	40.1	45.0	27.4	42.2	30.6	50.3	16.8	58.6	62.0	64.9	33.1
Working-age population (15-64 years) (millions)											
1950 .....	1,464	911	554	117	375	393	258	90	108	8	115
1965 .....	1,895	1,242	654	163	503	530	285	132	128	10	143
Increase, 1950-1965											
Number (millions) .....	431	331	100	45	128	137	27	42	21	3	28
Percentage .....	29.4	36.3	18.0	38.8	34.2	34.8	10.4	46.5	19.2	32.7	24.5
Old-age population (65 years and over) (millions)											
1950 .....	123	58	65	7	28	23	34	5	13	1	11
1965 .....	166	73	93	9	35	29	46	9	20	1	17
Increase, 1950-1965											
Number (millions) .....	43	16	28	1	7	6	12	4	6	0	6
Percentage .....	35.4	26.9	43.0	19.3	26.3	27.4	36.2	65.1	46.2	39.1	54.8
Females of reproductive age (15- 44 years) (millions)											
1950 .....	556	353	203	46	144	152	89	36	37	3	48
1965 .....	706	480	227	65	192	204	94	52	43	4	53
Increase, 1950-1965											
Number (millions) .....	150	127	24	18	48	52	5	16	6	1	5
Percentage .....	27.1	35.9	11.8	39.6	32.9	34.2	5.5	45.4	14.9	31.2	10.8

SOURCE: Compiled from data in United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

Note: Because of rounding, totals are not in all cases the exact sum of the parts.

100. For convenience, the groups or contingents which fulfil particular functions are usually delimited by age (as in the case of the working-age males referred to above), although there is far from complete coincidence between the age limits set for a given functional contingent and the population which actually performs the function in question. For example, the size of the school-age population in developing countries may far exceed the actual number of persons enrolled in schools, partly because of a shortage of educational facilities. Populations of working age may include large numbers not in the work force, particularly women, while excluding many children and older persons who work. Even where the age limits of a contingent are biologically defined, as in the case of women

of reproductive age, actual exposure to the risks of child-bearing are regulated by cultural norms affecting sexual behaviour and age at marriage. The functional contingents discussed below should therefore be viewed as rough approximations of the potential of given segments of a society to fulfil certain roles.

#### 1. DYNAMICS OF MAIN FUNCTIONAL GROUPS

101. A distribution of the population in each region of the world by broad age groups was presented earlier in the chapter. Table VIII.13 gives information on more detailed age contingents and changes in their size from 1950 to 1965. The contingents shown in the table are the

following: pre-school population, school-age population, working-age population, old-age population, and females of reproductive age. The age boundaries of these contingents are not similarly defined in all societies. For example, different conditions may prevail from one country to another with respect to customary working ages. Various additional groups may also be identified, such as the youth population, sometimes taken to be the population between the ages of 15 and 24, males of military age, or the population having legal responsibility, or being of voting age, e.g. persons 18 years of age and over in some societies.<sup>121</sup>

102. The table shows that during the decade and a half between 1950 and 1965, the different contingents were growing at varying rates, and this variation was much more marked in the developed than in the developing regions. In the developed regions, total population grew by a little more than one fifth during this period. The aging trend is apparent from the 43 per cent increase in the number of persons aged 65 years and over. The working-age contingent increased by 18 per cent, and the female contingent of reproductive age by 12 per cent. While the pre-school population grew by only 12 per cent, the school-age population showed a growth of 27 per cent, as the large cohorts from the post-war baby boom moved into this group. The greater uniformity of growth rates of the different contingents in the developing regions is reflected in a fairly stable age structure. Thus, the pre-school contingent, working-age population, and women of reproductive age all increased at about the same rate as the population as a whole (38 per cent). A somewhat higher than average percentage increase (45 per cent) is shown, however, for the school-age contingent.

103. The table shows a considerable contrast between East Asia and South Asia in the growth rates of different contingents. In East Asia the pre-school population grew by only 12 per cent, as compared with an increase of 30 per cent for the population as a whole. This slower growth rate of the pre-school group reflects the more moderate level of fertility estimated for China in the 1960s, and the well-documented decline in Japan. In the latter country, between 1950 and 1965, the number of pre-school children was reduced by about one fourth. In South Asia, on the other hand, where fertility has not yet begun to decline in the populous countries, both the pre-school and school-age contingents have been increasing at a considerably more rapid rate than the rest of the

population. As pointed out earlier, mortality decline in its initial stages is likely to affect the younger age groups disproportionately, resulting in such a pattern.

104. Of crucial importance for determining needs for educational facilities and teachers are the size and growth rate of the population of school age. This group of 5 to 14-year-olds makes up about one quarter of the total population in the developing regions, and about one fifth in most of the developed regions, although somewhat less in Europe. It is noteworthy that the expansion of numbers in this group between 1950 and 1965 was more rapid in Northern America and Oceania (62 per cent and 65 per cent, respectively) than in any of the developing regions, despite the latter's higher growth rates of total population. In the United States, the unprecedented numbers of children and adolescents resulting from the post-war baby boom were causing certain strains on the economy by the 1960s, and double-shift and oversize school classes had become commonplace.<sup>122</sup> In Europe, the school-age population showed a more moderate growth rate of 17 per cent between 1950 and 1965. In contrast to Northern America and Oceania, where high post-war birth rates were sustained for a considerable period, in Europe the baby boom was pronounced only in the immediate post-war years up to 1950; by 1965 the affected cohorts had thus passed into the 15-19 age group.

105. Very large increases in the school-age population were recorded in Latin America (59 per cent), South Asia (50 per cent), and Africa (42 per cent). The magnitude of the problem in one country—India—is illustrated by the fact that the number of children in primary, middle and secondary schools was expected to increase by more than 20 million—from 43.5 to 64.0 million—and the number of such schools to increase by about 96,000 during the Third Five-Year Plan period, 1961-1966.<sup>123</sup>

106. As discussed in chapter IX, section A, trends in the numbers of persons aged 15-64 years have much bearing on the size of the labour force and changes therein. For reasons stated earlier, the numbers in this age group cannot, of course, be equated with the economically active population. Nevertheless, the rate at which the working-age population is expanding gives a rough indication of the rate at which new jobs will have to be provided by the economy, if rising unemployment is to be prevented.<sup>124</sup>

107. The table shows that between 1950 and 1965, the working-age population—both in the developed and developing regions—was growing at a slightly lower rate than the total population. This pattern is also seen in each of the major regions, with the exception of East Asia. The largest percentage increase in the working-age

<sup>121</sup> In studies of the sex and age structure in Yugoslavia, for example, the following are among the contingents which have been singled out: pre-school children (0-6 years old); school-age children (7-14 years old); working-age population (15-64 years for men, 15-59 for women); population past working age; adult population (18 years and over); women of reproductive age (15-44 or 15-49 years), and those which contribute the most to total fertility (20-34 years). See Macura, *Stanovništvo i radna snaga* . . . (1958), pp. 114-117; Tasić, "Dugoročne promene starosne . . ." (1963); Todorović, "Buduće promene u starosnoj . . ." (1968). In an analysis of projected population trends in major developing countries, Taeuber identified the following groups: children in elementary school ages (5-14 years); youth aged 15-19 years and population in the productive ages (15-59 years). Taeuber, "Population growth in underdeveloped areas" (1963).

<sup>122</sup> Bogue, "Population growth in the United States" (1963), p. 77.

<sup>123</sup> India, Planning Commission, *Third Five Year Plan* (1961), pp. 573-577.

<sup>124</sup> Generally, the rate of growth of the active population has been found to be a little lower than that of the working-age population in view of the tendency for activity rates in the marginal age groups to decline over time. See chapter IX, section A.

contingent shown for any region is that for Latin America—46 per cent. The economic absorption of such a huge increase in the productive segments of the population poses an extremely formidable task, making the problem of unemployment and underemployment one of the dominant features of the Latin American economies in the 1960s.<sup>125</sup> Similar problems confront the other developing regions as well, though the rate of expansion of the working-age population was not quite so rapid.

108. On the whole, the old-age population has been growing at a more rapid rate in the world's developed regions than in the developing regions—43 per cent in the former and 27 per cent in the latter, between 1950 and 1965. While the percentage increases in the old-age population were greater in Northern America, the Soviet Union and in Oceania than in Europe, the absolute increase in the last-named region was particularly impressive. Numbering 34 million in 1950, the 65 and over group had increased by 12 million, to 46 million in 1965.

109. The size of the female population in the reproductive age influences the crude birth rate, and hence the rate of population growth. In 1965, the range in the proportion that women of reproductive age constituted of total population in the different regions was not very wide—from about 20 per cent in Northern America and Oceania to 23 per cent in the Soviet Union, the latter percentage reflecting the large deficit of males in the population referred to previously. Between 1950 and 1965 the number of women of reproductive age was growing at a slow rate in Europe, Northern America and the USSR, but very rapidly in the developing regions. In Latin America, this contingent increased by 45 per cent. Such rapid growth in the numbers of women in the fertile ages generates a powerful momentum for increase in the absolute number of births, even in the face of declining fertility rates.<sup>126</sup> Other developing regions also showed large percentage increases in this contingent: about 40 per cent in Africa and about 33 per cent in Asia.

## 2. GENERAL IMPLICATIONS

110. Many of the important economic and social implications of a population's sex and age structure are discussed in detail in later chapters. It has been seen above that age structure has a considerable bearing on the ratio of producers to the total number among whom the national product is distributed. Other things being equal, a population which has a higher ratio of persons in the productive age groups will have a higher *per capita* output, greater savings and larger investments available for developmental purposes. Under these conditions, less

will be spent *per capita* on primary education, housing and "social overhead". Higher *per capita* product is correlated with higher *per capita* consumption and, at least in the early stages of development, with higher productivity of the labour force, resulting in part from better nutrition and work incentives.<sup>127</sup>

111. The needs for educational facilities and teaching personnel are obviously closely connected with the current and projected numbers of population of school age. The larger the proportion of school-age children in the population, the greater is the proportion of national income which must be spent to provide education at a given standard. The high annual investment in education which is required to prevent a deterioration in standards makes it difficult for developing countries with rapidly increasing child populations to provide adequate educational progress.<sup>128</sup> While a change to an older age structure may reduce the proportion of expenditures for educational facilities, the relative needs for other types of social services are increased (see the discussion of implications of an aging population below).

112. The age structure of a population has an impact on consumption levels and patterns, since people at different ages have different needs.<sup>129</sup> Savings, too, may be affected, but these effects are not easily assessed. Generally speaking, findings of studies on the effect of age structure upon savings suggest that the greatest savings are likely to be achieved in a population having a relatively large proportion of adults of working age. The relationships between age structure, consumption levels and patterns, and savings, are examined in more detail in chapter XIII, section A.

113. The age structure of the population, through its effect on the composition of families, may considerably affect housing needs. The numbers of families of various sizes and the numbers with children of various ages clearly help to determine the need for different types of housing, since in a young population, where average family size is large, the relative requirements for houses as compared to apartments will be greater than in an older population where families are of smaller size. A discussion of the role played by age structure in influencing household size and composition and housing needs is contained in chapter X, particularly section E.

<sup>125</sup> United Nations, Economic Commission for Latin America, *Economic Survey of Latin America, 1968* (1970), pp. 21-28. See also El-Badry, "Perspectiva de la población Latinoamericana ..." (1971); Taeuber, "Population growth in underdeveloped areas" (1963), pp. 39-40.

<sup>126</sup> The continued rapid increase of women of childbearing age in the developing countries would result in a 50 per cent increase in the number of births in the late 1970s, compared with the early 1960s, even if fertility levels should remain unchanged. Taeuber, "Population growth in underdeveloped areas" (1963), p. 40.

<sup>127</sup> Coale, "Population and economic development" (1963), pp. 60-61. It has been estimated that the changes in age structure in India which would result from a 50 per cent reduction in the rate of childbearing beginning in 1956 would add about 40 per cent to the income per consumer after thirty years, above that which could be expected if fertility rates remained unchanged. Coale and Hoover, *Population Growth and Economic Development ...* (1958), pp. 272, 284, 291.

<sup>128</sup> See, for example, Coale and Hoover, *Population Growth and Economic Development ...* (1958), pp. 248-249; Lambert, "Croissance démographique et instruction ..." (1960).

<sup>129</sup> For example, nutritional needs (e.g. calorie requirements) vary with sex and age. See Sukhatme, "The world's hunger and future needs ..." (1961), p. 472.

### 3. IMPLICATIONS OF AN AGING POPULATION

114. Aging may concern an individual or a population, these being distinct concepts.<sup>130</sup> An individual ages as his chronological age increases, passing between conception and death through an orderly sequence of irreversible stages which include infancy, childhood, adolescence, adulthood and old age.<sup>131</sup> The aging of human populations is a much more complex notion, and there is no unanimously held definition of this concept. Unlike the case of the individual, a population does not necessarily age over time, but may remain unchanged or even grow younger.<sup>132</sup>

115. Generally speaking, the aging of a population consists of an increase in the proportion of persons defined as "old" in the population.<sup>133</sup> Conversely, it can be said that a population grows younger when the proportion of young persons increases. Actually, both processes, i.e., aging and rejuvenation as defined above, can occur simultaneously. It is sometimes said that a population is aging at the apex when the proportion of old persons is increasing and that it is aging at the base when the proportion of young persons is declining.<sup>134</sup>

116. As seen in section A, the populations of the industrialized countries have aged considerably during the past century, mainly as a result of declining fertility. As the countries most affected by this process are those of Western Europe, Northern America and Oceania, the problem of aging, far from being universal, is confined to a relatively small segment of the world's population. This progressive aging has had substantial repercussions on the economic, political and social life of nations, and has given rise to a special branch of research generally referred to as social gerontology, and concerned with the non-biological problems of aging.<sup>135</sup> Some of the major implications of the aging phenomenon, based on selected studies from the vast literature on this subject, are summarized below.

117. It has often been argued that aging of the population tends to depress the level of living in the highly industrialized countries. One of the ways aging may exert an influence is through its effect on the ratio of dependants to productive elements in the population. As shown in section A, until recently the aging of population in most of these countries has been such as to reduce the dependency ratio, since the relative number of children

has declined faster than the relative number of persons too old to work has increased. The lower dependency ratio which aging thus made possible is estimated to have contributed to rising levels of living in many of the industrialized countries.<sup>136</sup> Recent decades, however, have seen a rise in the total dependency ratio, as the proportion of older persons in the population has risen rapidly, and the proportion of children has increased as a result of the post-war recovery in the birth rate.

118. The shifting ratio of child to aged dependants is also of importance, since the cost of providing for a dependent child may be different from that for an aged dependant.<sup>137</sup> A few studies have attempted to estimate the relative costs of supporting juvenile and aged persons, as well as working-age adults. Burgdörfer found, for example, that the cost of maintaining a child in relation to that of an adult and an old person was in the ratio of 3.5 to 7 to 6 in Germany.<sup>138</sup> In France, the costs of maintaining persons in various age groups in 1966 have been estimated as follows: 16,400 francs for persons below 18 years of age, 32,600 francs for persons 18-65 years of age, and 22,500 francs for those over 65 years.<sup>139</sup> In Great Britain it was estimated for the financial year 1952-1953 that the cost of state social services for maintaining a child under 15 years of age was £34.9, whereas the cost of maintaining an old person was £69.6.<sup>140</sup> A United Nations study reported that the needs of a child and an elderly person were roughly the same—70 per cent of those of an adult.<sup>141</sup>

119. Not only the relative size of the working population, but also the efficiency of workers may be affected by the aging of the population and the concomitant aging of the labour force.<sup>142</sup> Many writers have expressed the view that a relatively young labour force is more efficient than an older one, since young people excel in such qualities as physical strength, energy, enthusiasm, adaptability and the capacity to learn new things and to innovate.<sup>143</sup> On the other hand, wisdom, experience, patience, breadth of view, stability and judgement are qualities more prevalent among older than among younger

<sup>130</sup> Spengler, "The aging of individuals and populations ..." (1966), pp. 44-47.

<sup>131</sup> See Anderson, "Psychological research on changes and transformations ..." (1964). Biological and psychological changes are inherent in the individual's passage from infancy to old age. Kiser, "The aging of human populations ..." (1962), p. 18. These changes have repercussions on the individual's economic activity and his social behaviour. United Nations, *The Aging of Populations* ... (1956), p. 1.

<sup>132</sup> Kiser, "The aging of human populations ..." (1962), p. 18.

<sup>133</sup> Sauvy, *Les limites de la vie humaine* (1961), p. 95. See also Féraud, "A propos du vieillissement d'une population" (1955); Benjamin, "Demographic and actuarial aspects of ageing ..." (1964).

<sup>134</sup> United Nations, *The Aging of Populations* ... (1956), p. 1.

<sup>135</sup> Tibbitts, "Origin, scope, and fields of social gerontology" (1960).

<sup>136</sup> The United Kingdom Population Commission estimated that *per capita* national income in the middle of the twentieth century would have been about one eighth lower if the nineteenth century age structure still existed. United Kingdom, Royal Commission on Population, *Report* (1949), p. 112.

<sup>137</sup> A discussion of several studies on this subject can be found in Stassart, *Les avantages et les inconvénients* ... (1965), pp. 60 ff.

<sup>138</sup> Burgdörfer, *Volk ohne Jugend* ... (1932), pp. 304-305.

<sup>139</sup> See Sauvy, *Théorie générale de la population*, vol. 2 ... (1966), pp. 60-61. These are adjusted figures, based on estimates made in 1950 by the Commission supérieure des conventions collectives.

<sup>140</sup> Paish and Peacock, "Economics of dependence (1952-82)" (1954), p. 289. These costs were expected to increase as a larger proportion of the aged became eligible for retirement, and other social benefits became more liberal. *Ibid.*, p. 290.

<sup>141</sup> United Nations, *The Aging of Populations* ... (1956), p. 61.

<sup>142</sup> Robbins, "Notes on some probable consequences ..." (1929), pp. 75-76; Daric, *Veillissement de la population* ... (1948), p. 35. Daric also said, however (p. 140), that a sizable proportion of older workers still have a higher efficiency and productivity than is found among younger workers.

<sup>143</sup> See, for example, United Kingdom, Royal Commission on Population, *Report* (1949), p. 121.

workers,<sup>144</sup> but there is little agreement as to whether such qualities may compensate in considerable measure for the loss of youth.<sup>145</sup> The British Population Commission contended that a reduction in the proportion of younger workers had not led to lowered efficiency since there remained a greater number of people possessing a high degree of strength than there were jobs demanding such strength.<sup>146</sup> Notestein and his colleagues also emphasized that productivity was as much a function of training and experience as of vigour.<sup>147</sup> The view has been expressed, however, that the positive qualities associated with advancing age are no longer considered as important as formerly.<sup>148</sup> Studies of the relative efficiency of workers of different ages in various types of jobs are as yet inadequate to resolve the question of the effect of aging on the efficiency of the labour force.<sup>149</sup>

120. Some authors believe that the efficiency, not only of the workers, but also of their machines, tools and other capital equipment tends to decline as population ages. This is thought to occur because the need for renewing equipment is not felt so strongly in a country where the average age is relatively high, as in one with a younger population.<sup>150</sup>

121. The flexibility of the economically active population is also believed to be affected by the aging process. It is generally concluded that younger men and women are the most mobile and adaptable groups in the population and that, as a consequence, a decline in their relative numbers in the labour force will result in less flexibility, other things being equal. Older workers have been shown to be less likely to migrate in search of better employment opportunities than are younger workers;<sup>151</sup> moreover, they are less occupationally mobile, since having acquired specialized skills, they often cannot easily be retrained

for other jobs.<sup>152</sup> That older workers are less adaptable has been demonstrated by statistics which show longer durations of unemployment for workers past middle age than for younger workers.<sup>153</sup> Thus, aging of the labour force may increase the risk of structural unemployment, though its precise effect in this respect has not been measured.<sup>154</sup>

122. As discussed in chapter XIII, section A, many authors believe that aging of the population tends to lower the rate of saving, since older persons typically live on accumulated savings and the community incurs large expenditures for services to them. It has also been suggested that the aging of a population over a long period may have a substantial effect on its income structure. In the United States a systematic increase in inequality of income with age has been found to exist, with the 65 years and over group displaying the greatest degree of income concentration.<sup>155</sup> Additional statistical analyses of the relation of savings, expenditures and income to age in various countries are needed in order to verify existing hypotheses.

123. Some writers who have concerned themselves with the implications of an aging population place great emphasis on the possibility that economic, cultural and political progress may be retarded where the population is composed of a relatively large proportion of aged persons. They maintain that the management of economic undertakings is less courageous and less enterprising. They believe also that the character of leadership, not only in the economic but also in political and other fields, becomes more conservative as the average age of the leaders rises, and thus, that society tends to lose some of its dynamism.<sup>156</sup> The British Population Commission concluded that not only technical efficiency and economic welfare, but also intellectual and artistic achievement may suffer in an aging society, and that comparisons between

<sup>144</sup> *Ibid.*; see also Spengler, "Some effects of changes in the age composition . . ." (1941), pp. 169-170.

<sup>145</sup> The importance of factors other than chronological age in determining productive performance has been noted by many writers. See, for example, Davis, "Population and welfare in industrial societies" (1962), p. 20; Lehman, *Age and Achievement* (1953); Anderson, "The use of time and energy" (1959).

<sup>146</sup> United Kingdom, Royal Commission on Population, *Report* (1949), p. 119.

<sup>147</sup> Notestein *et al.*, *The Future Population of Europe and the Soviet Union* . . . (1944), p. 130. Reddaway noted that even if some older workers are not fully efficient, neither are young boys and learners. Reddaway, *The Economics of a Declining Population* (1939), pp. 143-144.

<sup>148</sup> See Spengler, "The aging of individuals and populations . . ." (1966), p. 62.

<sup>149</sup> As early as 1940, Myrdal had called attention to the need for empirical studies to ascertain the productivity of workers in different age groups. See his *Population: a Problem for Democracy* (1940), p. 145. Based on a comprehensive summary of studies on the effects of aging on work performance, McFarland and O'Doherty concluded that it is difficult to find dependable criteria for measuring such effects on industrial efficiency. However, measures of productivity, absenteeism and sickness, accidents, and labour turnover were found, tentatively, to be little affected by aging. McFarland and O'Doherty, "Work and occupational skills" (1959).

<sup>150</sup> Darc, *Vieillessement de la population* . . . (1948), pp. 32-33. See also Sauvy, "Social and economic consequences . . ." (1948), p. 116.

<sup>151</sup> Moore, "The aged in industrial societies" (1950); Brennan, Taft and Schupack, *The Economics of Age* (1967), pp. 115-116.

<sup>152</sup> Thoma, "Ageing and problems of adjustment" (1963), pp. 369-370; Durand, *The Labor Force in the United States* . . . (1948), p. 41; Dereymaeker, "Interaction entre l'économie . . ." (1946).

<sup>153</sup> In 1957, in the United States, for example, the average duration of unemployment for men 65 and over was nineteen weeks, compared with only about eight weeks for teen-agers. Gordon, "Work and patterns of retirement" (1961), p. 19. These patterns are also partly due to age discrimination in hiring. *Ibid.*

<sup>154</sup> The theoretical problem of productivity and employment of older workers is dealt with at length in Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche* . . . (1960), pp. 268-304.

<sup>155</sup> Fisher, "Income, spending, and saving patterns . . ." (1952), pp. 82-84, 101-102. See also Sheldon, *The Older Population of the United States* (1958), p. 132.

<sup>156</sup> See Boverat, *Le vieillissement de la population* (1946), pp. 128-133; Spengler, "Some effects of changes . . ." (1941), pp. 159, 170-171; Sauvy, *Théorie générale de la population*, vol. 2 . . . (1966), p. 71; Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche* . . . (1960), pp. 492-499. A tendency for people to pass through several political stages from radical to reactionary as they grow old has been noted. Friedrich, *Constitutional Government and Democracy* . . . (1950), p. 421. Among the systematic age-related changes found in the political orientation of the American electorate were the oft-noted movement towards conservatism, and a steady increase in the strength of political party attachments with increased age. Campbell *et al.*, *The American Voter* (1960), pp. 160-167, 210-211; Campbell, "Social and psychological determinants of voting behavior" (1962).



countries have suggested that average age may have an important effect on the spirit of the community.<sup>157</sup> Furthermore, an aging population is thought to produce certain unfavourable effects on individuals, such as an increased sense of frustration among the young arising from greater competition for promotion, and an increased rigidity and negative attitude towards life with advancing age.<sup>158</sup> Other authors have taken a less pessimistic view of the aging of population as a factor retarding progress, and have stressed the role of non-demographic factors.<sup>159</sup>

124. Trends in aging also have important implications for social security provisions, health services, provision of facilities for the use of leisure, and other services to older persons. Demographic trends in industrialized countries have furnished an important stimulus to the establishment of social security schemes and the liberalization of old-age benefits. The growing proportion of elderly persons in the electorate has led to greater political pressure for higher benefits and more liberal conditions of eligibility.<sup>160</sup> Public expenditures for benefits to the aged have risen not only as a result of the rising proportion of aged persons in the population, but also because of rising *per capita* costs. The declining proportion of child dependants has not provided compensation, since the State normally assumes a much smaller share of financial responsibility for the support of children than for the aged.<sup>161</sup> While the family may be an efficient social institution for the care of dependent children, it cannot, under modern conditions, provide adequate security for older persons, since an increasing proportion of elderly people are childless, or live far away from their children.<sup>162</sup> The heavy budgetary burden imposed on the community by increasing needs for old-age pensions may necessitate restriction of allotments for new developments in other fields,<sup>163</sup> or modifications in the pension schemes.<sup>164</sup>

125. In addition to numerous studies concerned with the income needs and economic status of the aged,<sup>165</sup> a growing body of literature exists on problems associated with providing various services and facilities on behalf of the aged,<sup>166</sup> and the requirements for public expenditures which they entail. Foremost among these needs are adequate housing accommodations, health and medical care, including hospital care, social services and leisure-time facilities. The process of aging also tends to create psychological and social problems for the individual and society. Aging persons typically experience increasing isolation from family ties and personal and social relationships, and often suffer psychological effects from abrupt retirement at a fixed age.<sup>167</sup>

126. Owing to the rapid growth of the aged population and the progressive breakdown of the extended family which accompanied industrialization, the provision of suitable housing for the aged has become a matter for growing public concern. Since the limited financial means of a large proportion of older people precludes their finding suitable living accommodations, State activity, taking the form of subsidization of housing programmes, and rent supplements and allowances, has been stimulated. While a number of countries have made important strides in this area, the provision of housing which suits the physical needs of the aged, as well as their ability to pay, remains a major problem.<sup>168</sup>

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that the provision of old-age pensions will become an unbearable burden. Bogue, *The Population of the United States* ... (1959), p. 103.

<sup>164</sup> For a summary of a study of demographic factors affecting the pension scheme in Yugoslavia, see Yugoslavia, Centar za Demografska Istraživanja, "Demografska problematika penzijskog sistema ..." (1968).

<sup>165</sup> See, for example, Paillat and Wibaux, *Conditions de vie et besoins des personnes âgées en France*, vol. 1 ... (1969), chap. 3; Cole and Utting, *The Economic Circumstances of Old People* (1962); Corson and McConnell, *Economic Needs of Older People* ... (1956); Steiner and Dorfman, *The Economic Status of the Aged* (1957); Shanas, *Financial Resources of the Aging* ... (1959); Gordon, "Aging and income security" (1960); Kreps, ed., *Employment, Income, and Retirement Problems* ... (1963); Wedderburn, "Economic aspects of ageing" (1963); Orbach and Tibbitts, eds., *Aging and the Economy* (1963).

<sup>166</sup> See Rohrich, *Social Security for the Aged* ... (1969).

<sup>167</sup> These problems are enumerated, for example, in United States Congress, Senate, Special Committee on Aging, *The 1961 White House Conference on Aging* ... (1961). See also the reports of the Nuffield Foundation's surveys concerning incomes, housing, institutional care, recreation, employment, mental health and medical problems of the aged in: The Nuffield Foundation, *Old People* ... (1947); Sheldon, *The Social Medicine of Old Age* ... (1948), especially chap. 5; United Nations, *Welfare of the Aged* ... (1950), pp. 13-100; Perrott and Holland, "Population trends and problems of public health" (1940); Kent, "Social services and social policy" (1966).

<sup>168</sup> See Kleemeier, "The use and meaning of time in special settings ..." (1961); Donahue, "Housing and community services" (1960); De Ruijter, "Housing of the handicapped aged" (1962). Also, the articles listed under the heading of "Social issues in housing and living arrangements of older people" in Tibbitts and Donahue, eds., *Aging Around the World* ... (1962), vol. 2. Non-governmental organizations—including religious groups and trade unions—have also been active in attempting to meet the housing needs of older people. See Vivrett, "Housing and community settings for older people" (1960), pp. 581-583; also Wilner and Walkley, "Some special problems ..." (1966).

<sup>157</sup> United Kingdom, Royal Commission on Population, *Report* (1949), pp. 120-121.

<sup>158</sup> Lösch, "Die Vergreisung ..." (1936), p. 41; United Kingdom, Royal Commission on Population, *Report* (1949), pp. 119-120; Spengler, "Some effects of changes in the age composition ..." (1941), pp. 162-163; Riegel and Riegel, "A study on changes of attitudes ..." (1960), p. 199.

<sup>159</sup> Fourastié, for example, has emphasized the effect on society when large proportions of people live long enough to complete higher education, and can look forward to many years of creative life. Fourastié, "De la vie traditionnelle à la vie 'tertiaire'" (1959). See also Durand, "The trend toward an older population" (1945), p. 150; Brüscheiler, "Vorherrschaft der Alten?" (1941), pp. 6-10.

<sup>160</sup> See, for example, Borrie, *Population Trends and Policies* ... (1948), pp. 159-160; Durand, "The trend toward an older population" (1945), p. 149; Ammann, "Die Auswirkung der Überalterung ..." (1938); Tibbitts, "Politics of aging: pressure for change" (1962). For a case study of an old-age pressure group in California, see Pinner, Jacobs and Selznick, *Old Age and Political Behavior* ... (1959).

<sup>161</sup> Sauvy, *Richesse et population* (1944), chap. 9; Fromont, *Démographie économique* ... (1947), p. 145.

<sup>162</sup> Sauvy, "Social and economic consequences ..." (1948), pp. 118-119.

<sup>163</sup> Daric, *Viellissement de la population* ... (1948), pp. 37-39; United Kingdom, Royal Commission on Population, *Report* (1949), p. 116. Bogue has pointed out, however, that under a social security system such as that in the United States of America, which requires workers to pay a contribution to their future pension, it is unlikely



127. Increasing longevity also presents a challenge in the sphere of health and medical services, as the greater health care needs of the aged, compared with other segments of the population, are coupled with soaring medical costs. In countries with State-sponsored medical care programmes, such as the socialist countries and some Western countries, the costs of medical care for the aged represent a heavy public financial burden. In countries where this burden falls primarily upon the individual, the aged often simply do not receive the medical care which they require.<sup>169</sup>

128. As a person ages, the number of roles which he plays diminishes at the same time that the extent of his interaction with others also shrinks and changes in quality. This process of disengagement, as it has been termed by some writers, has been defined as "an inevitable process in which many of the relationships between a person and other members of society are severed, and those remaining are altered in quality".<sup>170</sup> The disengage-

<sup>169</sup> On health problems of the aged, see, for example, Rosen, "Health programs for an aging population" (1960); Peterson and Peterson, "The health of the aging" (1960); Lissitz, "Evolving a pattern of financing ..." (1962); Paillat and Wibaux, *Conditions de vie et besoins des personnes âgées en France, vol. 1* ... (1969), pp. 37-94.

<sup>170</sup> Cumming and Henry, *Growing Old* ... (1961), p. 211. See also Cumming, "Further thoughts on the theory of disengagement" (1963).

ment process may be initiated by the individual, the society, or by both simultaneously, and is often more abrupt for men than for women. It can result in crisis and loss of morale for the individual, unless suitable alternative roles are available to fill the voids.<sup>171</sup> The associated factors of work, retirement, leisure and morale, as they relate to older persons have, accordingly, been treated in numerous studies.<sup>172</sup>

129. With the trends in aging of the population expected to continue in most parts of the world, the basic problems which aging presents both for society at large and for the individual, some of which have been touched upon above, call not only for additional studies, but also for practicable and satisfactory solutions.

<sup>171</sup> Cumming and Henry, *Growing Old* ... (1961), chap. 12. Parsons believes that the older age groups can provide the necessary element of stability in a rapidly changing society. See his "The cultural background of today's aged" (1962), pp. 13-15.

<sup>172</sup> See, for example, Kleemeier, ed., *Aging and Leisure* ... (1961); Kaplan, "The uses of leisure" (1960); Donahue, Orbach and Pollack, "Retirement: the emerging social pattern" (1960); Dumazedier and Ripert, "Retirement and leisure" (1963); Burgess, "Aging in Western culture" (1960); Ter Veld, "Patterns of leisure-time behavior ..." (1962); Havighurst, "The nature and values of meaningful free-time activity" (1962); Simpson and McKinney, eds., *Social Aspects of Aging* (1966).

## DEMOGRAPHIC ASPECTS OF MANPOWER

1. Work and production are intimately linked to man's existence and survival. Throughout all stages of civilization and development—be it the food-gathering, hunting, agricultural or industrial stages—man has had to exert himself to provide for his subsistence and the needs and requirements of society. With the passage of time and cultures, the nature of work has been changed fundamentally. The growth of knowledge and technology, the increasing specialization and division of labour, and the transformation of economic functions and of society itself have enlarged man's needs, as well as his capacity to produce, thus creating changes in the volume, quality and character of his work.

2. Different disciplines have different interpretations of the economic functions of the population owing to their different frames of reference and diverse approaches to the understanding of human society. Demography, as a science of human population, has developed its own interpretation, based on the economists' distinction between producers and consumers. This interpretation considers the economically active population, or labour force,<sup>1</sup> as a demographically identifiable category which can be distinguished from other population segments by the fact that its function is to produce the goods and services needed to satisfy the requirements of the whole population. Within this conceptual framework, the economically active population is not only an economic category, but a demographic one as well. This means that the research apparatus of demography can be applied to manpower studies. In actual practice, however, many difficulties arise in attempting to distinguish the economically active from the inactive population, and precise concepts and definitions for measuring these categories have become a necessity.

3. The labour force includes, in addition to persons who work for wages or salaries (in civilian jobs or in the armed forces), own-account workers and employers who work for profit and persons who, like the farmer's son, assist without pay in a familial income-producing enterprise. According to recommended international definitions, unemployed persons seeking paid jobs are considered as members of the labour force, as well as

those actually employed.<sup>2</sup> On the other hand, the labour force does not include persons engaged in activities which do not produce income. Thus women engaged only in domestic work in their own homes are not counted as members of the labour force, as the services and goods which they produce are not considered as income, although the value of these services and goods represents an important part of the total product of a nation.<sup>3</sup>

4. The size of a country's labour force and its proportion to the population have evident bearings on the productive capacity of the economy and the level of income per head that can be attained, although the productivity of labour and the rates of unemployment and underemployment are also, obviously, factors of major importance. As a measure of the quantity of labour supply, the number of persons in the labour force is only a first approximation. A more satisfactory measure requires consideration of such aspects as the length of the working week, the numbers of labour force members available only for part-time or seasonal work, and the annual turnover of persons entering and leaving the labour force.<sup>4</sup> The qualities of labour supply are still more

<sup>2</sup> Some analyses have been based on the civilian labour force (that is, excluding the armed forces) or the civilian employed labour force (that is, also excluding the unemployed). See Bloch and Praderie, *La population active* . . . (1966), pp. 27-28. In some of the literature, particularly in socialist countries, "labour force" has a more restricted meaning in that it excludes the unemployed. For further discussion of this question, see Rajkiewicz, "Z problematyki badań nad . . ." (1963).

<sup>3</sup> A comprehensive view of a nation's human resources and their utilization for productive purposes would take into account not only the unpaid work of housewives but also other productive activities which do not yield income, such as "do-it-yourself" production and volunteer work. Data on inputs of working time into such activities and on the value of the products are not widely available. Estimates for Belgium are given in Chaput-Auquier, "La valeur économique du travail ménager" (1959); for Great Britain, Clark, "The economics of house-work" (1958); for the United States of America, Morgan, Sirageldin and Baerwaldt, *Productive Americans* (1966). On time-inputs of French married women into gainful and other activities, see Girard, "Le budget-temps de la femme mariée dans les agglomérations urbaines" (1958); Girard and Bastide, "Le budget-temps de la femme mariée à la campagne" (1959). For Poland, see Sokolowska, *Kobieta pracująca* (1966).

<sup>4</sup> Investigations of time budgets to ascertain working-time inputs have been carried out rather extensively in a number of socialist countries. See, for example, Strumilin, *Problemy ekonomiki truda* (1957), pp. 233-359; Artemov et al., *Statistika biudzheto vremen* . . . (1967); Staikov, *Byudzheto na vremeto* . . . (1964); Strzemińska, *Wyniki badania budzetu czasu* . . . (1964); Sokolowska, *Kobieta pracująca* (1966); Laur, "Statistika nerabochego vremen . . ." (1966). On other aspects of the relationship between the statistical measure of the labour force and the economic concept of labour supply, see Long, *The Labor Force under Changing* . . . (1958), appendix E.

<sup>1</sup> The term "labour force" is used here as the equivalent of "economically active population" in the terminology of international standards for census concepts. Other terms for the economically active population are also found in the literature: "gainful workers", "gainfully employed persons", "working force", "manpower" etc.

important than its quantitative dimensions. In addition to the more strictly demographic characteristics—such as sex ratio and age structure of the labour force—the skills, experience, aptitudes, education and health of workers and the factor of motivation are among the primary determinants of the productive power and growth potential of the economy. The importance of these factors has gained increasing recognition in recent works on the conditions of economic progress and problems of economic development in less developed areas.<sup>5</sup> Altogether, these quantitative and qualitative considerations call for an integrated approach to manpower planning. The manpower balance sheet technique, which has been developed in centrally planned economies, has proved useful in this connexion. It involves a detailed assessment of present and future manpower resources and reserves (by sectors of the economy, skills, geographic region etc.), as well as of present and future manpower requirements, and thus provides the basis for estimating required changes in manpower allocation and for taking measures to effect such changes.<sup>6</sup>

5. The occupational structure of the labour force, its distribution among industrial sectors, and rural-urban and regional distribution within the country are highly relevant to productivity and economic growth. The processes of industrialization and growth of output per head require progressive adaptations of these features of labour force structure and distribution. In part, these are reflections of the changing conditions of demand for labour—that is, of the economic factors which determine the number, character, and location of opportunities for employment, including self-employment. But these economic factors operate within a demographic, institutional and cultural framework which conditions the labour force structure and distribution and the changes in these respects in the course of time. Demographic and cultural factors play an important part in determining the size and growth of the labour force as a whole and its numerical proportion to the population; and they may have appreciable influences also on the rates of unemployment and underemployment and the development of qualitative attributes of labour supply.

6. Section A of this chapter presents a world picture of the labour force, including its size in relation to the total population of different regions, and changes in this relationship over time. Patterns and trends of labour force participation among different sex-age groups, and among women differing in their marital status and child-care responsibilities, are also examined. The main focus of section B is on the role of demographic factors in determining the size, growth and distribution of the labour force, though these are considered in the context

of economic and cultural determinants. Section C discusses tables of working life and related measures, and section D, variations in types of economic activities and their changes in the course of economic development. Measures and levels of unemployment and underemployment are considered in section E. The study of the economic implications of labour force characteristics and changes, and of employment and unemployment conditions, leads farther beyond the boundaries of demography. Such implications are considered only incidentally here, and some of them are treated in other chapters.

### A. Levels and trends of the labour force

7. The principal source of labour force statistics for most countries is the population census, although census-type demographic sampling surveys have been developed recently in some countries as a valuable supplementary source, providing current measures of the labour force, employment and unemployment.<sup>7</sup> Data on the male and female components of the labour force were available from censuses taken during 1955-1964 in 141 countries, representing about 64 per cent of the estimated world population as of 1967. While the great majority of the population in North and South America, Europe, the Soviet Union and Oceania was represented by such data, the representation was relatively poor for Africa (44 per cent) and Asia (50 per cent).<sup>8</sup> The coverage of historical series of labour force statistics for countries in the less developed regions is especially narrow, being limited in most cases to data from one or two censuses.

8. Variations in the definitions applied in the censuses impair the comparability of labour force statistics for different countries,<sup>9</sup> and also often of data from successive censuses for the same country.<sup>10</sup> Among the principal points of variation are:

(a) The time-reference of the census questions on economic activities, which may vary from a single day to one year, or may vaguely refer to the individual's "usual" status;

(b) The treatment of persons engaged both in economic and non-economic activities;

(c) The criteria for identifying unemployed persons; and

(d) The distinction in farm households between members to be classified as in the labour force and those

<sup>7</sup> Employment and unemployment statistics are also derived from various other sources in many countries, but these usually lack the comprehensive coverage of the population census.

<sup>8</sup> United Nations, *Demographic Analysis of Manpower Development* ... (1970), annex III.

<sup>9</sup> See, for example, United Nations, *Application of International Standards* ... (1951), pp. 5-17; ———, Economic Commission for Europe, *European Population Censuses: the 1960 Series* (1964), pp. 79-85; You, "Growth and structure of the labour force ..." (1963).

<sup>10</sup> See, for example: (for India) Sinha, "Comparability of 1961 and 1951 ..." (1964); (for Jamaica) Cumper, "A comparison of statistical data ..." (1964); (for the Philippines) United Nations, *Population Growth and Manpower* ... (1960); (for Israel) Hovne, *The Labor Force in Israel* (1961), appendix A; (for the United States of America) United States, Bureau of the Census, *Estimates of Labor Force, Employment* ... (1944).

<sup>5</sup> For example, Galenson and Pyatt, *The Quality of Labour and Economic Development* ... (1964); Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964); Correa, *The Economics of Human Resources* (1963), and Becker, *Human Capital* ... (1964).

<sup>6</sup> See, for example, Ulyanova, "The methods of drawing up the current and planned balances ..." (1967); Sonin, "Manpower balance in the USSR" (1966); and his *Vosproizvodstvo rabochei sily* ... (1959); Litvyakov, "Planirovanie ratsionalnogo ..." (1965); Kostakov and Litvyakov, *Balans truda* ... (1965); Lengyel, "A foglalkoztatottság ..." (1968).

not economically active.<sup>11</sup> Measurement of the labour force is extremely difficult under conditions prevailing in the rural areas of many less developed countries where a labour market scarcely exists.

9. In addition to the variations of definitions, census measures of the labour force and its components are affected to a great extent by various kinds of errors and biases which may result either from the respondents' inability to recall and report the facts accurately, or from enumerators' preconceptions as to the normal and proper roles of individuals according to sex, age, marital status, position in the family etc. They may also be affected considerably by the form and arrangement of the census questions on economic activities, the organization of the field work, and the training of interviewers.<sup>12</sup>

10. The variations in definitions, errors and biases affect in particular the statistics on the female labour force. For this reason international comparisons of labour force data are sometimes made for the male labour force alone. Alternatively, the category of unpaid workers—a group particularly sensitive to variation in definitions and procedures—is sometimes subtracted from the labour force for purposes of international comparisons. However, where there are real differences between countries in the contributions made by women or unpaid family workers of either sex to the labour supply, exclusion of these groups from the statistics does not provide a satisfactory basis for comparisons.<sup>13</sup>

## 1. THE TOTAL LABOUR FORCE

11. The two factors which determine the proportion of a country's population that is in the labour force are: (a) the propensity to participate in the labour force as reflected in activity rates for the different sex-age groups; and (b) demographic factors, principally the sex-age structure of the population, which is determined by fertility, mortality and migration.<sup>14</sup> There are considerable differences in the percentage of total population in the labour force, that is, in crude activity rates, as estimated for the different regions of the world. According to estimates of the International Labour Office presented in table IX.1, nearly 1,300 million persons belonged to the world's labour force in 1960, constituting 43 per cent of total world population. Owing largely to a higher

<sup>11</sup> For international recommendations on these subjects see United Nations, *Handbook of Population* ... (1958), vol. 2, pp. 24-28; International Labour Office, *Concepts and Methods* ... (1963), annex I, pp. 92-94.

<sup>12</sup> In the United States of America, the labour force totals enumerated in the 1950 and 1960 censuses were smaller by several million than those indicated by current sample surveys for the same dates and with the same definitions—a fact attributed mainly to better organization and training of field workers for the current surveys. See United States of America, President's Committee to Appraise Employment and Unemployment Statistics, *Measuring Employment and Unemployment* (1962), appendices J and K; Bancroft, *The American Labor Force* ... (1958), appendix A.

<sup>13</sup> See United Nations, *Demographic Aspects of Manpower* ... (1962), pp. 7-8.

<sup>14</sup> Sadie, "Demographic aspects of labour supply ..." (1966), p. 219. For a conceptual framework for analysing factors affecting the labour force participation of different sex-age groups, see Bowen and Finegan, *The Economics of Labor Force Participation* (1969), pp. 16-29. See also Becker, "A theory of allocation of time" (1965).

proportion of persons in the working ages, the more developed regions had a higher activity rate—about 45 per cent—compared with the estimated 42 per cent for the developing regions.

12. Within each of the two major areas, there was considerable regional variation. Among the more developed regions, activity rates are highest in Eastern Europe and the USSR, owing to the utilization of a large proportion of female workers. They are considerably lower in Northern and Western Europe, and lower still in Southern Europe, Northern America and Oceania. Among the developing regions, a marked contrast is noted between Asia and Africa—with relatively high rates—and Latin America, where rates are much lower. The much more frequent employment of women in agriculture in the former regions explains the major part of these differences. Whereas only about one fifth of all workers in Latin America were women, in Africa this figure was estimated to be close to one-third, and it may be still higher in Asia—if the high proportion estimated for China (41 per cent) is anywhere near the truth. The limited data on which the estimates for Africa are based suggest quite high levels of female participation in the labour force in Middle and Western Africa, and extremely low levels in Northern Africa.

13. Variations in the extent of female participation in the labour force also occur among the more developed regions. Women constituted slightly more than half of the labour force in the Soviet Union and over 40 per cent in Eastern Europe, but only 25 per cent in Australia and New Zealand.

14. It is estimated that between 1950 and 1960, the world's labour force grew by more than 200 million, with 141 million added in Asia, 16 million in the USSR, 17 million in Africa, 14 million in Latin America, 11 million in Northern America, 10 million in Europe and one million in Oceania (table IX.2.). For the world as a whole, the crude activity rate is estimated to have remained at about 43 per cent in 1950 and 1960. Small declines in crude activity rates were estimated to have occurred in most of the more developed regions. Demographic trends during the 1950s in these regions favoured a lower crude activity rate, since both the proportion of children and of older persons in the population increased at the expense of the working age group. This change in population structure, in combination with falling activity rates at the young and older ages, reduced the crude activity rate for males from an estimated 61 per cent in 1950 to 58 per cent in 1960. In the case of females, however, rising activity rates, particularly at ages 25 to 54 years, were sufficient to offset the effects of demographic trends, and the average crude activity rate rose from about 32 to 33 per cent during the decade.<sup>15</sup>

15. In the developing regions, a small decline in the proportion of population in the working ages and declining activity rates among certain age groups caused the crude activity rate for males to fall from 58 to 55 per cent between 1950 and 1960. Female activity

<sup>15</sup> International Labour Office, *Labour Force Projections* ... (1971), part V, table 2. See also Ypsilantis, "World and regional estimates and projections of labour force" (1969), pp. 41-56.

TABLE IX.1. ESTIMATED LABOUR FORCE AND CRUDE ACTIVITY RATES  
BY REGIONS: 1960

Major areas and regions	Labour force (millions)	Crude activity rate (labour force as percentage of total population)	Females as percentage of labour force	Dependency ratio (inactive persons per 100 economically active)
World total	1,277	42.8	35.0	134
Developing regions	837	41.7	33.6	140
More developed regions	439	45.0	37.8	122
Africa	109	40.4	31.5	148
Western Africa	36	45.0	39.4	122
Eastern Africa	34	44.4	35.4	125
Middle Africa	13	44.5	38.7	125
Northern Africa	19	28.9	6.7	246
Southern Africa	7	37.6	26.1	166
Asia (excluding the USSR)	713	43.3	35.4	131
East Asia	361	46.3	40.1	116
Mainland region	300	46.9	40.7	113
Japan	44	47.0	38.9	113
Other East Asia	17	36.1	32.3	177
South Asia	352	40.6	30.6	146
Middle South Asia	237	40.3	28.3	148
South-East Asia	92	42.2	37.5	137
South-West Asia	22	38.0	26.7	163
Europe (excluding the USSR)	191	45.0	33.6	122
Western Europe	60	44.6	34.1	124
Southern Europe	48	40.7	25.3	146
Eastern Europe	49	50.7	42.4	97
Northern Europe	34	45.3	31.6	121
Latin America	70	32.8	19.2	205
Tropical South America	36	32.1	18.0	212
Middle America (mainland)	15	30.4	15.3	229
Temperate South America	12	36.5	21.8	174
Caribbean	8	36.6	28.3	173
Northern America	77	38.8	31.4	158
Oceania	6	40.9	27.2	144
Australia and New Zealand	5	39.5	24.9	153
Melanesia	1	53.4	40.4	87
Polynesia and Micronesia	0.3	30.8	14.9	225
USSR	110	51.5	51.6	94

SOURCE: Based on International Labour Office, *Labour Force Projections* ... (1971), part V, table 2.

Note: Because of rounding, totals are not in all cases the exact sum of the parts.

TABLE IX.2. ESTIMATED LABOUR FORCE AND CRUDE ACTIVITY RATES,  
BY REGIONS, 1950 AND 1960

Major areas and regions	Labour force (millions)		Crude activity rates (labour force as percentage of total population)		Increase in labour force 1950-1960 (millions)
	1950	1960	1950	1960	
World total	1,067	1,277	42.9	42.8	210
Developing regions	675	837	41.4	41.7	162
More developed regions	392	439	45.7	45.0	47
Africa	92	109	42.5	40.4	17
Asia (excluding the USSR)	571	712	42.1	43.3	141
East Asia	268	361	40.8	46.3	93
South Asia	303	352	43.4	40.6	49
Europe (excluding the USSR)	181	191	46.3	45.0	10
Latin America	56	70	34.7	32.8	14
Northern America	66	77	39.9	38.8	11
Oceania	5	6	43.0	40.9	1
USSR	94	110	52.1	51.5	16

SOURCE: Based on International Labour Office, *Labour Force Projections* ... (1971), part V, table 2.

Note: Because of rounding, totals are not in all cases the exact sum of the parts.

rates are also estimated to have fallen slightly in South Asia and Africa, but these trends were offset by the substantial rise estimated for the mainland region of East Asia.<sup>16</sup> It must be pointed out that, owing to the inadequacies of available data, trends in activity rates in the world's developing regions are difficult to determine and those suggested in the International Labour Office estimates may be subject to considerable error.

16. The current prevailing trend in most parts of the world thus seems to be one of decreasing crude activity rates—in other words, of labour force growth lagging behind the growth of population—which results in part from a declining proportion of population in the working ages and from a widespread tendency towards decreasing specific activity rates for males in the youngest and eldest brackets of potential working ages. This is partly counteracted by increasing activity rates for females in certain parts of the world, although elsewhere the trend for female rates also is downward.

17. Earlier in the century demographic trends among the economically more developed countries favoured a rising activity rate. Due to the decreasing secular trend in birth rates in these countries, there was a rising proportion of population in the working ages<sup>17</sup> which counteracted the declining specific activity rates resulting from factors such as extended school attendance and earlier retirement. According to Bairoch and Limbor's recent analysis of long-term trends in the labour force in the world and its major regions, crude activity rates rose between 1900 and 1920 in those regions of Europe which had long been industrialized, but declined thereafter. In North America a gradually rising trend in the crude activity rate during the first half of the twentieth century was reversed after 1950. For the developed regions as a whole, the estimates show the labour force increasing from 273 million in 1900 to 445 million in 1960—or by nearly two thirds. At the same time, the total population in these regions was expanding by roughly three fourths.<sup>18</sup>

18. According to the less reliable estimates prepared for the world's developing regions, labour force growth is also shown to have lagged behind population growth in those regions. In absolute numbers, the labour force is estimated to have grown from about 477 million in 1900 to 817 million in 1960. This increase of about 70 per cent compares with a near doubling of the total population during the same 60-year period.<sup>19</sup>

19. Although changing activity rates cause the growth of the labour force to diverge from parallel with the population trend—and sometimes even to move in a contrary direction<sup>20</sup>—population growth has generally

played the dominant role in shaping long-range trends of labour force growth in various parts of the world during modern times. For example, in the United States of America between 1890 and 1940, as the growth of population decelerated with the falling birth rate and decreasing immigration, the rate of growth of the labour force diminished steadily from an annual average of 2.7 per cent in the decade of the 1890s to 1.1 per cent in the 1930s, although the trend of the crude activity rate was persistently upward. Of the total increase of roughly 30 million in the United States labour force during those fifty years, approximately 25 million was attributable to the growth of population, 2.5 million to the increase of the crude activity rate, and the remainder to interaction between the two factors.<sup>21</sup> In France, where the crude activity rate rose from 44 per cent in 1881 to 56 per cent in 1921 and declined slightly thereafter, the annual rate of growth of the labour force dropped, as population growth slackened, from about 1 per cent around the end of the nineteenth century to 0.2 per cent during 1926-1931, and the labour force decreased slightly during 1931-1936.<sup>22</sup> More recently, the revival of the French birth rate together with immigration from neighbouring countries has brought about renewed growth in the population and labour force in France.

20. In less developed countries during recent decades, the trends of labour force growth have been dominated by the sharply accelerating rates of population increase. In India, for example, although the crude activity rate dropped from an average of 47 per cent of the population at the censuses of 1901, 1911, and 1921 to 43 per cent in 1931 and 39 per cent in 1951, the rate of growth of the labour force rose from an average of about 2.5 per cent per decade between 1901 and 1931 to 6 per cent per decade between 1931 and 1951, and shot up to 34 per cent in the decade 1951 to 1961 (according to one interpretation of the relationship between the 1951 and 1961 census measures).<sup>23</sup> It appears likely that such a trend has been fairly typical of the recent experience of less developed countries, although long-range series of labour force statistics are lacking in most of them.<sup>24</sup>

<sup>21</sup> Durand, *The Labor Force in the United States* ... (1948), pp. 19, 22. Lebergott, *Manpower in Economic Growth* ... (1964), p. 510, gives estimates of the growth of labour force and employment in the United States of America since 1800.

<sup>22</sup> Desmarest, *La politique de la main-d'œuvre* ... (1946), pp. 13-15, 53-54, 70-74. See also Daric, *Vieillessement de la population* ... (1948).

<sup>23</sup> Kalra, "A note on working force ..." (1962), tables 2 and 3. These estimates were made by adjusting the classifications of 1951 and earlier census years for conformity with the new labour force definition adopted in the 1961 census. They indicate an increase in the crude activity rate from 39 per cent of the population in 1951 to 43 per cent in 1961, but this change appears dubious. Estimates derived from the national sample surveys of 1953-1954, with a labour force definition similar to that of the 1961 census, indicated a crude activity rate of 43.8 per cent.

<sup>24</sup> Egypt may be one exception. According to the results of censuses in that country since 1927 and recent labour force sampling surveys (if their comparability can be trusted), the rate of growth of the Egyptian labour force has diminished in spite of the accelerating growth of the population. The crude activity rate would appear to have dropped from 65.2 per cent of the population in 1937 to 52.3 per cent in 1957. See Seklani, "Population active et structures économiques de l'Égypte" (1962).

<sup>16</sup> International Labour Office, *Labour Force Projections* ... (1971), part V, table 2.

<sup>17</sup> United Nations, *The Aging of Populations* ... (1956), pp. 9-15.

<sup>18</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), pp. 314-315.

<sup>19</sup> *Ibid.*

<sup>20</sup> A striking example was the wartime expansion and post-war contraction of the labour force in countries involved as belligerents in the Second World War. See Long, *The Labor Force under Changing* ... (1958), chap. 2; Saunders, "Manpower distribution, 1939-1945 ..." (1946).

## 2. DEPENDENCY BURDEN

21. The application of economic analysis to population structure and change has revealed that one of the comparative disadvantages of developing countries, vis-à-vis developed countries, lies in their heavy dependency burden resulting from high fertility. Coale and Hoover have observed that a rapid growth in the number of dependants imposes greater claims on the income produced by the working population.<sup>25</sup> Families with a large number of children are likely to be less able to save, and as a result, the level of investment is likely to be lower. When a large proportion of national investment is provided by the government, high fertility is likely to reduce the government's capacity to raise money for investment through taxation. Populations with a high child dependency ratio must divert a larger proportion of investment funds to less immediately productive uses, for example to housing rather than to factory construction.<sup>26</sup> Moreover, the strain on educational facilities resulting from rapid growth in the child population may impede progress in reducing illiteracy and in providing adequate training for future entrants into the labour force.<sup>27</sup>

22. While there has been much discussion of the disadvantages of high dependency burdens, few studies have attempted to measure differences in dependency loads between countries, owing to the difficulties of obtaining satisfactory statistical measures. As discussed in chapter VIII, section A, the ratio of persons in dependent age groups to those of working ages gives a first approximation of a country's dependency burden. But not all persons of working age participate in economic activities, while, on the other hand, certain persons below or beyond what are considered the normal working ages are employed. Therefore a more accurate assessment of dependency is obtained from the activity classification of the population in the census. Utilizing such data, Ulanis has defined several different measures for studying the dependency burden. These include: (a) the number of inactive persons per economically active persons; (b) the number of inactive and unemployed persons per employed person; (c) the number of dependants of individuals per economically active person; and (d) the number of dependants of individuals per employed person.<sup>28</sup> Although these refinements give additional

<sup>25</sup> Coale and Hoover, *Population Growth and Economic Development* ... (1958), p. 234.

<sup>26</sup> Coale, "Population and economic development" (1963), pp. 54-55.

<sup>27</sup> Coale and Hoover, *Population Growth and Economic Development* ... (1958), p. 236.

<sup>28</sup> Comparing the dependency burden of the Soviet Union and the United States in 1959 according to these four indices, Ulanis found the following results:

	USSR	USA
Number of inactive persons per economically active	0.98	1.61
Number of inactive and unemployed per employed	0.98	1.80
Number of dependants of individuals per economically active	0.81	1.38
Number of dependants of individuals per employed	0.81	1.48

Ulanis, *Dinamika i struktura* ... (1964), pp. 48-49. For other analyses of age structure and dependency, see Sonin, "Aktualnye problemy uluchsheniia ..." (1967), pp. 256-257; and Ulanis, "Dinamika i struktura naseleniia SSSR" (1967), pp. 156-160.

insight into economic-demographic relationships, even they are far from satisfactory, not only because of the inadequacies of the census data on the labour force and the employed population, but also because the amount of time spent at economic activities and the value of the product produced vary for different age groups. A better index of the dependency burden could be obtained if data were available to compute the average value of product produced against that consumed for each age group.<sup>29</sup> Information on which to base such calculations is at present lacking, however, for most countries.

23. As shown in table IX.1, the dependency burden, computed in terms of the number of inactive persons per 100 economically active, is greater in the developing regions than in the more developed, but the gap between the two does not appear as wide as it does when age structure alone is considered.<sup>30</sup> Computed on the former basis, there are, on the average, 140 dependants per 100 active persons in the developing regions, compared with 122 in the world's more industrialized regions. Except for small areas in Oceania, the lowest dependency ratios (less than 100 dependants per 100 active) are found in the Soviet Union and Eastern Europe, owing in part to the high female labour force participation rates reported for those regions. At the other extreme, exceptionally high dependency ratios are shown in most parts of Latin America (over 200 dependants for each 100 active in Tropical South America and Middle American Mainland), as well as in Northern Africa.

## 3. THE MALE LABOUR FORCE

24. Of the estimated labour force of the world in 1960, males constituted nearly two thirds and females only a little over one third. The crude activity rate for males—that is, the male labour force as a percentage of total male population—was estimated to be 56 per cent (table IX.3). Owing to differences in age structure, the male population of industrialized regions averages higher proportions in the labour force (58 per cent) than the developing regions (55 per cent). Average activity rates for Latin America, Africa and Asia varied only from 53 to 55 per cent. Within the more developed regions, however, a much wider range of variations is seen. Whereas 62 per cent of the male population of Europe was economically active in 1960, the corresponding figure was only 54 per cent in North America.<sup>31</sup> The range of male activity rates in individual countries is, of course, much greater. Extremely low male activity rates were reported in Puerto Rico (38.7 per cent in 1960) and among the African population of Zambia (33.8 per cent in 1963). On the other hand, Romania (1956), Portugal (1960) and the Sudan (1956) reported some of the highest rates (66-67 per cent).<sup>32</sup>

<sup>29</sup> See the discussion in Durand, "Population structure as a factor ..." (1953), pp. 2-3. See also United Nations, *Methods of Analysing Census Data* ... (1968), pp. 13-14.

<sup>30</sup> Compare with table VIII.2.

<sup>31</sup> International Labour Office, *Labour Force Projections* ... (1971), part V, table 2.

<sup>32</sup> United Nations, *Demographic Yearbook, 1964* ... (1965), table 8.



TABLE IX.3. ESTIMATED AGE-SPECIFIC ACTIVITY RATES BY SEX, FOR THE WORLD, DEVELOPING AND MORE DEVELOPED REGIONS: 1960

Age (years)	Male			Female		
	World	Developing regions	More developed regions	World	Developing regions	More developed regions
All ages .....	56.0	55.0	58.2	29.8	28.3	32.8
10-14 .....	20.2	26.3	4.2	13.0	16.7	3.3
15-19 .....	68.2	71.3	59.7	44.7	42.9	49.5
20-24 .....	90.0	90.5	88.8	52.4	48.3	61.7
25-44 .....	96.8	97.1	96.4	49.7	49.1	50.8
45-54 .....	95.2	96.0	94.2	48.5	47.8	49.3
55-64 .....	86.0	88.5	82.9	35.2	36.4	34.1
65 and over .....	49.0	64.6	34.7	16.6	19.6	14.4

SOURCE: Based on International Labour Office, *Labour Force Projections* ... (1971), part V, table 2.

25. Despite some exceptions, it is clear that the proportions of male population in the labour force are generally higher in the more developed, than the developing countries.<sup>33</sup> On this account, the more developed countries would have an economic advantage even if output per worker were the same in all countries.

26. As noted above, this advantage of the more developed countries is due to the relatively small proportion of children and large proportion of adult population which result from a low birth rate. Without this difference in population structure, crude activity rates would be lower in the more developed than in developing countries, since the latter have higher age-specific activity rates (see table IX.3).

#### (a) Age-specific male activity rates

27. Differences between the patterns of age-specific male activity rates in different countries—and changes in any country in the course of time—primarily reflect variations in the age of entrance into the labour force and in the age of retirement or involuntary withdrawal into inactive status. Custom dictates in every society that able-bodied men in the intermediate ages should be engaged in income-producing work, and most of those not actually employed are likely to be reported as labour force members, in the unemployed category. Male activity rates exceeding 90 per cent in the age groups between 25 and 54 years are the general rule in countries at all levels of industrialization. Rates are found to be lower in the more developed countries than in developing countries in the age groups below 20 and over 55 years, and particularly in the extreme age groups, under 15 and over 65 years, as shown in table IX.3. These differences reflect the fact that males in the more developed countries

enter the labour force later and withdraw earlier in life, on the average, than they do in the developing countries.<sup>34</sup>

28. In addition to entering the labour force later and withdrawing earlier in life, male workers in the relatively wealthy industrialized countries put in shorter hours of work per week, on the average, than do workers in the less developed agricultural countries.<sup>35</sup> Thus, the age-specific activity rates give a distorted notion of the contribution of different groups to labour supply, since they take no account of variations in the extent of activity of labour force members. In assessing inputs to labour supply, it should be taken into consideration that part-time workers are proportionately more numerous in the youngest and eldest than in the central age groups.

29. The difference between the more developed and less developed countries in patterns of participation by males in the labour force has a counterpart in rural-urban differences within countries.<sup>36</sup> Males in rural communities generally enter the labour force earlier, on the average, and continue working to more advanced ages than they do in the cities.<sup>37</sup> In a study of age-specific

<sup>34</sup> Findings of other studies on the relationship between levels of male activity rates and the level of development are similar. See, for example, United Nations, *Demographic Aspects of Manpower* ... (1962), table 3.2.; Ducoff, *Human Resources of Central America* ... (1960); United Nations, *Population Growth and Manpower* ... (1960), p. 55; Correa, *The Economics of Human Resources* (1963), p. 21; Sadie, "Población y mano de obra ..." (1969), p. 35.

<sup>35</sup> Winston, "An international comparison of income ..." (1966).

<sup>36</sup> Examples of works in which urban-rural differentials in activity rates have been analysed are: United Nations, *Studies of the Economically* ... (1959), pp. 28-32; ———, *Population Growth and Manpower* ... (1960); ———, *The Mysore Population Study* ... (1961), chap. 15; Seklani, "Population active et structures économiques de l'Egypte" (1962); Sadie, "The white labour force ..." (1960); Yuan, "Relation of type and size ..." (1965); Taeuber, *The Population of Japan* (1958), chap. 5; Bancroft, *The American Labor Force* ... (1958), chap. 3; Kim, "Labour force structure in a dual economy ..." (1970). Estimated age-specific male activity rates in the agricultural and non-agricultural sectors in Brazil's population, 1940 and 1950 projections for 1960, are given in Arretx, *Población masculina económicamente activa* ... (1963), table 3, annex.

<sup>37</sup> An exception to the rule of lower average age of entrance into the labour force in rural areas was found in Japan before the Second World War; see Taeuber, *The Population of Japan* (1958), pp. 85-86.

<sup>33</sup> An analysis of 1950 census data showed that male activity rates averaged 62 per cent in industrialized countries (defined as having less than 35 per cent of the male labour force engaged in agriculture), 58 per cent in semi-industrialized countries (those having 35 to 59 per cent in agriculture) and 55 per cent in agricultural countries (those with 60 per cent or more in agriculture). United Nations, *Demographic Aspects of Manpower* ... (1962), table 2.4.

TABLE IX.4. URBAN AND RURAL ACTIVITY RATES AND GROSS YEARS OF ACTIVE LIFE,  
FOR SELECTED COUNTRIES

Areas		Crude activity rate (labour force as percentage of total population)			Gross years of active life in age range 15-74 years	
		Both sexes	Male	Female	Male	Female
Guatemala, 1950:	Urban .....	37.7	57.1	19.6	53.9	15.7
	Rural .....	33.0	59.5	5.1	57.3	4.5
Indonesia, 1961:	Urban .....	32.8	48.8	16.7	47.8	16.0
	Rural .....	36.5	53.3	20.1	54.0	20.7
Japan, 1955:	Shi of 50,000 or more inhabitants	42.2	56.6	37.1	49	21
	Gun .....	41.1	54.7	39.9	56	36
United States, 1960:	Urban .....	40.6	55.1	27.0	47.1	22.5
	Rural-farm .....	36.0	54.7	15.4	50.0	14.1
Poland, 1960:	Urban .....	41.8	53.8	31.1	45.7	24.7
	Rural .....	52.4	56.4	48.7	54.6	44.2

SOURCES: Calculated from data shown in: Ducoff, *Human Resources of Central America* ... (1960), p. 142; Japan, Bureau of Statistics, *1955 Population Census* ... (1957), vol. 2, part 2, p. 34; United States of America, Bureau of the Census, *Census of Population, 1960* ... (1963), table 194; Indonesia, Central Statistical Office, *Sensus penduduk 1961* ... (1961?); Poland, Główny Urząd Statystyczny, *Rocznik demograficzny, 1945-1966* (1968), pp. 86-87; Smolinski, "Statystyczne metody mierzenia ..." (1965), p.11. In computing gross years of activity rates for Japan and Poland, activity rates for certain age groups had to be estimated by graphic interpolation; the census tabulations for Japan provide no subdivisions of the age group 65 years and over in the labour force and those for Poland provide no subdivision of the 70 to 79-year group.

activity rates in forty countries, based on 1960 census data, it was found that rural activity rates for males surpassed the urban in all age groups, though the differences were greatest at ages under 20 and over 64 years and relatively slight at ages between 25 and 54. When the data were examined separately for more developed countries and less developed countries, generally similar patterns were found in both groups.<sup>38</sup> It may be concluded that increasing urbanization of a country at any level of economic development tends to reduce the male activity rate, other things being equal.<sup>39</sup> Yet the crude male activity rate is sometimes higher in the urban than in the rural population, because age-selective migration from the countryside to the cities inflates the proportion of young adults in the city population<sup>40</sup> (and also, in some countries, because the urban population has lower fertility than the rural).

30. A summary measure of the level of age-specific activity rates in urban and rural areas which eliminates the effects of differences in age structure is provided either by age-standardized activity rates or by calculating the gross years of active life. Applying the former measure, Denti found that the average activity rate in

forty countries studied was 52.2 in urban areas and 56.5 in rural areas.<sup>41</sup> The measure of gross years of active life, which has the advantage of not being affected by the arbitrary choice of a standard age distribution, is the sum of products of the age-specific rates multiplied by the number of years in the corresponding age groups. It represents the average number of years in the labour force for a hypothetical generation of males (or females) calculated on the assumption that all would survive up to the end of the potential span of working life and that they would have at each age the specific activity rates observed in a given population. A few examples of differences in gross years of active life and total activity rates are given in table IX.4. It is seen that the gross years of active life for males are higher in the rural than in the urban areas of each of the five countries studied, though in two of the countries (Japan and the United States of America) crude male activity rates were higher in the urban areas.

31. A significant negative correlation between activity rates and school attendance rates of males 10-14 and 15-19 years of age was found in an analysis of data for 30 countries.<sup>42</sup> This association existed even though part-time and seasonal employment of students is not uncommon in many countries, and on the other hand, teen-age males reported as neither in school nor in the labour force are disquietingly numerous in some less developed countries.<sup>43</sup> So the average age of entrance

<sup>38</sup> Denti, "Sex-age patterns of labour force participation ..." (1968), pp. 533-534.

<sup>39</sup> It is important to note that the inverse association between urbanization and activity rates is closely linked to other factors such as education and industrial composition of the labour force. In an analysis of 1961 activity rates by census district in India, it was found that when the influences of literacy, density and the industrial composition of the labour force were eliminated, the association between activity rates and degree of urbanization was not statistically significant. Namboodiri, "A contribution to the study of factors ..." (1966), pp. 51-52.

<sup>40</sup> See, for example, Daragan, "Economic development and internal migration" (1967).

<sup>41</sup> Denti, "Sex-age patterns of labour force participation ..." (1968), p. 536.

<sup>42</sup> United Nations, *Population Growth and Manpower* ... (1960), p. 55.

<sup>43</sup> Such conditions have been interpreted as a result of deficient opportunities for employment discouraging young people from seeking jobs. For example, see United Nations, *Studies of the Economically* ... (1959), p. 27.

of males into the labour force is to a large extent a function of social norms with regard to levels of educational attainment, reinforced by compulsory school attendance laws and legal restrictions on child labour as well as by public provisions for education. Likewise the average age of retirement is partly governed by social norms, which are backed up in this case by public or private provisions for old-age and disability pensions and, in some countries, by governmental efforts to prevent aging workers from being forced out of the labour force prematurely by discriminatory employment practices. Economic and demographic circumstances condition the formation of these norms and the corresponding provisions of law and public policy. In less developed countries, low incomes and high birth rates making for a large proportion of children in the population inhibit long schooling, late entrance into the labour force, and early retirement. At the same time, the organization of the less developed rural-agricultural economy largely in small-scale family units of production makes it relatively easy to put children to work early and affords opportunities for men to continue doing at least some work up to an advanced age—opportunities which may be difficult to find in the wage-earning régime of the urban-industrial economy.

#### (b) Trends of male activity rates

32. Gross years of active life for males in industrialized countries have been decreasing—at least since the early decades of the present century—as a result of decreasing activity rates at both ends of the span of potential working life.<sup>44</sup> Below the age of 14 or 15 years, activity rates for both males and females in industrialized countries have dwindled almost to the vanishing point; in fact, it is no longer considered worth while in the censuses of most of these countries to inquire about economic activities of persons below such an age. Although the trend in the age group 15-19 years has been less consistent, the average male activity rate in this age group for ten industrialized countries is estimated to have decreased from about 80 per cent around 1920 to 70 per cent around 1950. For men 65 years of age and over, the decrease was from about 65 per cent in 1920 to 45 per cent in 1950, and there has also been a noticeable decline in the rate for men between 55 and 65 years of age.<sup>45</sup> Data from more recent censuses show that these trends have continued in industrialized countries since the Second World War. In fourteen of fifteen industrialized coun-

tries<sup>46</sup> where comparable data were obtained in two post-war censuses, the activity rate for males 15-19 years of age decreased during the intercensal period, the average amount of the decrease being about 9 per cent (on a per-decade basis) of the male population in this age group. The rate for males 65 years of age and over decreased without exception in these 15 countries, the average amount of decrease being about 11 per cent (see table IX.5).<sup>47</sup>

33. The causes of the compression in the years of active life between a rising average age of entrance into the labour force and a falling average age of retirement are entwined with developments that have played essential parts in the evolution of modern industrial societies. Increasing need and increasing opportunities for extended education are the counterparts of the rising trend of average age of entrance; the relationship between rising rates of school attendance and falling activity rates for teen-age males in industrialized countries has been demonstrated statistically.<sup>48</sup> The trend towards earlier retirement (or forced withdrawal from the labour force on account of physical disability or other handicaps associated with advanced age) is related to the decrease of agriculture's share in the labour force, the growing proportion of men who work as employees and diminishing opportunities for self-employment,<sup>49</sup> as well as to the development of social security legislation and other provisions for retirement income.<sup>50</sup> The growth of output per worker can also be considered as a fundamental factor in promoting this curtailment of active life at the two ends, since this provides the means of supporting longer preparation for work and longer maintenance in retirement.<sup>51</sup>

34. In assessing economic implications of trends in activity rates, it is important to take account of con-

<sup>44</sup> Industrialized countries are here defined as those having less than 35 per cent of their male labour force engaged in agriculture and related activities, semi-industrialized countries having 35 to 59 per cent, and agricultural countries having 60 per cent or more so engaged.

<sup>47</sup> See also Penniment, "The influence of cultural and socio-economic factors . . ." (1967), p. 319.

<sup>48</sup> Long, *The Labor Force under Changing* . . . (1958), p. 112. In the United States during recent decades, there has been an increase in part-time student employment, but not enough to prevent the continuing decline of male activity rates at ages below 20 (except temporarily during the war decade of the 1940s); see Bancroft, *The American Labor Force* . . . (1958).

<sup>49</sup> Notestein *et al.*, *The Future Population of Europe* . . . (1944), p. 160, summed up this aspect of the matter aptly with the following words: "In agriculture, the handicrafts, and the keeping of small shops the process of retiring can be gradual and adjusted to the weakening faculties of the individual. As the economy has become more complex with larger and less flexible units and more narrowly specialized occupations, individuals tend to be employed fully or not at all. It becomes difficult to find a place for the person who fails to keep the general pace. Moreover rigid prescriptions that ignore the capacities of the individual tend to lower the age of retirement."

<sup>50</sup> There is a vast literature on causes of the decreasing trend of activity rates of elderly men in the industrialized countries. For example, see Daric, "L'organisation scientifique du travail . . ." (1948); Desmarest, "Le régime des pensions de vieillesse . . ." (1948); Long, *The Labor Force under Changing* . . . (1958), chap. 5; United Kingdom, Royal Commission on Population, *Report* . . . (1949), pp. 114-116; Rosset, *Ludzie starzy* . . . (1967).

<sup>51</sup> See section B.

<sup>44</sup> At an earlier stage in the industrial development of Western countries, child labour is believed to have increased; for example, on child labour in England, see Marshall, "The population problem during . . ." (1954), and Dunlop, *English Apprenticeship and Child Labour* . . . (1912). The censuses of the United States in the latter decades of the nineteenth century showed an increasing trend of male activity rates in the youngest age groups, but the reliability of these data is dubious; see Lebergott, "Population change and the supply of labor" (1958). See also Daric, *Vieillesse et de la population* . . . (1948), p. 85.

<sup>45</sup> United Nations, *Demographic Aspects of Manpower* . . . (1962), figure 2, p. 16, and table A-5. See also Bourgeois-Pichat, "Perspectives sur la population active européenne" (1953).

TABLE IX.5. CHANGES OF ACTIVITY RATES IN INDUSTRIALIZED, SEMI-INDUSTRIALIZED AND AGRICULTURAL COUNTRIES DURING INTERCENSAL PERIODS SINCE THE SECOND WORLD WAR

	Crude activity rates (both sexes, all ages)	Male activity rates			Female activity rates, all ages
		All ages	15-19 years	65 years and over	
<i>Industrialized countries</i> (less than 35 per cent of male labour force engaged in agriculture):					
Number of countries:					
Total .....	17	17	15	15	17
With increasing activity rate .....	3	2	1	0	12
With decreasing activity rate .....	14	15	14	15	5
Average change of activity rate, per decade <sup>a</sup> .....	- 1.3	- 2.9	- 8.7	- 11.2	+ 0.4
<i>Semi-industrialized countries</i> (35-59 per cent of male labour force engaged in agriculture):					
Number of countries:					
Total .....	20	20	15	17	20
With increasing activity rate .....	3	1	2	1	6
With decreasing activity rate .....	17	19	13	16	14
Average change of activity rate, per decade <sup>a</sup> .....	- 2.2	- 4.0	- 9.7	- 9.1	- 0.4
<i>Agricultural countries</i> (60 per cent or more of male labour force engaged in agri- culture):					
Number of countries:					
Total .....	8 <sup>b</sup>	8	5	5	8
With increasing activity rate .....	1	1	1	2	3
With decreasing activity rate .....	6	7	4	3	5
Average change of activity rate, per decade <sup>a</sup> .....	- 2.2	- 3.2	- 9.5	- 3.7	- 1.3

SOURCES: Calculated from data in United Nations, *Demographic Aspects of Manpower* ... (1962), tables A-1 and A-3; ———, *Demographic Yearbook, 1956* ... (1957); ———, *1964* ... (1965); and van den Boomen, "Population and labour force growth ..." (1967).

<sup>a</sup> Unweighted mean of changes in rates, pro-rated to a per-decade basis where the intercensal periods were greater or less than 10 years.

<sup>b</sup> Including one country with no change in activity rate.

comitant changes in the amounts of labour input per worker. It is well known that average hours of work per week have followed a decreasing secular trend in industrialized countries. Taking this factor into account, it has been estimated that labour-time inputs per 1,000 males 14 years of age and over decreased in the United States of America by 41 per cent between 1890 and 1950, in Great Britain by 27 per cent between 1911 and 1951, and in Germany by 29 per cent between 1895 and 1950. In the female population, although the trend of activity rates was upward in the United States and Germany, this was more than counterbalanced by a decrease in weekly hours per worker, so that hours of labour input per 1,000 females 14 years of age and over decreased by 5 per cent in the United States of America and 7 per cent in Germany during the first half of the present century.<sup>52</sup>

<sup>52</sup> Long, *The Labor Force under Changing* ... (1958), chap. 13. In the United States between 1909 and 1964, it has been estimated that average annual hours of work per head for the civilian labour force decreased from 2,662 to 1,999; the decrease was much greater in non-farm than in farm work. See United States, National Commission on Technology, *Automation and Economic Progress* (1966), vol. 1, p. 12. The intensity of work is another question. Wiles, "Notes on the efficiency ..." (1951), maintains that the pace of

35. The decreasing trend in activity rates for males under 20 and over 65 years of age are not confined to industrialized countries. With few exceptions among semi-industrialized countries where indications of changes during post-war intercensal periods are available, the trend has been downward in both of these age groups, and the average amounts of decrease in the rates have been comparable to the averages for industrialized countries (see table IX.5). In the agricultural group, although measures of the changes are available only for a few countries, the prevailing trend in the rates for males below age 20 has been steeply downward since the Second World War. Among men over age 65 also, the downward trend is apparent in some of the few countries for which data are available, but these data are not sufficient to indicate whether this trend is generally typical of agricultural countries.<sup>53</sup> International Labour Office estimates for 1950 and 1960 for the less developed regions as a whole show a considerable decline in the activity rates for men 65 years of age and over and

work in Britain nowadays is slower than it was in the nineteenth century.

<sup>53</sup> On recent changes in Asian countries, see You, "Growth and structure of the labour force ..." (1963).

under 20 years.<sup>54</sup> In India, the total activity rate in the male population appears to have been falling for half a century prior to the 1951 census; measures of long-range trends in the age-specific rates are not available.<sup>55</sup> In Jamaica, decreasing trends of the activity rates for males in the youngest and eldest groups have been traced back to the latter decades of the nineteenth century,<sup>56</sup> and in Puerto Rico, to 1910.<sup>57</sup>

#### 4. THE FEMALE LABOUR FORCE

36. The part taken by women in income-producing work varies enormously in different parts of the world. According to International Labour Office estimates for 1960, women constituted slightly more than half of the total labour force in the Soviet Union, and 42 per cent in Eastern Europe. At the other extreme, they made up only about 7 per cent of the labour force in Northern Africa, and 15 to 18 per cent in Tropical South America and the Middle American Mainland (see table IX.1.). In addition to the Soviet Union, there are a number of countries in tropical Africa whose recent census reports show females outnumbering males in the labour force; these include the Democratic Republic of the Congo, Guinea and Niger. A near equality of the sexes is also found in Thailand. On the other hand, in Kuwait, less than one female was reported as economically active for every hundred males so reported in the census.

37. The regional range of variation in female crude activity rates in 1960 was from 48 per cent in the Soviet Union to 4 per cent in Northern Africa, although individual country figures fell outside these limits. Rates of less than 3 per cent were reported in Jordan (2.6 per cent) and Kuwait (only 0.4 per cent). These exceedingly low figures are in contrast with the rates of more than 50 per cent reported in Thailand (51.4 per cent), among the African population of Guinea (51.4 per cent) and among the African population of Niger (57.3 per cent).<sup>58</sup>

38. In most countries, the census statistics are likely to understate the number of economically active women, especially in the category of unpaid helpers on farms and other family-operated economic enterprises. Differences in the extent of this under-reporting are partly responsible for the wide variations in recorded female activity rates. On the other hand, a full enumeration of all women engaged to any extent in economic activities would exaggerate their contribution to the labour supply, since relatively many female workers are part-time workers in most countries.<sup>59</sup>

39. The economic significance of variations in female activity rates is not the same as that for the variations in male rates, because most adult females who are not

in the labour force engage in productive activities within the home, rendering services and producing goods which are none the less valuable for not being counted as income. While the housewife not in the labour force may be regarded as dependent, she is not so in the same sense as a child or aged person who does not contribute to production. The apparent economic advantage for a nation in having a high female activity rate is to a large extent illusory if it results merely from women producing in paid employment the same kinds of services and goods which, under a different organization of the economy, they would produce without pay within the home.

40. Influences of culture are apparent in the international picture of variations in female activity rates. That some of the highest rates have been recorded in tropical African countries is not surprising in view of the fact that, in many societies in that part of the world, it has traditionally been women's responsibility to till the soil, plant, weed, and harvest the crops.<sup>60</sup> In West Africa, women are also renowned for their role as petty traders.<sup>61</sup> In contrast, the countries of Mediterranean Europe and Latin America form a group having generally rather low female activity rates, Bolivia being a notable exception. The Moslem countries form another such group, although there are some exceptions there, too.<sup>62</sup> The custom of "purdah" in Moslem societies inhibits employment of women.<sup>63</sup> Such traits of culture may affect not only the extent to which women actually engage in income-producing work but also the reporting of their activities in the census. For example, it has been surmised that the very small numbers of women reported as economically active in the conservative rural areas of upper Egypt might be due in part to reluctance to acknowledge the fact of their employment.<sup>64</sup>

41. In Western industrial societies, although employment of women outside the home no longer encounters the disapproval it did in former times, it is still inhibited in varying degrees in different communities by stereotyped ideas about the intellectual and physical capacities of women and traditional conceptions of their proper function as wives and mothers.<sup>65</sup> The feeling that they should not compete with men in their role as breadwinners is likely to be strengthened when there is much unemployment. In socialist societies, on the other hand, equality of the sexes in employment opportunities is emphasized as a principle of social policy<sup>66</sup> and female

<sup>60</sup> Duvieusart, "Note sur le commerce indigène ..." (1959); Lefaucheux, "The contributions of women ..." (1962); Forde, *Habitat, Economy, and Society* ... (1946), particularly pp. 171 ff.; Boserup, *Women's Role in Economic Development* (1970).

<sup>61</sup> On the economic activities of women in Ghana, for example, see Addo, "Demographic aspects of manpower ..." (1967), particularly p. 22.

<sup>62</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), p. 7; Bean, "Utilisation of human resources ..." (1968), pp. 394-396.

<sup>63</sup> Husain, *Employment of Middle Class Muslim* ... (1958).

<sup>64</sup> El Shafei, "The current labour force ..." (1960).

<sup>65</sup> International Labour Office, "Discrimination in employment or occupation ..." (1962).

<sup>66</sup> For example, see USSR, Tsentralnoe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, *Zhenshchiny i deti v SSSR* (1969); Timar, "Long-term planning of employment ..." (1964); Ilyina,

(Continued on next page)

<sup>54</sup> International Labour Office, *Labour Force Projections* ... (1971), part V, table 2.

<sup>55</sup> Kalra, "A note on working force ..." (1962).

<sup>56</sup> Roberts, *The Population of Jamaica* (1957), pp. 93-95.

<sup>57</sup> Jaffe, *People, Jobs, and Economic Development* ... (1959), p. 76.

<sup>58</sup> United Nations, *Demographic Yearbook, 1964* ... (1965), table 8.

<sup>59</sup> With reference to industrialized countries, see Bruntz, "The part-time employment of women ..." (1962).

activity rates are high: above 40 per cent in the USSR, Bulgaria and Poland and 31 to 33 per cent in Hungary and Yugoslavia according to censuses taken around 1960. These rates compare with a range of 13 to 36 per cent for Western European countries.<sup>67</sup> A comparable measure for China is lacking.<sup>68</sup> Other reasons which have been given for the current high female activity rates in socialist countries include the absorption of male manpower reserves as a result of rapid development, the educational advancement of women and the expansion of social legislation and facilities for child care.<sup>69</sup>

42. Regarding the effect of industrialization upon women's participation in economic activities, Sinha advanced the hypothesis that industrialization at an early stage makes for a decrease in their participation, and at a later stage for an increase.<sup>70</sup> Some support for this hypothesis was found in a comparison of average female crude activity rates for industrialized, semi-industrialized and agricultural countries, based on 1950 census data. While the average for industrialized and agricultural countries was found to be about the same (24 per cent and 25 per cent, respectively), the average for semi-industrialized countries was lower (21 per cent). Not much significance can be attached to this difference, though, in view of the wide variations of the rates among countries within all three groups.<sup>71</sup> The same observations apply to differences between female activity rates in countries classified by income per head, which have been found to be somewhat lower, on the average, for middle-income countries than for those in the lowest and highest

income classes.<sup>72</sup> No correlation is apparent between female activity rates and degrees of urbanization.<sup>73</sup>

43. Urban-rural differences of female activity rates in different countries do not conform to any consistent rule. Among the examples shown in table IX.4, the cases of Indonesia and Japan, with larger percentages of women in the rural than in the urban population classified in the labour force, appear to represent the dominant pattern in the Asian region.<sup>74</sup> The opposite differential, exemplified by statistics for Guatemala, seems to predominate in the Latin American region and it is also found in the United States and to a lesser extent among Western industrialized countries.<sup>75</sup> Whether the urban or the rural rate is higher depends largely on the extent of the reporting of women in farm households as unpaid helpers in agricultural work.<sup>76</sup>

44. The same diversity is found in the results of studies of regional variations in female activity rates within countries, associated with varying degrees of industrialization and other economic and social characteristics. A study of differences in the female rates for various states in India has shown, in the rural population, an inverse association with the percentage of rural workers engaged in non-agricultural industries, and in the urban population, an inverse association with the percentage of workers in "organized" industries (those having at least 50 per cent of the wage-earning labour force and 75 per cent or more of the labour force in non-household establishments). Negative correlations with measures of income and literacy were also found.<sup>77</sup> On the contrary, in Central American countries and Mexico, provincial differences of female activity rates were found to be associated positively with industrialization.<sup>78</sup>

45. In a study limited to the populations of metropolitan areas in various countries (thus minimizing the

(Footnote 66 continued)

"The participation of women ..." (1967); Litvyakov, "Economic and social factors in ensuring full employment ..." (1967), p. 310. Several writers have observed, however, that at the present stage of development of socialist societies, certain problems arising from this policy remain unsolved. For example, it has been recognized that in Yugoslavia, women's participation in social production often results in their carrying a double work load, since they have not been freed from most of their domestic duties in the home. For an extensive discussion, see Hadžiomirović, *Ekonomija ženskog rada* ... (1959), particularly pp. 354-360.

<sup>67</sup> United Nations, *Demographic Yearbook, 1964* ... (1965), table 8. Characteristics of the female labour force of the USSR and the United States are compared in Ulanis, *Dinamika i struktura naseleniia SSSR i SShA* (1964).

<sup>68</sup> In the non-agricultural sector of the Chinese economy, it has been estimated that 17.7 per cent of employed workers in 1958 were females. Emerson, *Sex, Age and Level of Skill* ... (1965).

<sup>69</sup> Rajkiewicz, *Zatrudnienie w Polsce Ludowej w latach 1950-1970* ... (1965), p. 55. See also Sergeeva, "Spetsifika primeneniia zhenskogo truda" (1969).

<sup>70</sup> Sinja, "Dynamics of female participation ..." (1965). There is some evidence to suggest that such a trend has occurred in Poland. Despite increases in non-agricultural activity rates for women during the interwar period, the average activity rate for all women 14 years of age and over declined owing to the outflow of population from agriculture. The total female activity rate stabilized in the 1950s, however, owing to a large increase in female employment in non-agricultural occupations. See Piotrowski, *Praca zawodowa kobiety a rodzina* (1963), p. 39. See also Penniment, "The influence of cultural and socio-economic factors ..." (1967), p. 320.

<sup>71</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), table 2.4. The variations were especially wide among agricultural countries, with both the highest and the lowest recorded activity rates for females being found within this group. Interquartile ranges were 19.6 to 31.0 per cent in the group of industrialized countries, 13.4 to 28.5 per cent in the semi-industrialized, and 10.7 to 41.8 per cent in the agricultural group.

<sup>72</sup> Sinha, "Dynamics of female participation ..." (1965). Since many of the countries included in the middle-income group in this study were Latin American and Southern European countries, the question arises whether the relatively low average female activity rate for the group was related more to income or to culture.

<sup>73</sup> Stewart, "Degree of urbanization ..." (1967), table 4.

<sup>74</sup> Denti, "Sex-age patterns of labour force participation ..." (1968), p. 548. In India, the rural female activity rate recorded at the 1961 census was nearly three times the urban rate, and within the urban population, the rate diminished progressively with increasing city size. See Sinha, "Dynamics of female participation ..." (1965); and India, Cabinet Secretariat, *Tables with Notes on Employment* ... (1959). In West Malaysia, according to a 1962 survey, the lowest female activity rates occurred in large urban areas and the highest in rural areas, with those in small urban areas and metropolitan areas falling in between. Jones, "Female participation in the labour force ..." (1965), pp. 69-70. In the Philippines, on the other hand, female activity rates were not found to be lower in urban than in rural areas. Gupta, "Patterns of economic activity ..." (1970), p. 392.

<sup>75</sup> Regarding the Latin American countries, see van den Boomen, *Algunos aspectos de la actividad* ... (1962), chap. 3. In censuses of some European countries where many family members in farm households are classified as economically active in agriculture, female activity rates in the agricultural sector may exceed those in the non-agricultural sector. This is the case for France and Poland, for example, but it does not appear to be the general rule in Europe.

<sup>76</sup> Denti, "Sex-age patterns of labour force participation ..." (1968), pp. 546-547.

<sup>77</sup> Sinha, "Dynamics of female participation ..." (1965).

<sup>78</sup> Ducoff, *Human Resources of Central America* ... (1960).

effects of variations in women's employment in the agricultural sector), Collver and Langlois found that the average activity rate of females within the age group 15 to 64 years was highest in the economically most developed countries, lowest in the least developed, and intermediate in a group of countries coming in between on the scale of economic development. Here again, though, the variations among individual countries were so great as to deprive the averages of much significance. The authors of this study concluded that economic progress might bring either an increase or a decrease in women's participation in the labour force, depending on the level of the female activity rate at the start and on cultural traits relevant to "the speed with which adjustments are made between the family and work". They also noted that the effect of economic development was to diminish participation in some occupations and industries (especially those carried on within the home) while increasing it in others; thus the net effect on the total female activity rate would depend on the circumstances in each country. It is possible also that apparent effects may be illusory in some cases.<sup>79</sup>

(a) *Marital status, motherhood, and economic activity of women*

46. The extent of women's participation in the labour force is related more or less closely in different societies to their marital status and the number and ages of children under their care, as these factors affect their needs for income, the amount of time and energy which they can spare for extra-domestic activities, and social concepts of their proper role. Thus the size of the female labour force may be influenced to an important extent by the ages at which women marry, the frequencies of non-marriage, widowhood, and other forms of broken marriage, and the level and age-pattern of fertility rates. Conversely, variations in female activity rates due to other factors may react upon patterns of behaviour relating to marriage and childbearing.

47. In Western industrialized countries, the great majority of young women work for their living from the time they leave school at least until their marriage. Activity rates for single women in these countries appear to be, on the average, some 15 per cent below those of men at ages 20-34 years. Comparing the average rates for single women in industrialized countries as shown in table IX.6 with the corresponding rates for males in table IX.3, one can see that the difference widens considerably in the older working age groups, thus suggesting that women who remain unmarried tend to withdraw from the labour force earlier than men do.<sup>80</sup> Single women account for a large majority of the female labour

force in some countries, their share of the total exceeding 70 per cent in Norway, for example, and 80 per cent in Ireland according to censuses taken around 1960.<sup>81</sup> Among Western industrialized countries, the United States of America ranks lowest in the share of single women in the female labour force (24 per cent at the census of 1960).

TABLE IX.6. AVERAGE AGE-SPECIFIC ACTIVITY RATES OF FEMALES CLASSIFIED BY MARITAL STATUS IN TWELVE INDUSTRIALIZED COUNTRIES,<sup>a</sup> ACCORDING TO RESULTS OF CENSUSES BETWEEN 1948 AND 1956

Age (years)	Single	Married	Widowed, divorced or separated
15 and over .....	63.8	19.2	27.8
15-19 .....	55.7	24.3	b
20-24 .....	80.9	25.4	b
25-34 .....	79.6	20.1	63.5
35-44 .....	74.2	21.1	61.7
45-54 .....	69.1	20.4	51.6
55-64 .....	52.1	14.1	30.3
65 and over .....	18.5	6.5	8.5

SOURCE: United Nations, *Demographic Aspects of Manpower* ... (1962). Adapted from tables 6.1 and appendix tables A-11 to A-13.

<sup>a</sup> Unweighted means of percentages of economically active among female population of specified age and marital status: censuses of Australia, Canada, England and Wales, France, Federal Republic of Germany, Ireland, Israel, Japan, New Zealand, Norway, Sweden and the United States of America.

<sup>b</sup> Numbers too small for calculation of reliable activity rates.

48. The level of the total female activity rate depends mainly on the extent of gainful employment of married women, who make up a large majority of all women in the potentially employable age groups. In Western industrialized countries, the activity rates of married women are much lower than those of single women,<sup>82</sup> but they differ widely from country to country. Among the countries for which averages are shown in table IX.6, the percentages of all married women 15 years of age and over recorded as economically active in the censuses taken around 1950 ranged from about 5 per cent in Ireland and Norway to 46.5 per cent in Japan.<sup>83</sup> Widowed, divorced, and separated women have activity rates below those of single women but generally much higher than those of married women of corresponding ages.

49. In the USSR and some Eastern European countries not included in the averages in table IX.6, the activity rates of married women in particular are undoubtedly

<sup>81</sup> United Nations, *Demographic Yearbook*, 1964 ... (1965).

<sup>82</sup> Married men, on the contrary, tend to have somewhat higher activity rates than single men do, but the variations of activity rates according to marital status are much less pronounced in the male than in the female population. For example, see United Nations, Economic Commission for Latin America, *Some Aspects of Population Growth in Colombia* (1962), part 2, p. 38; Taeuber and Taeuber, *The Changing Population of the United States* (1958), p. 222.

<sup>83</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), table 6.1, p. 37. Activity rates of females specific for age and marital status are tabulated by countries in tables A-11, A-12 and A-13 of the same report.

<sup>79</sup> Collver and Langlois, "The female labor force ..." (1962). Where the extent of women's engagement as unpaid agricultural workers is greatly understated by the census returns, a false picture of higher female activity rates in urban-industrial than in rural-agricultural areas may appear, and an illusion of rising rates in the country's total female population as industrialization and urbanization progress.

<sup>80</sup> The number of countries and the census dates used in computing the rates in tables IX.3 and IX.6 differ, but the broad comparison being made is unlikely to be affected by these differences.



TABLE IX.7. AGE-SPECIFIC ACTIVITY RATES FOR SINGLE AND MARRIED<sup>a</sup> FEMALES ACCORDING TO RESULTS OF RECENT CENSUSES FOR SELECTED DEVELOPING COUNTRIES

Age (years)	Mauritius 1962		Morocco 1960		Panama 1960		Peru 1961		Puerto Rico 1960	
	Single	Married	Single	Married	Single	Married	Single	Married	Single	Married
15 and over .....	21.6	13.2	21.3	5.5	38.4	16.1	38.7	11.7	26.3 <sup>b</sup>	20.4 <sup>b</sup>
15-19 .....	9.7	4.3	16.4	4.3	27.8	7.4	30.1	12.8	11.5 <sup>b</sup>	10.3 <sup>b</sup>
20-24 .....	34.9	7.9	30.9	4.7	55.6	13.1	47.3	10.4	49.3	21.1
25-29 .....	43.6	11.4	32.9	5.1	58.0	17.3	51.5	12.1	59.3	25.1
30-34 .....	44.1	14.2	28.9	5.4	55.1	20.0	45.8	14.0	52.1	26.5
35-39 .....	45.8	16.5	40.6	6.1	51.9	20.0	50.4	12.6	46.9	24.2
40-44 .....	49.3	18.9	28.7	6.3	48.4	19.6	50.5	11.4	46.3	22.0
45-49 .....	47.9	18.6	38.0	6.8	42.8	18.8	43.5	12.5	41.9	18.7
50-54 .....	48.3	17.5	28.6	6.7	34.3	15.1	44.0	12.4	40.7	16.8
55-59 .....	41.8	16.1	28.5	7.0	26.4	10.9	37.0	9.8	32.3	13.2
60-64 .....	28.2	8.8	20.7	6.7	19.1	7.5	34.1	9.7	25.1	8.5
65 and over .....	19.5	4.5	14.7	6.2	8.8	4.3	13.9	4.5	10.3	3.8

SOURCE: Computed from data shown in United Nations, *Demographic Yearbook*, 1962 ... (1963); ———, 1963 ... (1964); and ———, 1964 ... (1965).

<sup>a</sup> Consensually married women (if classified separately) have been combined with married women for the purpose of these calculations.

<sup>b</sup> Persons 14 years of age reported as economically active are included in the numerators for calculation of these rates.

much higher than the typical range in Western countries. For example, in Czechoslovakia, 1961 census data show that nearly two thirds of married women aged 35-49 years were economically active.<sup>84</sup>

50. Marital status classifications for the female labour force are available for only a few developing countries and the examples of age-specific activity rates for single and married females in such countries, shown in table IX.7, cannot be trusted to be representative. It is certain that much higher percentages of both single and married women are classified as economically active in the censuses of some agricultural countries not shown in the table, since this can be readily inferred from the high activity rates in the female population as a whole, recorded, for example, in Thailand (over 85 per cent of all females between the ages of 15 and 50) and Niger (over 98 per cent between the ages of 14 and 60). In those agricultural countries where the recorded activity rates of married women are very low (represented by the example of Morocco in table IX.7), it is likely that in reality, many farmers' wives share at least to some extent in the farm work. The same observation applies to unmarried daughters in farm households. Thus the fact that the age-specific activity rates for single females recorded in the countries included in table IX.7 are below the typical range for industrialized countries, can be considered as a reflection of incomplete reporting of their services as unpaid family workers and limited opportunities for their employment in paid jobs.<sup>85</sup>

<sup>84</sup> Czechoslovakia, Ústřední Komise Lidové Kontroly a Statistiky, *Vývoj společnosti ČSSR v číslech* ... (1965), p. 193. See also United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1968* ... (1969), p. 250.

<sup>85</sup> Additional factors tending to depress activity rates of single females in some agricultural and semi-agricultural countries are social disapproval of the employment of marriageable daughters outside the home, reporting of many consensually married women as single, and high rates of illegitimacy, meaning that many single women have maternal responsibilities interfering with their employment. It is also possible that, where marriage is early and nearly universal, the few women remaining single at employable adult ages suffer a high incidence of disabilities.

51. The responsibilities of motherhood are the main inhibition to employment of married women in Western industrialized countries, although even those who have no children exhibit lower activity rates than single women do.<sup>86</sup> In England and Wales, for example, a tabulation of women married only once and still married at the 1951 census, showed that half of those who were childless and 20 per cent of those who were mothers were economically active.<sup>87</sup> The larger the number of children, the lower the activity rate of mothers, but the ages of the children may be as important as the number, or more so. It has been shown that in the United States of America, nothing is as effective in keeping a woman out of the labour force as the presence of a child below

<sup>86</sup> The following works are among many in which maternal responsibilities have been studied as a factor affecting activity rates of women in Western industrialized countries: Gendell, "The influence of family-building ..." (1967); United Nations, *Demographic Aspects of Manpower* ... (1962), pp. 49-53; Denmark, Statistiske Department, "Frugtbarheden i og holdbarheden ..." (1955); Kelsall and Mitchell, "Married women and employment ..." (1959); Stewart, "Future trends in the employment ..." (1961); Jephcott, Seear and Smith, *Married Women Working* (1962); Girard, "Le budget-temps de la femme mariée dans les agglomérations urbaines" (1958); Girard and Bastide, "Le budget-temps de la femme mariée à la campagne" (1959); Bloch and Praderie, *La population active* ... (1966); Guilbert and Isambert-Jamati, "La répartition de la main-d'œuvre ..." (1961); Guélaud-Leridon, *Recherches sur la condition féminine* ... (1967), p. 82; Adams and Gendriesch, "Familienstruktur und Frauenerwerbstätigkeit" (1965); Horányi, "A nők foglalkoztatottságának ..." (1965), p. 196; Pfeil, *Die Berufstätigkeit von Müttern* ... (1961); Germany, Federal Republic, Statistisches Bundesamt, "Die erwerbstätigen Ehefrauen ..." (1956); Widstam, "Giftna kvinnors yrkesverksamhet ..." (1958); Dahlström et al., *Studieförbundet Näringsliv* ... (1963); Bancroft, *The American Labor Force* ... (1958), chap. 3; Long, *The Labor Force under Changing* ... (1958), pp. 68-70; Lebergott, "Population change and the supply of labor" (1958); Perrella, "Marital and family characteristics ..." (1964); United States, National Manpower Council, *Womanpower* (1957); Myrdal and Klein, *Women's Two Roles* ... (1968), p. 71. See also the works cited in chapter IV on economic activity of women as a factor affecting fertility.

<sup>87</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), p. 53.

school age.<sup>88</sup> Mothers who enter the labour force are more likely than non-mothers to be employed part-time and intermittently, and the average amount of their time devoted to income-producing occupations varies according to the number and ages of their children.<sup>89</sup> These factors also affect the activity rates of widows, divorcees, and separated women, but they are more likely than married women to go to work in spite of maternal responsibilities.<sup>90</sup> In the socialist countries, extensive public provision for day-care of the children of working mothers helps overcome obstacles to their employment, but even in these circumstances, the presence of several young children depresses the activity rate of the mothers.<sup>91</sup>

52. The conditions of participation for mothers in the labour force are not the same in a rural-agricultural setting where women carry on economic activities mainly at home, on family farms, in family operated retail stores, home-handicraft industries etc. Data from rural areas of little-developed agricultural countries show little relationship, or a positive relationship, between the number of children and activity rates of married women.<sup>92</sup> Likewise, in the agricultural population of industrialized countries, the inverse relationship does not hold as a general rule,<sup>93</sup> but does appear in cities in less developed countries.<sup>94</sup>

#### (b) Age-patterns for female activity rates

53. The ages at which women marry and bear children, together with the conditions of participation of wives and

<sup>88</sup> Bowen and Finegan, *The Economics of Labor Force Participation* (1969), pp. 97-98.

<sup>89</sup> United States of America, Bureau of Labor Statistics, *Special Labor Force Report No. 26* ... (1962), table 10, p. A-17; Morgan, Sirageldin and Baerwaldt, *Productive Americans* (1966); Girard, "Le budget-temps de la femme mariée dans les agglomérations urbaines" (1958); Girard and Bastide, "Le budget-temps de la femme mariée à la campagne" (1959).

<sup>90</sup> Bancroft, *The American Labor Force* ... (1958), p. 61.

<sup>91</sup> Juraček, "Některé ponýatky o ekonomické činnosti ..." (1964), p. 351; Kuba, "Zamestnanost žien a rozmiestňovanie dorastu" (1964); Prokopec, "Udaná žena v rodine a zamestnanosti, 1961" (1963); Hungary, Kozponti Statisztikai Hivatal, *A termékenységi családtervezési* ... (1963), table 8.3, p. 89; Józefowicz, "Hipoteza zmian aktywności zawodowej ..." (1965), p. 15. The latter study showed that for women in the older working ages, activity rates did not vary much according to the number of children, but for the younger women who were likely to have small children, the variation in activity rates was substantial. See also Berent, "Some demographic aspects of female employment ..." (1970), particularly p. 188; Sonin, "Aktualnye problemy uluchsheniia ..." (1967), p. 255; and Vdovenko and Korchagin, "Zaniatost v domashnem khoziaistve ..." (1969), pp. 208-209.

<sup>92</sup> Jaffe and Azumi, "The birth rate and cottage industries ..." (1967), pp. 6-7.

<sup>93</sup> In Poland activity rates for married women in the villages were little affected by the numbers of children. Berent, "Some demographic aspects of female employment ..." (1970), pp. 184, 189. Positive relationships are indicated by data for the agricultural population in the Federal Republic of Germany and Japan, for instance; see United Nations, *Demographic Aspects of Manpower* ... (1962), p. 53; Germany, Federal Republic, Statistisches Bundesamt, "Die Erwerbstätigkeit von Frauen ..." (1960), p. 41.

<sup>94</sup> For example, see United Nations, *The Mysore Population Study* ... (1961); Tabah and Samuel, "Preliminary findings of a survey ..." (1962).

mothers in economic activities, affect not only the size of the female labour force but also the relative levels of specific activity rates in different age groups of the female population. The age-patterns of these rates differ markedly in different countries and have changed greatly in some countries during recent decades. The estimated activity rates for 1960, given in table IX.3, show that in the more developed regions, labour force participation reaches a maximum in ages around 20 years and declines progressively in higher age groups, while the average activity rates for developing regions are on a much more even level over the range from 15 to 64 years. These averages conceal a diversity of patterns in different geographical regions and in individual countries, especially within the developing group.<sup>95</sup>

54. Two forms of age-curves of female activity rates commonly found among Western industrialized countries are represented by the data for Northern America and Oceania. In both cases, the female activity rates rise in the teen ages to a peak somewhere about the age of 20 and then enter a decline which reflects the increasing proportions of married women, and of mothers among the married. Some time after age 30, the curve for Oceania flattens while that for Northern America rises again towards a second peak around the age of 50 years—this second peak being about as high as the initial peak. The rise to the second peak reflects the growing freedom of middle-aged mothers from maternal cares as their children grow older. It appears that women in Canada and the United States of America take advantage of this opportunity to seek paid jobs in their middle age to a greater extent than do the women of Australia and New Zealand. Curves for both of the above types appear in different countries of Western and Northern Europe. For example, a fairly pronounced secondary peak appears in the data for France and Norway, while those for Denmark, the Netherlands and Sweden show a flattened curve at ages 35 to 55.

55. The forms of age-curves for female activity rates currently found in most industrialized countries have evolved only recently. Before the Second World War, the most common form of these curves in Western industrialized countries seems to have been one in which the rates declined without interruption after the initial peak around the age of 20.<sup>96</sup> There has been a general trend in the post-war period of increasing labour force participation by women at ages in the forties and fifties, while the activity rates for women between the ages of about 25 and 35 have increased less or diminished in some countries. Where these divergent trends have been most pronounced, the double-peaked curve of the North American type has evolved, while elsewhere the curve has taken a form closer to that shown for Oceania.

<sup>95</sup> In the analysis of the data derived from censuses taken between 1946 and 1958, nine regional types of age-curves for female rates were defined by averaging the rates for selected countries within each region. United Nations, *Demographic Aspects of Manpower* ... (1962), table 5.2 and figure 5.

<sup>96</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), p. 30. On changes in female activity rates in Japan, see Umemura, "An analysis of employment ..." (1962); and Taeuber, *The Population of Japan* (1958), p. 81.

Female activity rates in the countries of Southern Europe typically follow the pattern that was common in Northern and Western Europe before the Second World War; thus, the activity rates show a gradual fall with increasing age throughout the age range from 25-65 years.<sup>97</sup> Still another pattern is evident in many Eastern European countries, where very high and nearly constant activity rates are maintained from about ages 20-50.<sup>98</sup>

56. Quite different patterns of age-curves for female activity rates are found within the various developing regions. In Latin America, for example, activity rates reach a peak around 20 and then decline continuously in higher ages.<sup>99</sup> A similar pattern is found in the statistics of some Middle Eastern countries and China (Taiwan). This pattern represents a situation in which the participation of women in the labour force, as recorded in the censuses, is mainly an urban characteristic and those who participate are chiefly young women not yet married or not having children. In contrast, the curve for India and Pakistan is domed in shape and rather similar to the typical age-curve for male activity rates, though at a much lower level. Curves of this form at lower or higher levels are also found in a number of African countries, including the Democratic Republic of the Congo, Morocco, Mozambique, Senegal and Tunisia. They represent a predominantly rural-agricultural pattern of women's economic activities, affected relatively little, if at all, by the changing maternal responsibilities at different ages in the life cycle, and also relatively little by differences between activity rates for the married and the single, since very few women in the countries concerned remain single after the age of 20.<sup>100</sup>

### (c) Trends of female activity rates

57. In some countries, recorded activity rates for females have been rising and offsetting the falling trend in male rates, while elsewhere the trend of the female rates also has been downward. The diversity of trends is apparent among countries of all degrees of industrialization, as shown in table IX.5. Female rates have increased since the Second World War in a majority of industrialized countries and decreased in a majority of semi-industrialized countries, but the average amounts of the changes have not been very great. For agricultural countries, the data are too few to give a reliable indication of the direction of the dominant trend.<sup>101</sup>

<sup>97</sup> United Nations, *Demographic Yearbook, 1964* ... (1965), table 8.

<sup>98</sup> Berent, "Some demographic aspects of female employment ..." (1970), pp. 181-182.

<sup>99</sup> See, for example, Ypsilantis, "World and regional estimates ..." (1969), table 4.

<sup>100</sup> For example, among the countries included in table IX.7, single women made up only 18 per cent of the labour force in Morocco, whereas their share was 56 per cent in Peru and 57 per cent in Panama.

<sup>101</sup> International Labour Office estimates of female activity rates for 1950 and 1960 show a rising trend both in the developed and developing regions, though the increase in the latter derives mainly from the estimated rise in China. International Labour Office, *Labour Force Projections* ... (1971), part V, table 2. Among the factors cited by Bloch and Praderie as contributing to rising activity rates for women in developed countries were: changing social

58. In a number of industrialized countries, as female activity rates rose and male rates fell recently, women began to contribute a major share in the growth of the labour force. Females, mostly past 40 years of age, accounted for almost two thirds of the increase in the civilian labour force during the 1950s in Great Britain<sup>102</sup> and nearly three fifths in the United States of America.<sup>103</sup> The post-war trends have been similar in Australia, Austria, Belgium, Canada and Sweden. In a number of Eastern European countries the share of total labour force growth accounted for by women has been particularly high.<sup>104</sup> Even where the female activity rates have decreased, their decrease has been less than that of the male rates in most instances, so that the labour force sex ratio has shifted to the feminine side. This is the case of France, Italy, Norway, Ireland, the Netherlands, and New Zealand. The Federal Republic of Germany and Japan are cases illustrating increasing rates both for males and females, due to changes in population age structure. In these cases, the increases in female rates exceed those of male rates.<sup>105</sup>

59. In a longer-range view, neither an increase nor decrease in women's participation in economic activities can be discerned as a predominant tendency among industrialized countries. In a comparative study of census data since 1910 for ten industrialized countries, the long-range trend of age-standardized female activity rates was found to be definitely upward in four countries (Australia, Canada, England and Wales, and the United States of America), downward in three (France, Sweden, and Switzerland) and relatively level or unsteady in three

norms concerning the work of married women, use of time-saving appliances for household work, and improvements in the provision of day-care facilities for children. See their *La population active* ... (1966), p. 48.

<sup>102</sup> Clark, *Women, Work and Age* ... (1962), pp. 32-33. See also Hunter, "Cyclical variations in ..." (1963), p. 144.

<sup>103</sup> United States of America, National Manpower Council, *Womanpower* (1957), p. 247. Also Perrella, "Marital and family characteristics ..." (1964).

<sup>104</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1961* ... (1964), part 2, chap. 4, pp. 1 and 6; for Czechoslovakia, see Kuba, "Zaměstnanost žien a rozmiestovanie dorastu" (1964), p. 58; for Bulgaria, see Mikulsky, "Trudovye resursy bratskikh stran sotsializma" (1967), p. 38.

<sup>105</sup> See, for example, the compilation of post-war statistics for Western European countries in Dubrelle, "Sur l'emploi féminin en Europe" (1966). See also Clark, *Women, Work, and Age* ... (1962); Bats-Denis, "Le travail de la femme mariée" (1964); Morsa, "La population féminine active ..." (1956); Meerdink, *De achteruitgang der geboorten* (1937); Bloch and Praderie, *La population active* ... (1966); Guélaud-Leridon, *Le travail des femmes en France* (1964); Pressat, "La population active en France ..." (1963); Daric, *L'activité professionnelle* ... (1947); Koller, "Die verheiratete berufstätige ..." (1949); Kirk, *Europe's Population in* ... (1946), p. 199; Lungu, "Population and labour force ..." (1965); Pallós and Valkovics, "A gazdaságilag ..." (1965); Ypsilantis, *The Labor Force of Czechoslovakia* (1960), p. 8; Czechoslovakia, Ústřední komise lidové kontroly a statistiky, *Vývoj společnosti ČSSR v číslech* ... (1965), p. 78; Maksimović, "Formiranje radne snage u Jugoslaviji ..." (1964), p. 277; Lebergott, *Manpower in Economic Growth* ... (1964), pp. 519-520; Baker, *Technology and Woman's Work* (1964); Umemura, *Sengo nippon no rodoryoku* ... (1964); and his "An analysis of employment ..." (1962); Taeuber, *The Population of Japan* (1962), p. 81.

(Japan, the Netherlands, New Zealand).<sup>106</sup> In another study, the conclusion was drawn that the general pattern was one of increasing uniformity in the levels of female activity rates in industrialized countries, the rates rising where they were previously low and remaining stable or falling where they were previously high.<sup>107</sup> For the United States of America, the validity of the statistical indications of a long-range trend of rising activity rates of women has been questioned.<sup>108</sup>

60. In the countries where great increases in female activity rates have been recorded in the censuses since the early decades of the present century, these can be attributed mainly to increasing participation by married women in economic activities, although the activity rates for single, widowed, divorced, and separated women also have risen. In the United States of America, for example, where only 13 per cent of all women in the labour force in 1890 were married, the ratio increased to 60 per cent by 1960.<sup>109</sup> Increasing trends in specific activity rates for married women (and for single, widowed, divorced, and separated women as well) have been observed even in some countries where the total female activity rate has been sagging during recent decades. This paradox is explained by changes in the marital status composition of the female population<sup>110</sup>—especially those brought about by the “marriage boom” during the aftermath of the Second World War in many industrialized countries. The spate of early marriages as well as the rise in marital fertility rates at that time depressed activity rates of young women in some countries and prevented substantial increases which might otherwise have occurred elsewhere.

61. During the first half of the present century, the secular trend of decreasing birth rates in industrialized countries helped to smooth the way for increasing economic activity by married women. Growing freedom from maternal cares was only a minor factor, though, in causing increases in women's activity rates recorded in the United States of America. More important factors were the expanding demand for labour in occupations regarded as suitable for women and changing attitudes and aspirations which predisposed more and more

married women to seek paid jobs when they could spare the time from domestic duties.<sup>111</sup>

62. According to one hypothesis, changes in the activity rates of certain sex-age groups in the population tend to induce compensating changes in other groups, so that the extent of labour force participation on the part of the whole population of employable ages is not greatly affected. This might imply that rising activity rates for women in countries like the United States of America have been caused partly by declining activity rates for males under 20 and over 55 years of age, leaving gaps in the labour force which women came in to fill or, that women crowding into the labour force added impetus to the forces which were pushing older men out and delaying the entrance of young people. Support for this hypothesis has been found in observations of relative stability over long time-periods in age-standardized activity rates for the two sexes in a number of industrialized countries.<sup>112</sup> However, as the findings reviewed above indicate, such a complementary relationship between trends of male and female activity rates does not appear to be a universal rule.

63. Among developing countries, a long-range decreasing trend in female activity rates has been traced in India back to the beginning of the present century, and has been interpreted primarily as a result of industrialization, urbanization, and limited opportunities for women's employment in urban industries.<sup>113</sup> In Egypt, a steep downward trend in female rates (as well as male rates for age groups at the two extremes of the working-life span) since the census of 1927 has been attributed to failure of the growth of employment opportunities in agriculture to keep pace with the growth of the rural population.<sup>114</sup> In Jamaica, where the female rates have been decreasing since the late nineteenth century, the trend has been considered partly as a reflection of the gradual transformation of customs inherited from the former slave-labour régime.<sup>115</sup> In West Malaysia, activity rates among Malay and Indian women fell between 1947 and 1957 as a result of increasing urbanization.<sup>116</sup> In the Republic of Korea, on the other hand, a study of the results of the censuses since 1930 failed to reveal any consistent long-range trend of female activity rates; and the same observation applies to Puerto Rico, when women employed in home needlework are excluded from the labour force totals.<sup>117</sup> The trend has been upward, in a number of Latin American countries such as

<sup>106</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), table 5.3. In the United Kingdom, an increase in the proportion of married women and of older women during the first half of the twentieth century depressed the total female activity rate, but if allowance is made for these factors, labour force participation by women has shown a significant long-term rise. Beckerman, “The future growth of national product” (1965), p. 84.

<sup>107</sup> Leser, “Trends in women's ...” (1958). See also Bourgeois-Pichat, “Perspectives sur la population active européenne” (1953); Long, *The Labor Force under Changing* ... (1958).

<sup>108</sup> Smuts, “The female labor force ...” (1960); Jaffe, “Trends in the participation ...” (1956).

<sup>109</sup> Percentages calculated from data shown in Durand, *The Labor Force in the United States* ... (1948), p. 216, and United Nations, *Demographic Yearbook, 1964* ... (1965), table 14. See also Oppenheimer, *The Female Labor Force* ... (1970), pp. 19-20.

<sup>110</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), p. 48 and table 6.5. See the estimates of effects of marital status changes between 1920 and 1950 on the trend of female activity rates for two age groups in five countries. *Ibid.*, p. 48.

<sup>111</sup> Durand, *The Labor Force in the United States* ... (1948), p. 59.

<sup>112</sup> Long, *The Labor Force under Changing* ... (1958), pp. 23-24 and chaps. 13 and 14.

<sup>113</sup> Sinha, “Dynamics of female participation ...” (1965).

<sup>114</sup> Seklani, “Population active et structures économiques de l'Égypte” (1962).

<sup>115</sup> Roberts, *The Population of Jamaica* (1957), pp. 93, 95.

<sup>116</sup> Jones, “Female participation in the labour force ...” (1965), pp. 65, 67, 82.

<sup>117</sup> Kim and Lee, “The Korean labor force ...” (1966); Jaffe, *People, Jobs, and Economic Development* ... (1959), p. 76.

TABLE IX.8. TOTAL MALE ACTIVITY RATES IN MODEL STABLE POPULATIONS WITH VARIOUS LEVELS OF FERTILITY AND MORTALITY AND TWO SCHEDULES OF MALE AGE-SPECIFIC ACTIVITY RATES

Gross reproduction rate	30 years expectation of life at birth		50 years expectation of life at birth		70 years expectation of life at birth	
	A	B	A	B	A	B
<i>Male labour force as percentage of total male population</i>						
4.0 .....	52	46	49	43	46	40
3.0 .....	58	52	55	49	52	46
2.0 .....	66	60	63	57	61	54
1.0 .....	78	71	76	67	74	65

SOURCE: United Nations, *The Aging of Populations* ... (1956), table 34a.

Note: Column A: Average age-specific activity rates for agricultural countries.

Column B: Average age-specific activity rates for industrialized countries.

Costa Rica, El Salvador, Mexico, Nicaragua and Panama, and in Pakistan, since 1950.<sup>118</sup>

## B. Demographic and economic factors in labour force size and growth

### 1. THE ROLES OF FERTILITY, MORTALITY, POPULATION AGE STRUCTURE, AND AGE-SPECIFIC ACTIVITY RATES

64. As mentioned above, the age structure of the population, as determined by fertility, mortality, and migration, plays a leading role in determining the size of the labour force. The sex composition of the population in potentially employable age groups is also pertinent, but the sex ratio ordinarily varies too little to be a major factor, except where sex-selective migration occurs on a large scale or war losses create a severe imbalance between the numbers of the sexes.<sup>119</sup> The relative effects of age structure and age-specific activity rates in determining the proportion of workers in a population are examined in the present section, and the role of migration is discussed in the following section.

65. As shown in chapter VIII, the share of working-age adults in the population is generally smaller in economically less developed than in more developed countries because of higher fertility making for proportionately larger numbers of children in the former countries. On this account, with equal age-specific activity rates, the less developed countries would generally have a smaller labour force in proportion to population, and a higher dependency ratio.

66. The eventual effects of different levels of demographic variables and of age-specific activity rates are difficult to study in actual populations. However, the extension of stable population analysis to the economi-

cally active population provides a convenient tool for assessing the long-term effects on total activity rates of (a) varying fertility and mortality rates, operating through the age structure, and of (b) different age-specific activity rates. The results of such an analysis for the male population, summarized in table IX.8, bring out the importance of fertility as a primary determinant of the proportion between the labour force and population in the long run. Under given conditions of mortality and age-specific activity rates, when the gross reproduction rate drops from 3.0 to 1.0, the total male activity rate in these models increases by some 20 per cent of the male population. Lowering mortality rates (that is, increasing life expectation) with the other factors constant has an opposite but less pronounced effect. Under given conditions of mortality and fertility, the ratio of the male labour force to the male population would be appreciably reduced by a change from the pattern of age-specific activity rates typical of agricultural countries to that typical of industrialized countries. However, the effect of changing activity rates, even when combined with the effect produced by declining mortality, would be outweighed by that of a large decrease in fertility.

67. As the stable models represent the structure and dynamics of the population which would eventually result from a continuation of given rates of fertility, mortality and participation in economic activities, they do not show the shorter-run effects of changes in these rates. The shorter-run effects, which may be of great importance in a country undergoing a demographic and economic transition, can be studied by means of the kind of projections illustrated with reference to Brazil in table IX.9. These show how hypothetical changes in fertility, mortality, and age-specific male activity rates, operating separately and in combinations, would affect the total male activity rate and the rate of growth of Brazil's male labour force during a 25-year period. The specific activity rates are assumed to shift from those recorded in Brazil to those recorded in Sweden at the 1950 censuses, thus decreasing in the age groups under 20 and over 55 years by amounts similar, on the whole, to the differences between average male rates for agricultural and industrialized countries. It can be seen that such a change in specific activity rates, under any of the given assumptions as to fertility and mortality trends, makes for an appreciable reduction both of the total

<sup>118</sup> United Nations, *Demographic Yearbook*, 1956 ... (1957), table 10; and ———, 1964 ... (1965), table 8. See also van den Boomen, "Population and labour force growth ..." (1967); You, "Growth and structure of the labour force ..." (1963); Bean, "Utilisation of human resources ..." (1968), pp. 402-403.

<sup>119</sup> On the effects of Second World War losses of male population upon post-war labour force characteristics and trends see United Nations, Economic Commission for Europe, *Economic Survey of Europe* ... (1950), pp. 208-212 and appendix A; Baum, *Population, Manpower and Economic* ... (1961), pp. 24-26; Lungu, "Population and labour force ..." (1965), p. 136; Ypsilantis, *The Labor Force of Czechoslovakia* (1960); Hunter, "Cyclical variations in ..." (1963).

TABLE IX.9. PROJECTIONS OF MALE LABOUR FORCE OF BRAZIL, 1950-1955 TO 1975-1980

1950-1955 estimates	Assumption as to trend of age-specific activity rates	1975-1980 projections		
		A: Constant mortality and fertility	B: Declining mortality, constant fertility	C: Declining mortality and fertility
<i>Total male activity rate (male labour force as percentage of total male population)</i>				
56.3 .....	Constant specific activity rates	56.5	55.0	59.5
	Changing specific activity rates	51.7	50.1	54.8
<i>Annual rate of growth per 1,000 of male labour force</i>				
23.4 .....	Constant specific activity rates	22.2	28.2	22.6
	Changing specific activity rates	19.6	24.6	20.3

*Note:* Definition of assumptions: decline of mortality rates according to the assumption adopted for projections of Brazil's population in United Nations, *The Population of South America 1950-1980* (1955), implying rise of expectation of life at birth from 44.1 years in 1950-1955 to 56.6 years in 1975-1980. Decline of fertility according to the assumption of the "low" variant of the same projections, implying decrease of the sex-age-adjusted birth rate from 43.0 in 1950-1955 to 31.6 in 1975-1980. Change of male age-specific activity rates from those recorded in Brazil at the 1950 census, for 1950-1955, to those recorded in the 1950 census of Sweden, for 1975-1980.

male activity rate and the rate of growth of the male labour force. This would suffice, in Brazil's case, to counterbalance the upward pressure on the total male activity rate resulting from a considerable decline of fertility, or to prevent a great acceleration of the male labour force growth rate resulting from a decline of mortality with fertility remaining constant.<sup>120</sup> While the results are presented here in terms of activity rates, the effects of changes in any of the factors on labour force size are obviously also of importance.

68. In view of the possible interdependence of factors, all attempts to isolate the effects of particular factors are made with reservations. For example, it is likely that some of the developments influential in decreasing mortality and fertility rates in Western countries during the course of their industrialization also contributed to the decreasing trends in male activity rates in the youngest and oldest age groups. On the other hand, growth and changing structure of the population may influence specific activity rates. For example, it has been suggested that in less developed countries, the high proportion of children in the population may be one factor tending to force young people to go to work early and men to continue working at an advanced age so as to provide for the dependent children.<sup>121</sup> With regard to industrialized countries, it has been suggested that if the increasing proportion of old people in the population continues, the

time may come when the trend toward earlier retirement will be reversed as a matter of economic necessity.<sup>122</sup>

69. Subject to reservations regarding interdependence, the method of standardization can be used to estimate how much of the difference between crude activity rates in two populations, or how much of the change in the rate for a given population during a period of time, is attributable to changes in population composition and how much to changes in specific activity rates.<sup>123</sup> For example, in the United Nations study of data from censuses taken around 1950, the following averages of crude male activity rates, actual and standardized for age composition of the population, were obtained:<sup>124</sup>

	Actual rates (1)	Age- standardized rates (2)	Difference (1)-(2)
Industrialized countries . . . .	62.2	60.5	+ 1.7
Semi-industrialized countries . . . .	57.8	62.8	- 5.0
Agricultural countries . . . . .	55.2	65.1	- 9.9

The effects of differences in male age-specific activity rates among the three groups of countries are measured by comparing the age-standardized rates (which show how the crude activity rates would have differed if the age composition of the population had been the same in all three groups). The difference between the actual and age-standardized rates measures the effect of differences in the population age structure, bringing out the strong

<sup>120</sup> It should be noted that these calculations are not perfectly comparable with the example of long-run changes either in activity or fertility or mortality rates studied in the preceding paragraph. The results of an analysis along similar lines involving projections of the combined population of seven developing countries is presented in Seklani, "Variations de la structure par âge ..." (1961). Coale and Hoover, *Population Growth and Economic Development* ... (1958), chap. 15, present an analysis by means of projections of the effect of a possible decline of fertility upon the growth of the labour force and the dependency ratio in India.

<sup>121</sup> Durand, "Population structure as a factor ..." (1953).

<sup>122</sup> Daric, *Viellissement de la population* ... (1948).

<sup>123</sup> The methodology is discussed and illustrated in Tamasy, "A munkaerő vizsgálatának ..." (1959). The problem of treating the interaction has often been neglected; on this problem, see Durand, *The Labor Force in the United States* ... (1948), pp. 219-220.

<sup>124</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), table 3.4. The age composition of the Netherlands population as of 1947 was used as a standard in these calculations. Different values would be obtained by the choice of different standards.



negative effect of this factor in the agricultural countries (where fertility is high) and its lesser effect in semi-industrialized countries (where the average level of fertility is somewhat lower).<sup>125</sup>

70. In industrialized countries, the long-range trend of decreasing fertility in the past has had a strong tendency to raise crude activity rates or at least to cushion the effects of other factors tending to lower them. For example, in the United States, the decrease in the proportion of children under 14 years of age in the population, due to declining fertility, would have raised the crude activity rate between 1920 and 1940 by 3.5 per cent of the population if other factors had remained equal. Actually, the effect of other factors was to limit the increase of the rate to 2 per cent.<sup>126</sup> Japan derived a like advantage from the sharp decrease of fertility which occurred in that country more recently. This was the cause of an increase in the Japanese male activity rate from 56.0 per cent of the male population in 1940 to 58.5 per cent in 1960; without any change in the age structure of the population, the rate would have decreased by 3.2 per cent.<sup>127</sup>

71. The post war "baby boom" in Western industrialized countries caused a temporary reversal of the trend in their population age structure which tended to depress activity rates. On this account, the increase of the labour force (both sexes) between 1954 and 1964 in France and the Federal Republic of Germany was only about one half as large as it would have been with an unchanged age structure, while age structure changes detracted about one third from the labour force increase in the United States and about one fifth in the United Kingdom and Canada.<sup>128</sup> Recently, the trend has turned again as the birth rates in these countries have subsided and children born in the years of peak fertility have begun to come into the labour force. Eastern European countries and the USSR also experienced a temporary decrease in the proportion of population in certain working ages during the late 1950s as a result of the war-time decrease and post-war recovery of their birth rates.<sup>129</sup>

72. Shifts in the age distribution of the adult population also may influence the labour force trend, but their effects have generally been much less important than the effects of the changing ratios between adult and child population. In France, where the male labour force in proportion to the male population 15 years of age and over decreased from 90.2 per cent in 1911 to 82.2 per cent in 1954, only 0.4 points of this decrease

could be attributed to the increasing proportion of elderly men and other changes in age distribution of the population over 15 years of age. Findings with regard to the trends in other industrialized countries are similar.<sup>130</sup>

73. The age structure of the adult population has more to do with the age composition of the labour force than it does with the crude activity rate. Aging of population in industrialized countries has resulted in a swelling proportion of elderly workers in the labour force in spite of decreasing activity rates for males in the higher age brackets. In the United States of America, for example, the median age of males in the labour force increased from 33.3 years in 1890 to 38.5 in 1950 and the median for females increased even more, from 24.3 to 35.9 years.<sup>131</sup> The question of effects of aging of the labour force upon productive efficiency has engaged the attention of many writers, but the theoretical discussion and results of such empirical research as has been attempted pertaining to this question are inconclusive.<sup>132</sup> It is clear that aging does tend to diminish spatial and occupational mobility and on this account the increasing proportion of elderly workers may aggravate problems of structural unemployment; on the other hand, it may diminish the unemployment associated with absorption of young people into the labour force.<sup>133</sup>

74. In the less developed countries, where the birth rates have remained, in general, on relatively high levels, population age structures as a rule have undergone no very great changes. Appreciable decreases in the proportions of the adult population have been recorded recently, in some of these countries, however, probably as a result of decreasing mortality rates and possibly some increases in fertility. In India, for example, according to the census returns, the 15 to 59 year age group shrank from 60.2 per cent of the total population in 1931 to 57.1 per cent in 1951 and 54.4 per cent in 1961. This factor could account for about one half of the decrease in India's crude activity rate from 43.3 per cent in 1931 to 39.1 per cent in 1951. The change in population age structure also would have reduced the crude activity rate to 37.3 per cent by 1961 if the 1951 ratio of labour force to population 15-59 years of age had applied

<sup>130</sup> United Nations, *Demographic Aspects of Manpower* ... (1962), tables 3.5 and 5.3; Long, *The Labor Force under Changing* ... (1958), chap. 8.

<sup>131</sup> Jaffe and Stewart, *Manpower Resources and Utilization* ... (1951), p. 165. On the long-range pre-war trend in France, see Desmarest, *La politique de la main-d'œuvre* ... (1946), chap. 1; in Belgium, Dereymaeker, "Interaction entre l'économie et la population ..." (1946); in Switzerland, Renggli, "Die wirtschaftlichen Auswirkungen ..." (1938).

<sup>132</sup> For examples of diverse views and conjectures on this question, see: Létinier, "Vue d'ensemble des conséquences ..." (1948); Daric, *Vieillessement de la population* ... (1948); Myrdal, *Population: A Problem for Democracy* (1962); Robbins, "Notes on some probable consequences ..." (1929), p. 75; Notestein *et al.*, *The Future Population of Europe* ... (1944), p. 130; Höök, *Befolkningsutveckling och arbetskraftsförsörjning* (1952), pp. 113-114; United Kingdom, Royal Commission on Population, *Report* ... (1949), p. 114; Spengler, "Some effects of changes ..." (1947); Stassart, *Les avantages et les inconvénients* ... (1965); Michałkiewicz, *Przydatność zawodowa robotników* ... (1962). See also chapter VIII, section D and chapter XIII, section D.

<sup>133</sup> See sections D and E.

<sup>125</sup> The small positive difference for industrialized countries reflects a difference between the average age structure for this group of countries and that of the Netherlands, which was taken as the standard.

<sup>126</sup> Durand, *The Labor Force in the United States* ... (1948), p. 61.

<sup>127</sup> Calculated by standardization with the data shown in Japan, Bureau of Statistics, *1960 Population Census* ... (1964), part 1, pp. 138-141, 226-227. See also Kono, "Jinkogaku-teki yoin no ..." (1959).

<sup>128</sup> Bloch and Praderie, *La population active* ... (1966).

<sup>129</sup> Lungu, "Population and labour force ..." (1965), p. 136. See also Pod'yachikh, *Naselenie SSSR* (1961), p. 29; and Gozulov and Grigoryants, *Narodonaselenie SSSR* ... (1969), pp. 66-67.



in 1961.<sup>134</sup> In Egypt, the percentage of population in the 15 to 64-year age group is estimated to have decreased from 57.8 in 1947 to 54.1 in 1957; in this case, slightly more than one half of the decrease of the recorded crude activity rate (from about 35 to 30 per cent of the total population) could be attributed to the change in age structure.<sup>135</sup> For the developing regions as a whole, Ypsilantis found that both changes in population age structure and, to a lesser extent, changes in age-specific activity rates, led to a decline in the crude male activity rate from about 58 to 55 per cent between 1950 and 1960.<sup>136</sup>

75. The negative effect of falling mortality rates upon the proportion of the working-age population in less developed countries may be offset by positive effects of improving conditions of health upon specific activity rates as well as upon the productive capacity of the labour force. Losses of potential labour supply and impairment of productive efficiency due to illness have been emphasized as factors in the economic problems of less developed countries.<sup>137</sup> For example, according to one estimate, while 3 million people in these countries might die of malaria annually, 300 million might be suffering from the disease, with an annual loss of 20 to 40 working days per worker afflicted.<sup>138</sup> In the Philippines, malaria was found to be largely responsible for a 35 per cent rate of absenteeism among workers in a sample of enterprises; the rate dropped to the range of 2 to 4 per cent after an anti-malaria campaign.<sup>139</sup> However, in a study in the hill region of Mysore State, India, activity rates and measures of the extent of employment during a year were found to be lower in villages where large-scale anti-malarial operations had been conducted than where they had not; thus it was apparent that any positive effect of the anti-malarial campaigns in this area upon labour supply and employment had been relatively slight and had been more than offset by other differences in the circumstances of the two groups of villages.<sup>140</sup>

<sup>134</sup> Calculations based on the figures given by Kalra, "A note on working force ..." (1962), table 10. According to Kalra's figures, the ratio of labour force to population in this age group rose from 68.5 per cent in 1951 to 79.0 per cent in 1961 (approximately the level of 1901-1921); but as noted above, the reality of this change is dubious.

<sup>135</sup> Seklani, "Population active et structures économiques de l'Égypte" (1962). For the trend in Chile, see Herrick, "Efectos económicos de los cambios ..." (1964); in the West Indies, Harewood, "Employment in Grenada in 1960" (1966).

<sup>136</sup> Ypsilantis, "World and regional estimates ..." (1969), p. 46.

<sup>137</sup> For example, see Swaroop, "Study of morbidity ..." (1959); Belshaw, *Population Growth and ...* (1956). Correa, *The Economics of Human Resources* (1963), pp. 43-45, gives estimates of the reduction of "capacity to work" as a result of sickness in various countries, based on a simplified assumption with regard to bed-disability days. In view of reservations with regard to the comparability of available statistical measures of morbidity in various countries, it is difficult to determine whether the prevalence and incidence of disabling diseases are greater or less in less developed than in more developed countries. See India, Cabinet Secretariat, *Report on Morbidity* (1961), pp. 5-7, 28-29.

<sup>138</sup> Swaroop, "Study of morbidity ..." (1959), p. 543.

<sup>139</sup> Belshaw, "Population growth and ..." (1956), p. 135.

<sup>140</sup> United Nations, *The Mysore Population Study ...* (1961), chap. 15.

## 2. THE ROLE OF MIGRATION

76. International migration has often played an important role in improving the balance between the growth of labour supply and demand. Within national boundaries, internal migration takes a larger role, commonly furnishing the major part of labour force increases in cities and regions of rapid economic expansion and serving as an indispensable medium for the spatial redistribution of manpower which the evolution of modern industrial economies demands. Effects of migration on the trends of labour supply in certain occupations and industries are likely to be more important than its influence on the growth of the labour force as a whole.

77. Immigration generally contributes proportionately more to the growth of the labour force than to the growth of population (and emigration detracts proportionately more) on account of the characteristically large proportion of adults of working age among migrants. Thus the short-run effect of migration is generally to raise the crude activity rate in areas of immigration and to lower it in areas of emigration.<sup>141</sup> The longer-run effects are more diffused, especially when the volume of migration varies over time.<sup>142</sup> The advantage for a developed community in recruiting labour supply by immigration has been demonstrated by a calculation which showed that a "stock" of 100 males in the population concerned yielded a gross annual increment of 14 and net increment of 7 to the male labour force, whereas a "flow" of 100 immigrants provided a net increment of some 40 male workers.<sup>143</sup> The effects of migration upon the growth of the labour force and the crude activity rate are conditioned, of course, by the specific activity rates of migrants in various sex-age groups. These may be either higher or lower than the specific activity rates in the non-migrant population, depending on such factors as the proportion of migrants who are accompanied by dependants, the proportion of students among young migrants and retirement patterns among older migrants and any handicaps or advantages of migrants in competing for employment in the area of immigration.<sup>144</sup>

<sup>141</sup> For example, in Puerto Rico, where the male activity rate dropped from 70.4 per cent of the male population 14 years of age and over in 1950 to 65.2 per cent in 1960, it has been estimated that nearly two-thirds of the change could be attributed to net emigration. See Stone, "Net migration and the sex-age ..." (1965), p. 115. Effects of migration have not often been calculated in these terms; a more common practice has been to calculate effects on the proportions of "working age" and "dependent age" groups of the population without reference to activity rates; for example, see Organization for European Economic Cooperation, Manpower Committee, *Demographic Trends in Western Europe ...* (1956), pp. 43-45; Spengler, "Effects produced in receiving ..." (1958), pp. 24-25.

<sup>142</sup> United Nations, *The Aging of Populations ...* (1956), pp. 48-49.

<sup>143</sup> Sadie, "The white labour force ..." (1960), p. 101.

<sup>144</sup> In Israel, the handicaps of new immigrants in education and skills have been reflected in low specific activity rates as well as high unemployment rates, in comparison with the rates of older immigrants and Israel-born population; see Muhsam, "Labour force characteristics ..." (1961), pp. 71-86; Hovne, *The Labor Force in Israel* (1961). On differences between activity rates of interstate migrants and non-migrants in the United States, see Miller, "Migration differentials ..." (1966). On effects of internal migration and population redistribution upon activity rates in Puerto Rico, see Stone, "Population redistribution and economic ..." (1965).

78. The trans-Atlantic migration from Europe, at its height in the late nineteenth and early twentieth centuries, made major contributions to the expansion of labour supply in the United States of America and other countries in the New World. Foreign-born workers made up more than one third of the United States labour force during the four decades preceding the First World War, and it has been found that the volume of the migratory inflow responded positively to variations in demand for labour.<sup>145</sup> The movement also had an appreciable moderating effect on labour force growth in the European homelands, where the rate of natural increase was speeding up. Around 1910, at least one out of every fifteen workers born in Europe (including the present area of the USSR) was living overseas.

79. Although the volume of intercontinental emigration from Europe has diminished considerably in more recent times, it still played a part which was by no means negligible during the period following the Second World War, in keeping up the expansion of labour supply in the United States and other receiving countries in the face of slackening natural increase and declining male activity rates. Net immigration furnished one fifth of the increase of the labour force between 1954 and 1964 in the United States of America and more than one fourth in Canada.<sup>146</sup> In Australia, without immigration, the available male labour force would have grown during 1947-1957 by less than one half of 1 per cent per annum; immigration brought the rate up to nearly 2 per cent.<sup>147</sup> Within Europe, post-war intracontinental movements of workers have been even more important in relative terms, in supplying the manpower needs of the leading industrial countries and easing labour surpluses in less developed areas, particularly the Mediterranean countries. Immigration into France and the Federal Republic of Germany prevented decreases in the labour force which would otherwise have been expected in those countries during 1954-1964. In Italy, net emigration of workers during this period amounted to about 3 per cent of the 1954 labour force, exceeding the growth due to natural increase and changes of activity rates and thus causing Italy's labour force to decrease by about 1.2 per cent during the ten-year interval.<sup>148</sup> Greece, Spain, Turkey, and Yugoslavia also sent out considerable numbers of migrant workers during recent years (see chapter VII, section A).

80. Seasonal and other temporary movements of workers, as well as migration of a more permanent character, are important in meeting labour requirements in many countries. In European countries, work permits of limited duration are used as a device for regulating the flow of such temporary migrant labour according to the needs of the economy. In 1963, there were approximately 2,700,000 temporary migrants working in Western European countries, 800,000 of them being employed in

the Federal Republic of Germany. In Switzerland, they constituted one quarter of the labour force.<sup>149</sup>

81. In Africa, migration of labour within and across national boundaries, much of it having a seasonal character, is an important feature of economic life. Among others, the cocoa plantations of Ghana, the coffee farms of Uganda, the sisal plantations of the United Republic of Tanzania, and the gold mines of South Africa depend on temporary migrants from subsistence-agricultural areas for a major share of their labour supply.<sup>150</sup> The migratory labour system is estimated to involve an annual flow of 2,500,000 or more workers in Africa. In some instances, it depletes male manpower in the areas of emigration by almost 50 per cent during the intermittent spells of wage-labour employment, and wives and children are left the task of caring for the crops.<sup>151</sup> Here, as in the early period of Japanese industrialization and in the case of migrants to the cities in India who return to their villages periodically, the workers remain uncommitted to stable industrial employment.<sup>152</sup>

82. Migration from rural areas to cities—the dominant type of internal migration in most countries—can be viewed as the counterpart in spatial movement of population, for the shift of manpower from agricultural to non-agricultural industries which is an essential feature of the evolution of modern industrial societies. (It is true that this shift does not depend entirely on migration; within limits, it may also be accomplished by the development of non-agricultural economic activities within rural communities or by rural residents commuting to urban jobs.)<sup>153</sup> In terms of labour supply and demand, the “push” factors motivating rural-to-urban migration are identified with demographic pressures generated by natural increase of the rural labour force and technological changes tending to reduce or limit the growth of manpower requirements in agriculture; while the “pull” factors are linked with the growth of demand for labour in the urban-industrial sector.<sup>154</sup> In more developed countries, it is generally recognized that both “push” and “pull” factors have been influential in governing the flow of such migration, although their relative importance has

<sup>149</sup> International Labour Office, “Foreign workers in Switzerland” (1963), pp. 133-134. See also Mayer, “The impact of postwar immigration . . .” (1966).

<sup>150</sup> Davison, “Labour migration in tropical Africa” (1957). See also chapter VII, section A.

<sup>151</sup> South Africa, Commission for the Socio-Economic Development of the Bantu Areas, *Summary . . .* (1955), chap. 23; Sadie, “Manpower resources of Africa” (1963), pp. 276-277.

<sup>152</sup> Myers, “India” (1959), p. 31; Scalapino, “Japan” (1959), p. 96; Bhavé, “The nature of . . .” (1956), pp. 182-183.

<sup>153</sup> For example, see Hoffman, “Employment problems of regional . . .” (1964); Frenkel, “Wychodźstwo zawodowe . . .” (1966).

<sup>154</sup> In addition to the factors of labour supply and demand, and the related differences of earnings in the rural and urban sectors, non-economic factors may also be involved in the “push” and “pull” forces; for example, see Fisk, “The mobility of rural labor . . .” (1961).

<sup>145</sup> Rubin, “The United States” (1958), pp. 138-139.

<sup>146</sup> Bloch and Praderie, *La population active . . .* (1966). In regard to Canada, see also Timlin, “Canada” (1958), table 10, p. 160.

<sup>147</sup> Brown, “The Australian male work force” (1959), pp. 89-90.

<sup>148</sup> Bloch and Praderie, *La population active . . .* (1966). See also Parenti, “Italy” (1958), pp. 85-95; Lutz, *Italy . . .* (1962), pp. 144-152.

varied in different countries and periods of time.<sup>155</sup> In less developed countries during recent times, some observers hold that the rising tide of cityward migration has been caused, in most cases, chiefly or wholly by the "push" of a swelling labour surplus in agriculture; whatever "pull" the urban-industrial sector could exert is viewed as having been too weak to influence the volume of the movement significantly.<sup>156</sup>

83. Migration from rural to urban places may lower the total activity rate for the country as a whole, since certain migrants who previously worked in agriculture are less likely to be employed in the towns. The "migration loss" in the labour force resulting from the exodus from agriculture between 1930 and 1960 in Poland was calculated at about 20 per cent of the number of migrants. While the loss was negligible for men in the prime working ages, it was substantial for women of all ages, as well as for boys under 18 years and men 60 years and over.<sup>157</sup> While the general tendency is for rural-urban migration to lower activity rates for males, it may result in an increase in female activity rates in those countries where relatively few women are employed in agriculture.

### 3. EFFECTS OF INCOME, EDUCATION AND EMPLOYMENT CONDITIONS

84. Levels of income and conditions of employment—that is, the relative scarcity or plenty of employment opportunities, including opportunities for self-employment and unpaid family work as well as paid employment—affect the dimensions and growth of the labour force through influences on the growth and structure of population and on age-specific activity rates. The patterns of these influences are varied and the net effect on the labour force of rising income and expanding employment opportunities may be positive, negative, or nearly neutral according to the circumstances.

85. The influences of economic factors upon the components of population change have been considered in other chapters. In summary, it appears that only through migration do high income and plentiful employment opportunities consistently tend to promote growth in both the population and the labour force, and opposite conditions consistently have a contrary effect. Through migration, these economic factors commonly play a dominant role in the redistribution of the labour force among parts of countries, but ordinarily a less important part in shaping the trends of national labour force growth.

<sup>155</sup> For example, see Lasorsa, "Notes sur les mouvements naturels ..." (1963); Frenkel, *Zatrudnienie w rolnictwie polskim* ... (1968). On occasion, the prevailing direction of the migration from rural to urban areas has been reversed. See Baum, *Population, Manpower and Economic* ... (1961), p. 34.

<sup>156</sup> For example, see United Nations, Economic Commission for Asia and the Far East, *Economic Bulletin for Asia* ... (1957), p. 34; ———, Economic Commission for Latin America, "The demographic situation ..." (1961), pp. 31-32; Desmukh, "Delhi: a study of floating migration" (1956), p. 145; Hájek, "Územní zřetel při zvyšování ..." (1963).

<sup>157</sup> Frenkel, "Wychodźstwo zawodowe ..." (1966), p. 101. For a discussion of employment losses resulting from migration from agriculture in Bulgaria, see Minkov, "Vstreshnite migracionni procesi ..." (1965); and his "Opit za opredeljane ..." (1967).

To the extent that mortality decline is associated with rising income and improving employment conditions, the effect on the numbers of workers would be positive, although in relative terms, the ratio of workers to dependants might decrease, since the effect of mortality decline on age structure is generally to raise the proportion of young children in the population. Variations in mortality in the modern world, however, have come increasingly under the domination of technological developments only loosely connected with economic factors. Regarding fertility, although its recent short-term variations in industrialized countries have been related positively with short-term changes in income and employment opportunities, an opposite relationship is apparent in long-range past trends in these countries, while fertility in less developed countries has shown little sensitivity to varying economic conditions. The main effect of a change in the birth rate upon growth of the labour force is, of course, postponed some 15 or 20 years, while any immediate effect through the influence of women's maternal responsibilities upon their activity rates works in the opposite direction.

86. The international differences and secular trends of specific activity rates, reviewed in section A, exhibit a mixed picture of associations with variations in income. The associations are negative as far as activity rates of males at the two ends of the span of working ages are concerned,<sup>158</sup> sometimes negative and sometimes positive in the case of women's activity rates, while there is little variation in activity rates of men in the central age groups, who provide most of the labour supply in most countries. In industrialized countries, as income has risen in the course of time, contributions to labour supply per head of the male population have been reduced by the shortening of weekly hours of work as well as the decreasing activity rates for males in the youngest and eldest age groups. Women's contributions also have decreased in some industrialized countries while they have increased in others. Present information does not warrant generalizations in these respects with regard to less developed agricultural countries. For associations between the variations in employment conditions and those of activity rates and labour supply contributions per worker, it is more difficult to get a broad view because of the limitations of scope and comparability of employment, unemployment, and underemployment measures.

87. Some attempts have been made to get a better understanding of the economic determinants of activity rates by studying their correlations with income, unemployment, and other variables in annual time-series and cross-sectional data for different areas and population groups within countries. Data on activity rates of family members classified by income of the household head or the family, and of married women according to income or employment status of their husbands, have also been used for this purpose. Research along these lines has been mostly limited to the industrialized market econo-

<sup>158</sup> However, within a group of eleven industrialized countries, differences in male activity rates at ages over 65 years were not found to be correlated significantly with income levels; see Long, *The Labor Force under Changing* ... (1958), p. 7.

mies.<sup>159</sup> In subsistence economies where no labour market in a strict sense exists and in the centrally planned economies where wages are controlled, the relationship of income to activity rates is likely to be of less importance and has not received much study.

88. In studies of cross-sectional data for the United States, Bowen and Finegan found male activity rates to be associated positively, on the whole, with the incomes of employed males, although the implied effect of the income level upon activity rates is relatively slight for males in the central age groups and follows an irregular pattern for younger and older age groups.<sup>160</sup> Married women's activity rates, likewise, have been found to be associated positively with incomes of employed females, but negatively with those of employed married men. For example, a multiple regression analysis of 1960 census data for standard metropolitan areas yielded a coefficient of +.42 for the regression of married women's activity rates upon the median income of females employed 50 weeks or more during 1959 (implying that an increase of one per cent in women's earnings would raise their activity rate by about four tenths of one per cent), while the coefficient was -.63 for the regression upon median income of married male family heads.<sup>161</sup> The latter finding is consistent with cross-sectional data on variations in married women's activity rates classified according to their husbands' incomes. For example, a United States population survey as of March 1960 showed activity rates of married women 20-44 years of age decreasing as their husbands' incomes rose, from 41 per cent for

women whose husbands had less than \$2,000 in income in 1959 down to 15 per cent for those whose husbands had \$10,000 or more.<sup>162</sup> A negative association between activity rates of women and the incomes of men is also found in other industrialized countries,<sup>163</sup> and in less developed countries as well. In India, for example, a study of 1961 census data for the thirteen states showed a significant negative correlation between female activity rates in the rural population and average income per male agricultural worker.<sup>164</sup>

89. According to one hypothesis, an increase in income exerts two contrary influences upon the propensity to be employed: an "income effect" which is negative because higher family incomes mean that family members can afford to devote less time to income-producing work and more to leisure and other activities; and a "substitution effect" which is positive because higher income from employment raises the "opportunity cost" of leisure and other activities. It is argued that while the "income effect" is generally dominant in the case of men, the "substitution effect" may be stronger in the case of women. This hypothesis finds empirical support in the positive association observed between married women's activity rates and the levels of women's earnings, and the negative association between their activity rates and the incomes of their husbands. This has been suggested as an explanation for the divergent secular trends of female and male activity rates accompanying the rising trend of income in the United States of America.<sup>165</sup> Alternative explanations would give more weight to factors other than the income trend which have influenced the trends of male and female activity rates in this country.

90. Educational attainment has sometimes been used as an indicator of socio-economic status, or earning power of workers, in studying the factors which affect female activity rates. Analyses for Canada, based on 1961 census data, show that better educated women were more likely to be in the labour force than the less educated, and that this was true for the entire female population, including married women, whether or not they had children. While the activity rates of married women were thus found to be positively associated with educational attainment, they were negatively associated with the income of the husband, but of the two factors, education appeared to exert a stronger influence.<sup>166</sup>

<sup>159</sup> Pioneering studies in this field in the United States were those of Douglas, *The Theory of Wages* (1934); and Schoenberg and Douglas, "Studies in the supply ..." (1937). Among the most important recent studies are those of Bowen and Finegan, *The Economics of Labor Force Participation* (1969); Cain, *Married Women in the Labor Force* (1966); Finegan, "Hours of work in the United States ..." (1962); Hansen, "The cyclical sensitivity ..." (1961); Long, *The Labor Force under Changing ...* (1958); Mincer, "Labor force participation of married women ..." (1962); Morgan et al., *Income and Welfare in the United States* (1962); Rosett, "Working wives ..." (1958); Strand and Dernburg, "Cyclical variation in civilian ..." (1964). With more particular reference to the effects of employment conditions upon activity rates, see Bowen and Finegan, "Labor force participation ..." (1965); Mincer, "Labor-force participation and unemployment ..." (1966); Tella, "The relation of labor ..." (1964); and his "Labor force sensitivity ..." (1965). On variations in activity rates in "long swings" of economic growth, see Easterlin, "Economic-demographic interactions ..." (1966).

<sup>160</sup> Bowen and Finegan, *The Economics of Labor Force Participation* (1969), particularly pp. 80, 84, 341, 456-457; and their "Labor force participation ..." (1965). Coefficients of regression of activity rates for men of prime working age, youths, elderly men, and married women on various measures of income as well as unemployed rates and other independent variables are presented, as derived from an analysis of 1960, 1950, and 1940 census data for standard metropolitan areas in the United States. A negative correlation between earnings and labour force participation was found for males aged 16-24 years; the authors interpreted this as reflecting the reluctance of employers to hire very many young workers where their wages are high. See *The Economics of Labor Force Participation* (1969), pp. 431-433.

<sup>161</sup> Cain, *Married Women in the Labor Force* (1966), table 15, p. 59. Different values of the coefficients were obtained in an analysis of 1950 census data, *ibid.*, table 11, p. 48. See also Bowen and Finegan, *The Economics of Labor Force Participation* (1969), pp. 161-162, 172-174, 190; and their "Labor force participation ..." (1965); Lebergott, "Population change and the supply of labor" (1958).

<sup>162</sup> Cain, *Married Women in the Labor Force* (1966), p. 3. See also United States, National Manpower Council, *Womanpower* (1957), p. 22; Long, *The Labor Force under Changing ...* (1958), chap. 4; Bancroft, *The American Labor Force ...* (1958), p. 75. Oppenheimer pointed out, however, that according to 1963 survey data, the negative association between female activity rates and husband's income was no longer so uniform. See her *The Female Labor Force ...* (1970), p. 29.

<sup>163</sup> On the variations of British married women's activity rates in relation to their husbands' incomes, see Jephcott, Seear and Smith, *Married Women Working* (1962), p. 103. For France, see Paillat, "Féminisation de la population active ..." (1963), p. 58.

<sup>164</sup> Sinha, "Dynamics of female participation ..." (1965).

<sup>165</sup> Mincer, "Labor force participation of married women ..." (1962); Cain, *Married Women in the Labor Force* (1966), pp. 5-7.

<sup>166</sup> Ostry, *The Female Worker in Canada ...* (1968), pp. 30-32. On the relationship of education and family income to female activity rates in the USSR, see Guseinov and Korchagin, "Voprosy trudovyykh resursov" (1971).

A distinct positive correlation between educational level and female activity rates has been found in a number of other industrialized countries such as Belgium, France, Hungary, the Netherlands, Poland, Sweden and the United States of America, where cross-section analyses have been carried out on the basis of census data.<sup>167</sup> On the other hand, it has been suggested that a similar relationship does not exist in Switzerland.<sup>168</sup> Cross-tabulations of data on education and economic activity are less frequently available for developing countries. In Puerto Rico, a strong positive association between economic activity rates and level of education has been observed, both for the island as a whole, and for the metropolitan area of San Juan.<sup>169</sup> In India the pattern was somewhat different: urban activity rates were found to be lower for literate than for illiterate women, though within the literate group, advanced education appeared to favour increased labour force participation.<sup>170</sup>

91. As was noted in the case of income, it is also considered that varying conditions of employment may exert two contrary influences on activity rates. On the one hand, the labour force may be inflated under conditions of relative shortage of labour and deflated under opposite conditions by the inflow and outflow of marginal workers who can compete for jobs only in a "seller's market" for labour, or who are interested in being employed only when they can find jobs perfectly suited to their tastes. On the other hand, there may be an opposite flow—into the labour force under adverse employment conditions and out under favourable conditions—of secondary breadwinners who are forced by economic necessity to seek work when primary family breadwinners are unemployed or underemployed. These two counteracting influences correspond, respectively, to the "discouraged worker" hypothesis and the "additional worker" hypothesis with regard to variations in activity rates under the pressure of unemployment. The results of empirical studies in the United States imply, on the whole, that the former influence has overbalanced the latter so that activity rates have tended in general to vary inversely with unemployment rates under the conditions which have prevailed in this country since

the 1940s. However, the patterns of associations between these variables appear to have differed in different sex-age groups of the population and to have changed from one date to another.<sup>171</sup> According to Strand and Dernburg, the depressing effect of unemployment upon activity rates is greatest in the initial phase of an employment depression, when the "discouraged worker" influence prevails; whereas the "additional worker" influence gains strength later as adverse employment conditions continue.<sup>172</sup>

92. Studies in other countries also have produced evidence of activity rates sagging under the pressure of unemployment and underemployment.<sup>173</sup> Based on 1954 data for various population groups and districts in Israel, Hovne found significant negative correlations between unemployment and activity rates for males and females in the groups from 35-64 years, though not for younger groups.<sup>174</sup> Similar indications are found in the results of a 1951-1952 survey in the State of Mysore, India, where activity rates in different rural zones and areas of the capital city were shown to vary in inverse association with unemployment and part-year employment rates.<sup>175</sup> In Egypt, it has been suggested (without such empirical evidence) that failure of employment opportunities to expand in pace with the rapid growth of the population was responsible for the decreasing trend of activity rates observed during the last few decades.<sup>176</sup>

93. Activity rates in certain segments of the population may be affected by the composition of employment opportunities as well as their volume. As already noted, the shrinking share of agriculture in the labour force and the decrease in opportunities for self-employment have played a part in shortening the gross years of active life of males in industrializing countries. On the other hand, the growing demand for labour in secretarial, clerical, and other white-collar occupations has been credited as an important factor in the secular increase of female activity rates in some of these countries.<sup>177</sup>

<sup>171</sup> See the results of the analysis by Bowen and Finegan, *The Economics of Labor Force Participation* (1969), particularly pp. 483, 487-489, 510, 526, 533-537; see also their "Labor force participation ..." (1965); Mincer, "Labor-force participation and unemployment ..." (1966).

<sup>172</sup> Strand and Dernburg, "Cyclical variation in civilian ..." (1964). In this connexion, see Proulx, "La variabilité cyclique ..." (1969), on possible reasons for the predominance of the "additional worker" hypothesis in Canada. On the effect of changing unemployment levels upon the rate of continuation of young males in school, see Duncan, "Dropouts and the unemployed" (1965), p. 128.

<sup>173</sup> Regarding post-war experience in European countries, see United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1962* (1963), part 1, chap. 2; ———— *1963* (1964), part 1, chap. 2; Hunter, "Cyclical variations in ..." (1963).

<sup>174</sup> Hovne, *The Labor Force in Israel* (1961), pp. 48-49.

<sup>175</sup> United Nations, *The Mysore Population Study ...* (1961), chap. 15.

<sup>176</sup> Seklani, "Population active et structures économiques de l'Égypte" (1962).

<sup>177</sup> For example, Oppenheimer concluded that an important factor in the accelerated rise in female activity rates between 1940 and 1960 in the United States was the fact that the industries and occupations which were expanding most rapidly were those which were major employers of women. Oppenheimer, *The Female Labor Force ...* (1970), p. 187. See also Lebergott, "Population change

(Continued on next page)

<sup>167</sup> See Belgium, Institut national de statistique, "Le degré d'instruction de la population" (1966), pp. 266-270; for France, Praderie, "L'emploi féminin en 1962 ..." (1964), pp. 57-62; Trois-gros, "Employment opportunities for women in France" (1961), p. 371; for Hungary, Horányi, "A nők foglalkoztatottságának ..." (1965), p. 192; for Poland, Frenkel and Józefowicz, "Perspektywy wzrostu zasobów ..." (1965), p. 6; for Sweden, Statistiska Centralbyrån, *Kvinnornas förvärvsverksamhet: 2 ...* (1965), pp. 30-31, 34; for the United States of America, Bancroft, *The American Labor Force ...* (1958), pp. 67-68; Folger and Nam, *Education of the American Population* (1967), pp. 198-199; Bowen and Finegan, *The Economics of Labor Force Participation* (1969), pp. 115-117. For the Netherlands, rates computed from 1960 census tabulations support the finding of a positive relation between educational level and activity rates of women. The role of education as a factor affecting the activity rate of women is also discussed in Sonin, *Vospriizvodstvo rabochei sily ...* (1959), pp. 117-118.

<sup>168</sup> Janjic, "Women's employment and conditions ..." (1967), pp. 303-304.

<sup>169</sup> Puerto Rico, Committee on Human Resources, *Puerto Rico's Manpower Needs and Supply* (1957), p. 60; Carleton, "Labor force participation ..." (1965), pp. 234-236.

<sup>170</sup> Sinha, "Dynamics of female participation ..." (1965).

## C. Length of working life and its implications

### 1. TABLES OF WORKING LIFE

94. Among the new possibilities of analysis opened up by the application of demographic techniques to the study of manpower is that of working life expectancy and its implications. Life table techniques have been applied in calculating working life tables which have proved to be a useful tool for studying the processes of labour force growth and replacement and structural change and for estimating such measures as expected lifetime earnings.<sup>178</sup> These techniques have also been applied in studying the process of replacement in particular industries and occupations.<sup>179</sup> The average length of working life or "net expected years of active life"<sup>180</sup> is determined by age-specific activity rates, considered as measures of the probability of a person of either sex being in the labour force at each age, together with the probabilities of survival to various ages as given by a life table.<sup>181</sup> Measures of this average are provided by "tables of working life", which have been calculated for a number of countries.<sup>182</sup> In addition, such tables may

(Footnote 177 continued)  
and the supply of labor" (1958). Examples of empirical studies in the United States in which the occupational composition of demand for labour has been considered as a factor in differences of female activity rates among metropolitan areas are: Belloc, "Labor force participation and employment ..." (1950); Bowen and Finegan, "Labor force participation ..." (1965).

<sup>178</sup> United Nations, *Methods of Analysing Census Data* ... (1968), p. 19.

<sup>179</sup> Benjamin, *Demographic Analysis* (1969), pp. 151-154. Processes of change in labour force structure are discussed in section D of this chapter.

<sup>180</sup> This term is used in opposition to the "gross years of active life", calculated without regard to mortality.

<sup>181</sup> The measure of working-life expectancy includes indiscriminately periods of full-time and part-time work and of unemployment. It can be reduced to a measure of the expected lifetime input of working time by means of data on unemployment and hours of work classified by age and sex. For an example, see Pallós and Valkovics, "A gazdaságilag ..." (1965).

<sup>182</sup> The following is a partial list of works containing various functions of national tables of working life. For Bulgaria, see Kacarov, "Vrhu srednata prod'žitelnost ..." (1961); for Canada, Denton and Ostry, *Working-life Tables for Canadian Males* (1969); for Chile, Sadie, "Población y mano de obra ..." (1969); for France, Daric, *Viellissement de la population* ... (1948); Depoid, "Tables françaises concernant ..." (1951); Naville, "Measurement of working life ..." (1959); for Ghana, Kpedekpo, "Working life tables ..." (1969); for Great Britain, United Kingdom, Ministry of Labour and National Service, *The Length of Working* ... (1959); for Hungary, Pallós and Valkovics, "A gazdaságilag ..." (1965); for India, Cabinet Secretariat, *Report on Some Characteristics* ... (1959), p. 65; Gnanasekaran, "Increasing length of working life ..." (1960); for Jamaica, Roberts, *The Population of Jamaica* (1957), p. 95; for Japan, Kono, *Nihon-jin danshi* ... (1965); Azumi, "Length of work life ..." (1958); for West Malaysia, Saw, "Malaya: Tables of male ..." (1965); for New Zealand, Census and Statistics Department, *Table of Working Life, 1951* ... (1955); for Norway, Thonstad and Sørsveen, "Lengden av den yrkesaktive ..." (1966); for Pakistan, Bean, "Provisional estimates of length ..." (1967); for Panama, García and Castro, *República de Panamá, vol. 2: Proyección* ... (1965); for Poland, Józefowicz, *Zagadnienia stagnacji w zatrudnieniu* (1967), sections 3, 7; Smoliński, "Statystyczne metody mierzenia ..." (1965); for Romania, Ghețau, "Durata medie a vieții ..." (1968); for the United States of America, Bureau of Labor Statistics, *Tables of Working Life* ... (1950); Garfinkle, *Tables of Working Life for Women, 1950* (1957); his "Tables of working life for men, 1960" (1963); and his "The lengthening of working life ..." (1967).

provide age-specific rates of accretion for the labour force by the entrance of new workers, depletion by retirement (that is, voluntary or involuntary withdrawal into inactive status), and depletion by death:<sup>183</sup> also the average ages of entrance into and retirement from the labour force in a cohort of males or females subject to these age-specific rates and the given conditions of mortality.

95. Two alternative measures of the average length of working life can be calculated. The first represents the net expected years of active life for a cohort of males or females at birth, or in the remainder of their lifetime after a given age. This is readily calculated for either sex at each age, from the schedule of age-specific activity rates and the survival functions of the life table.<sup>184</sup> The second measure, referring to males or females in the labour force at a given age, represents their average remaining number of years of active life. Its calculation involves more complications, since entries into the labour force at earlier ages have to be taken into account as well as the possibility of individuals withdrawing and re-entering the labour force once or more during their lifetime, and possible associations between the age of entrance and the age of withdrawal from economic activity. In the circumstances of most countries, while a satisfactory approximation to the latter measure may be derived in the case of males from the age-specific activity rates and survival functions,<sup>185</sup> calculation of the corresponding measure for females requires additional data on the frequencies of first entrance, withdrawal, and re-entrance into the labour force at various ages.<sup>186</sup>

<sup>183</sup> For males, the increments of age-specific activity rates by single years up to the age at which the rate reaches its maximum may be considered as approximate measures of the age-specific rates of accretion by new entries on the assumption that retirements are negligible up to that age. Likewise, decrements of the specific activity rates at higher ages may be taken as approximations to the rates of retirement, while the rate of depletion of the labour force by death at each age is assumed to be the same as the mortality rate in the population of the same age, as given by the life table. For methodological details, see United States of America, Bureau of Labor Statistics, *Tables of Working Life* ... (1950). In the case of females, these methods do not give valid results under the conditions existing in many countries, where considerable numbers of females may withdraw from the labour force at an early age and enter, or re-enter, at a relatively late age. In such circumstances, specific data on the frequencies of entrance, retirement, and re-entrance at various ages are required. In United States tables of working life for females, the age-specific rates for entrance and retirement are separated into parts attributable to changes in marital status and family characteristics and those due to other factors. See Garfinkle, *Tables of Working Life for Women, 1950* (1957).

<sup>184</sup> The measure is obtained by summing the products ( $w_x L_x$ ) of specific activity rates and the life table stationary population by single years of age from the given age up to the end of the life-span, and dividing the sum by the number of survivors ( $l_x$ ) in the life table at the given age.

<sup>185</sup> On the assumption that withdrawals of males from the labour force are negligible below the age at which the specific activity rate ( $w_x$ ) reaches its maximum and entries are negligible above that age, and that the age of withdrawal is independent of the age of entrance, the measure is obtained by substituting the maximum value of ( $w_x$ ) for the observed values at all lower ages, summing the products ( $w_x L_x$ ) from each given age up to the end of the life span, and dividing the sum by ( $w_x L_x$ ) for the given age. For methodological details, see United States of America, Bureau of Labor Statistics, *Tables of Working Life* ... (1950).

<sup>186</sup> For methodological details, see Garfinkle, *Tables of Working Life for Women, 1950* (1957).



TABLE IX.10. AVERAGE EXPECTATION OF LIFE AND NET EXPECTED YEARS OF ACTIVE AND INACTIVE LIFE FOR MALES IN INDUSTRIALIZED, SEMI-INDUSTRIALIZED, AND AGRICULTURAL COUNTRIES, ACCORDING TO DATA FROM CENSUSES TAKEN BETWEEN 1946 AND 1958 AND CORRESPONDING LIFE TABLES

(Figures are unweighted averages of the measures for countries in each group)

Degree of industrialization	At birth			At age 15		
	Expectation of life ( $e_0$ )	Net years of active life	Net years of inactive life	Expectation of life ( $e_{15}$ )	Net years of active life	Net years of inactive life
Industrialized countries . . . . .	65.0	42.2	22.8	54.5	45.3	9.2
Semi-industrialized countries . . . . .	52.8	35.6	17.2	49.5	43.1	6.4
Agricultural countries . . . . .	48.3	33.9	14.4	46.1	41.5	4.6

SOURCE: United Nations, *Demographic Aspects of Manpower* . . . (1962), table 4.4.

Subtraction of the working-life expectancy from the total expectation of life at the given age yields the expected number of years in inactive status.<sup>187</sup>

96. The net expected years of active life of males, at birth and at the age of entrance into the labour force, are considerably greater in industrialized than in agricultural countries on the average, as shown in table IX.10. A comparison in terms of average remaining years of economic activity for males in the labour force, in the younger age brackets, would show a similar difference. The difference is due to lower mortality rates in the industrialized countries, which more than compensate for their relatively low male activity rates in the youngest and eldest groups. The average loss of active years by mortality (measured as the difference between net expected years of active life and gross years as defined in section A above) for males between the ages of 15 and 70 years has been estimated at 4.8 years in industrialized countries, 8.5 years in semi-industrialized, and 11.4 years in agricultural countries.<sup>188</sup> The average length of inactive life of males is also greater in industrialized than in agricultural countries, owing to the combined effects of later entrance and earlier withdrawal from the labour force, with lower mortality rates in industrialized countries. On the average, the years of inactive life are a larger fraction of the total life expectancy of males in industrialized than in agricultural countries (see table IX.10).

97. In the course of time, as the total expectation of life increases, the average length of working life of males in industrialized countries also increases in spite of the decreasing tendency of male activity rates in younger and older age brackets. The average number of years of inactive life increases still more, so that the inactive years represent a growing fraction of the lifetime for males.<sup>189</sup> In most of the less developed countries, data

are lacking for the calculation of long historical series of working life table functions; but it has been found possible in the case of Jamaica to construct such a series going back to 1891. The expected number of active years for males at the age of entrance into the labour force appears to have changed little in Jamaica between 1891 and 1943. Improved chances of survival were balanced by decreases in activity rates at the two ends of the age scale. In Jamaica, as in industrialized countries, the inactive years increased in average number and as a fraction of the total life expectation for males.<sup>190</sup>

## 2. DYNAMIC FUNCTIONS OF THE LABOUR FORCE

98. In a closed population under given conditions of mortality, sex-age structure and age-specific activity rates for each sex, the rate of increase or decrease of the labour force is the net balance of (a) the rate of replenishment by persons entering or re-entering the labour force from the inactive population, (b) the rate of depletion by deaths of the labour force members, and (c) the rate of depletion by retirements (that is, voluntary or involuntary withdrawals into inactive status). The net balance of these three components is the "replacement rate" of the labour force, which is analogous to a rate of natural increase. It may be modified by migration into and out of the area and by changes in the specific activity rates. The ratio of (a) to the sum of (b) and (c) is the labour force "replacement ratio", a sensitive index of pressure on the labour market from new recruits to be placed in proportion to the number of posts being vacated by death and retirement.

99. These components of labour force dynamics have been calculated with the help of a table of working life which provides the age-specific rates corresponding to (a), (b) and (c). These age-specific rates are applied to the corresponding numbers of the actual labour force (as distinct from the labour force in the hypothetical stationary population of the working-life table), and the products summed to obtain totals for all age groups. Alternatively, the components can be estimated for a country during the interval between two censuses, by

<sup>187</sup> Measures of the expected numbers of years of life in the normal ages of economic activity and of dependency, without regard to actual participation in the labour force, are derived from the life table alone. Variations of these measures in space and time have been analysed by Mortara, "Durée de la vie économiquement active . . ." (1951).

<sup>188</sup> United Nations, *Demographic Aspects of Manpower* . . . (1962), table 4.2, p. 18.

<sup>189</sup> Garfinkle, "Changes in working life . . ." (1955), gives measures of long-term changes in the United States. Pallós and Valkovics, "A gazdaságilag . . ." (1965), present a historical series for Hungary,

1910-1960, with reference to males, females, and the two sexes combined. In this case, the trends for both females and males follow the pattern described above.

<sup>190</sup> Roberts, *The Population of Jamaica* (1957), p. 95.



TABLE IX.11. ANNUAL REPLACEMENT RATES AND RATIOS FOR THE MALE LABOUR FORCE AND ANNUAL RATES OF ENTRANCE, RETIREMENT, AND LOSSES BY DEATH, IN STABLE POPULATION MODELS WITH VARIOUS LEVELS OF FERTILITY AND MORTALITY AND TWO SCHEDULES OF MALE AGE-SPECIFIC ACTIVITY RATES

Gross reproduction rate	30 years expectation of life at birth		50 years expectation of life at birth		70 years expectation of life at birth	
	A	B	A	B	A	B
<i>Replacement rate (entrants less retirements and deaths) per 1,000 active males</i>						
4.0 .....	24.0	21.9	39.1	36.9	47.6	45.0
3.0 .....	14.1	12.2	28.8	26.9	37.4	35.6
2.0 .....	- 0.8	- 1.4	14.2	13.3	22.9	22.0
1.0 .....	- 25.2	- 24.8	- 10.3	- 10.4	- 1.7	- 1.8
<i>Entrants into the labour force per 1,000 active males</i>						
4.0 .....	44.8	44.7	49.3	48.9	52.4	51.4
3.0 .....	37.1	37.6	41.0	41.0	43.7	43.7
2.0 .....	27.5	28.8	30.3	31.4	32.7	33.7
1.0 .....	14.7	16.5	16.1	17.8	17.5	19.2
<i>Retirements from the labour force per 1,000 active males</i>						
4.0 .....	0.7	2.5	0.9	2.8	0.9	2.9
3.0 .....	0.9	3.3	1.3	3.9	1.3	3.9
2.0 .....	1.7	5.0	2.3	6.0	2.7	6.2
1.0 .....	3.3	9.2	5.1	11.4	6.3	12.1
<i>Deaths per 1,000 active males</i>						
4.0 .....	20.1	20.3	9.3	9.2	3.9	3.5
3.0 .....	22.1	22.1	10.9	10.2	4.9	4.2
2.0 .....	26.6	25.1	13.8	12.1	7.1	5.6
1.0 .....	36.6	32.2	21.4	16.8	12.9	9.0
<i>Replacement ratio (entrants into the labour force per 100 retirements and deaths)<sup>a</sup></i>						
4.0 .....	220	200	480	410	1090	800
3.0 .....	160	150	340	290	700	540
2.0 .....	100	100	190	170	330	290
1.0 .....	40	40	60	60	90	90

SOURCE: Based on United Nations, *The Aging of Populations ...* (1956), table 36.

Note: Column A: Average age-specific activity rates for agricultural countries.

Column B: Average age-specific activity rates for industrialized countries.

<sup>a</sup> Ratios rounded to the nearest multiple of 10.

analysing the changes in labour force cohorts according to age and sex at the two census dates.<sup>101</sup>

100. Effects of demographic factors upon the rates of labour force replenishment by entries from the inactive population, depletion by death, and depletion by retirement have been analysed by means of stable population models after the fashion described above regarding their influences upon crude activity rates. The results of this analysis of components of growth in the male labour

force, shown in table IX.11, again bring out the potent influence of fertility.

101. Lowering the gross reproduction rate from 3.0 to 1.0 under given conditions of mortality and age-specific activity rates reduces the rate of accretion by entries into the male labour force by one half or more in these models, while substantially increasing the rates of retirement and losses by death. Increased life expectancy, however, primarily affects the rate of depletion by death, while the effect of shifting from the average age-specific activity rates of agricultural countries to those of industrialized countries is mainly an increase in the rate of retirement. With the gross reproduction rate at 3.0, the replacement ratio ranges from 150 to 700 male entrants per 100 posts vacated by males, according to the combinations of mortality and specific activity rates; whereas with the gross reproduction rate reduced to 1.0, the pressure is greatly relaxed—indeed, reversed, as more posts are vacated each year than are demanded by new entrants.

<sup>101</sup> For examples of calculations along these lines referring to various countries, see: García and Castro, *República de Panamá, vol. 2: Proyección ...* (1965); Jaffe and Froomkin, "Economic development and jobs ..." (1966); Sadie, "Población y mano de obra ..." (1964); Jaffe and Carleton, *Occupational Mobility in the United States ...* (1954). In a number of demographic works, components of natural increase of the population in working ages have been calculated without reference to activity rates; such measures are less directly pertinent to the study of dynamics of labour supply. For examples, see Notestein *et al.*, *The Future Population of Europe ...* (1944); Bowles and Taeuber, *Rural Farm Males ...* (1956); Sadie, "Manpower resources of Africa" (1963); Taeuber, "Population growth in Latin America ..." (1962).

### 3. EXPECTATIONS OF EARNINGS AND CONSUMPTION

102. The economic consequences of the extensions of working life expectancy, and particularly the effect of increased longevity on earnings and consumption, have attracted the attention of a number of scholars. Tables of working life have been used in conjunction with data on annual earnings according to age and sex, to estimate the expectation of lifetime earnings of workers, or all persons, in each sex-age group. With estimates of the annual value of consumption according to age and sex (which is more difficult to measure), the expectation of lifetime consumption has also been computed. Thus the average net economic value, represented by the difference between expected earnings and consumption, can be calculated for males and females at each point in the life cycle, as well as the average cost of maintenance after withdrawal from economic activity and the average cost of bringing up and educating the annual crop of new entrants into the labour force. These calculations are pertinent to the study of such questions as the effects of changing activity rates and population structure upon the burden of dependency, the valuation of human capital, costs and economic benefits of migration considered as a transfer of human capital, and the costs of mortality considered as a human capital loss.<sup>192</sup>

103. Costs of mortality, reckoned in terms of the loss of investments in the upbringing of children who do not survive to maturity as well as the loss of the expected earnings of workers who die before retirement age, appear rather large in proportion to national income where mortality rates are high.<sup>193</sup> It seems that the reduction of these losses by decreasing death rates should be an economic boon for developing countries; but it has to be taken into account that decreasing mortality rates add to the inactive as well as the active years of life and that the additional adult survivors generate further growth in the child population.<sup>194</sup> As shown above, the effect is likely to be some increase in the ratio of dependants to the labour force if fertility remains constant. So, unless the improved chances of survival to adulthood and the lengthening of working life lead to enhanced quality in the labour force or in other ways to rising productivity, the effect on income per head is likely to be adverse. In a comprehensive assessment of the economic implications of decreasing mortality rates, the stimulus to growth in the labour force and its possible effect on the trend of output per worker also requires

consideration. These remarks also apply to the question of economic implications in the transfer of human capital between countries by migration.

### D. Economic structure of the labour force

104. The economic significance of the industrial structure of the labour force and its relationship to progress in technology, productivity and national output have long engaged the attention of scholars. As early as the seventeenth century, Petty observed the adverse effects of a maldistribution of the labour force characterized by an overloading in non-productive occupations. Adam Smith and some of his contemporaries strongly emphasized the economic and social consequences of the division of labour. In a longer historical perspective, Marx viewed the specialization and diversification of labour as important landmarks of progress. But it was only with the pioneering studies of Clark and others that the structure of the labour force was precisely defined and quantitatively analysed in terms of the numbers and proportions of workers in the principal sectors of the economy. Still more recent contributions, such as that of Fourastié, stressed the relationship of labour force structure to technological progress and increased productivity.

105. Three principal classifications of the economic characteristics of the labour force are currently used in census statistics: industry, referring to the function of the establishment or enterprise in which the individual works; occupation, referring to the type of work which he does; and status, of which the four primary categories are employees, employers, workers on own account, and unpaid family workers.<sup>195</sup> The composition of the labour force in terms of each of these classifications reflects an important aspect of structure of the economy, closely related to the level of a country's economic development and productive efficiency.

106. Industry, occupation and status are among the least reliably reported items in population census enumerations.<sup>196</sup> In addition to errors in the reporting of these items, the statistics are affected by errors in the reporting of individuals as economically active or inactive and by the variations in census definitions of the labour force, which bear unevenly on different industry, occupation and status groups. For example, where few of the women in farm households who take part in the farm work are reported as economically active, not only the size of the labour force is understated but also the shares of agriculture in the industry classification, of farm labourers in the occupation classification and of unpaid family

<sup>192</sup> For examples of calculations along these lines, discussions of the concepts and problems of measurement, and interpretations of the economic significance of results, see Valkovics, "Magyarország népességének ..." (1966); Lengyel and Valkovics, "Mennyit termel és fogyaszt ..." (1965); Schmücker, "Der Lebenszyklus ..." (1956); Dublin and Lotka, *The Money Value of a Man* (1946); Perroux, "Les coûts de l'homme" (1952); Weisbrod, "The valuation of human capital" (1961); Sauvy, *Théorie générale de la population*, vol. 1 ... (1963), chaps. 24-26; Růžicka, "Economic aspects of mortality rates" (1965); Gini, "Los efectos demográficos ..." (1946); and his "Apparent and real causes ..." (1948); Boldrini, *Demografia* (1956), chap. 7.

<sup>193</sup> However, the magnitude of such losses in proportion to annual national income has been exaggerated in some computations, as shown by Hansen, "A note on the cost ..." (1957).

<sup>194</sup> Singer, *International Development* ... (1964), pp. 80 ff.

<sup>195</sup> In addition to these three main classifications, various socio-economic classifications have been provided in certain censuses. These generally consist of broad-based categories or a combination of occupation and status criteria. See, for example, Benjamin, *Demographic Analysis* (1969), pp. 148-151.

<sup>196</sup> See the results of reliability tests of the reporting of these and other items in the 1950 census of the United States Bureau of the Census, *The Post-Enumeration Survey: 1950* ... (1960), pp. 18, 35-40. For a discussion of the effects of errors in reporting of industry, occupation and status, see United Nations, *Methods of Analysing Census Data* ... (1968), pp. 73-76.

workers and possibly own-account workers in the status classification.

107. Varying forms of the classifications, especially of industry and occupation, pose additional problems both in international comparisons and in historical studies of national statistics. Distinct concepts of industry, occupation and status were first introduced in the censuses of a few countries about half a century ago. The earlier practice, which persisted in the censuses of many countries until a much more recent time, was to mix these concepts in a single, confused classification with overlapping rubrics from which, at best, only approximate measures of a few industry and occupation groups could be extracted.<sup>197</sup> International standards for census classifications of occupation, industry and status have been developed since the Second World War<sup>198</sup> and progress has been made in improving the quality and comparability of these classifications in recent national censuses; but numerous deviations from the standards persist.<sup>199</sup>

### 1. REGIONAL VARIATIONS

108. In spite of the defects of the statistics, it is clear that the proportionate shares of industry, occupation and status groups differ in characteristic ways between regions and countries at different levels of economic and social development. In fact, the share of the labour force engaged in agriculture is so closely related to the level of economic development that it is often used as an approximate measure of the latter.

109. Estimates of the distribution of the world's working force by broad industrial sector in 1960 show about 58 per cent in agriculture, 20 per cent in industry and 22 per cent in services (table IX.12). The high concentration in agriculture and the comparatively minor role of industry reflect the fact that the majority of the world's population lives in the less developed regions.<sup>200</sup> The striking difference between the sectoral distribution of the work force in developing and more developed regions is also shown in this table; whereas the former regions have, on average, 73 per cent of their labour force working in agriculture, the figure for the latter regions is only 28 per cent. In both the developing and the more developed regions, the segment of the labour force in the service sector is somewhat larger than that in industry.

<sup>197</sup> It has been pointed out that clear-cut occupational classifications cannot accurately describe the economic activities of many persons in societies at an early stage of economic development where there is little specialization; Bauer and Yamey, "Economic progress and occupational distribution" (1951), p. 753; and their *The Economics of Under-developed Countries* (1957), pp. 33-40. See also chapter XIV.

<sup>198</sup> International Labour Office, *The International Standard Classification of Occupations* (1958); United Nations, *The International Standard Industrial ...* (1958); ———, *Handbook of Population ...* (1958), vol. 2. See also United Nations, *Application of International Standards ...* (1951).

<sup>199</sup> The variations of major group classifications of industry and occupation can be seen in the compilation of data from the most recent censuses in United Nations, *Demographic Yearbook, 1964 ...* (1965), tables 9-11. The status classifications (table 11) are seen to vary less.

<sup>200</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), pp. 316-318.

TABLE IX.12. PERCENTAGE DISTRIBUTION OF THE LABOUR FORCE BY BROAD INDUSTRY GROUP AND BY REGION, 1960

Major areas and regions	Agriculture <sup>a</sup>	Industry <sup>b</sup>	Services <sup>c</sup>
World total .....	58	20	22
Developing regions .....	73	12	14
More developed regions .....	28	34	37
Africa .....	77	9	15
Western Africa .....	76	9	15
Eastern Africa .....	87	5	8
Middle Africa .....	84	7	9
Northern Africa .....	66	12	22
Southern Africa .....	41	26	33
Asia (excluding the USSR) ....	72	14	14
East Asia .....	69	17	14
Mainland region .....	75	15	9
Japan .....	33	30	38
Other East Asia .....	62	15	23
South Asia .....	74	10	15
Middle South Asia .....	74	11	15
South-East Asia .....	76	8	16
South-West Asia .....	69	14	17
Europe (excluding the USSR) ..	29	39	33
Western Europe .....	17	45	39
Southern Europe .....	43	32	25
Eastern Europe .....	43	33	24
Northern Europe .....	10	45	46
Latin America .....	48	20	32
Tropical South America ....	51	17	32
Middle America (mainland) ..	57	18	25
Temperate South America ...	24	33	43
Caribbean .....	53	18	29
Northern America .....	7	36	56
Oceania .....	28	32	40
Australia and New Zealand ..	12	39	49
Melanesia .....	87	5	8
Polynesia and Micronesia ....	62	13	25
USSR .....	42	28	30

SOURCE: Based on International Labour Office, *Labour Force Projections ...* (1971), part V, table 3.

Note: Because of rounding, parts do not in all cases add to exactly 100.

<sup>a</sup> Including agriculture, forestry, hunting and fishing.

<sup>b</sup> Including mining and quarrying, manufacturing, construction and electricity, gas, water and sanitary services.

<sup>c</sup> Including commerce, transport, storage and communications, public and private services.

110. Even wider differences are observed when the data for particular geographical regions are examined. In the most highly developed regions (Northern America, Northern and Western Europe and Australia and New Zealand) only 7 to 17 per cent of the labour force is engaged in agriculture and 36 to 45 per cent in industry. At the other extreme, in Africa, the percentage in agriculture runs as high as 84 to 87 per cent in the Middle and Eastern regions, and the industrial component amounts to only 5 to 7 per cent.

111. Among the more developed regions, Southern and Eastern Europe and the USSR are seen to have 42 to 43 per cent of their labour force still in the agricultural sector, a proportion which greatly surpasses that in Temperate South America and even slightly exceeds the figure for South Africa. The latter two

regions are, of course, well above the general level of development of the continents of which they are a part.

112. Aside from the Temperate region of South America, the rest of Latin America had just slightly more than half of its work force in the agricultural sector, according to the 1960 estimates. This is considerably less than the corresponding estimate for Asia (74 per cent in South Asia), but part of the difference may be due to the fact that few women are enumerated as unpaid family workers in agriculture in the former region. The very low percentage of workers in the industrial sector in South-East Asia (8 per cent) is particularly noteworthy, as it compares with 11 to 14 per cent in neighbouring regions.

113. The relatively high ratio of the services sector to the industrial sector in many of the developing regions is partly due to the historical role of these countries as exporters of primary products, a role which has led to the development of elaborate transportation and distribution networks to facilitate foreign trade.<sup>201</sup> Moreover, in some less developed regions the absence of sufficient employment opportunities in industry has led many persons to engage in low productivity service activities.<sup>202</sup>

## 2. CHANGES IN THE PROCESS OF ECONOMIC GROWTH

114. As discussed in detail in the introduction to chapter XIV, the process of economic growth is accompanied by profound changes in the structure of the economy, which is reflected, *inter alia*, in the corresponding structure of the labour force. With economic development, there is a movement of the labour force away from agriculture (at least in relative terms) and an increase in the proportion in secondary and tertiary activities. It is generally considered that once a certain stage of development has been reached, the share of the labour force in the secondary sector may stabilize or possibly even decline, while that of the tertiary sector continues to expand.

### (a) *Decrease in the share of agriculture*

115. Although there are imperfections in their quality, sufficient data are available for a number of countries to trace the typical patterns of change in the sectoral distribution of the labour force that have accompanied the process of economic growth.<sup>203</sup> One of the most

conspicuous features of these patterns, as mentioned above, is the decreasing proportion of the labour force engaged in agriculture. Clark observed from his analysis of available census data that "a high proportion of the total labour force engaged in agricultural and associated forms of employment is only to be found in economically underdeveloped communities, and that in an economically developed community there is almost invariably, through time, a tendency for this proportion to fall".<sup>204</sup>

116. Bairoch and Limbor have estimated that, for the developed countries as a whole, the share of the labour force engaged in agriculture declined from close to 60 per cent at the beginning of the century to about 30 per cent in 1960. For a group of more industrialized countries (excluding the countries of Eastern Europe and the USSR), the estimated percentage of the labour force in agriculture was 56 per cent in 1880, and had declined to 23 per cent by 1960. Moreover, the pace of the decline in these countries was found to have been accelerating throughout most of the period studied, having risen from 0.8 per cent per annum in 1880-1900 to 3.0 per cent in 1950-1960 and about 4 per cent between 1960 and 1967. In fact, the change that occurred in the 17 years between 1950 and 1967 was relatively as great as that in the 60-year period between 1890 and 1950.<sup>205</sup>

117. For certain industrialized countries the proportion of the agricultural labour force to the total can be traced back to very early censuses. In the United Kingdom (Great Britain), it dropped from about 35 per cent in 1801 to 5 per cent in 1961; in the United States of America, from about 75 per cent in 1800 to 8 per cent in 1960. In absolute numbers, the agricultural labour force reached its maximum during the 1850s in the United Kingdom and around 1910 in the United States of America; since those dates it has been approximately cut in half in both countries.<sup>206</sup> The decline in the absolute number of persons engaged in agriculture is a characteristic trend of developed countries. For the group of more highly industrialized countries studied by Bairoch and Limbor, the agricultural labour force fell from 84-85 million in 1900-1920 to 65 million in 1960.<sup>207</sup>

118. The basic causes of these trends are easily seen: with rising income and advancing technology in agriculture, the industrializing nations have been able to satisfy the relatively inelastic demands for agricultural products with diminishing proportionate (and eventually absolute) inputs of manpower in this sector, while rapidly growing demands for non-agricultural products

<sup>201</sup> International Labour Office, "The world's working population ..." (1956).

<sup>202</sup> Baum, "The world's labour force ..." (1967), p. 103.

<sup>203</sup> In addition to the comparative international studies cited separately, the following are examples of works in which long-range trends of industry, occupation, and status distributions of the labour force have been studied: for Canada, Allen, "Tendances des professions ..." (1965); Alexandrin, "Notes on occupational classification" (1966); for France, Vincent, "Population active, production et productivité ..." (1965); for Great Britain, Deane and Cole, *British Economic Growth ...* (1962); Routh, *Occupation and Pay ...* (1965); for India, Meera Reddy, "Occupational mobility in India" (1964); for Jamaica, Roberts, *The Population of Jamaica* (1957), pp. 85 ff.; for Japan, Ohkawa et al., *The Growth Rate of the Japanese ...* (1957); Okazaki, *Nihon no Rodoryoku Mondai* (1966), chap. 3; Taeuber, *The Population of Japan* (1958), chap. 5; Umemura, "An analysis of employment ..." (1962); for Sweden, Ahlberg and Svernlund, *Sveriges arbetskraft ...* (1946); Höök,

*Befolkningsutveckling och ...* (1952); for the United States of America, Edwards, *Comparative Occupation Statistics ...* (1943); Kaplan and Casey, *Occupational Trends ...* (1958); Palmer and Ratner, *Industrial and Occupational ...* (1949); Lebergott, *Manpower in Economic Growth ...* (1964).

<sup>204</sup> Clark, *The Conditions of Economic Progress* (1957), pp. 496-497.

<sup>205</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), pp. 319-321.

<sup>206</sup> Deane and Cole, *British Economic Growth ...* (1962), p. 142; Lebergott, *Manpower in Economic Growth ...* (1964), p. 510.

<sup>207</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), p. 320.

have created an expanding market for labour in other sectors.<sup>208</sup>

119. In some less developed countries also, the proportionate share of agriculture in the labour force has been decreasing recently, but the trend has not been universal in the less developed regions of the world and, where it has occurred, the absolute numbers of the agricultural labour force have continued to grow rapidly, as a rule, owing to the rapid growth of the total population and the insufficient expansion of non-agricultural industries. Bairoch and Limbor's estimates for 1900 to 1960 for developing countries as a whole, while admittedly subject to many reservations, suggest that the agricultural segment has decreased from about 78 per cent of the labour force in 1900 to 71 per cent in 1960. The position of the developing regions in 1960 with respect to this indicator was comparable to that of the group of Western industrialized countries a century and a half earlier.<sup>209</sup>

120. In India, the proportion of agricultural and related workers in the total labour force has followed an irregular trend at the successive censuses since 1901 with little net change in the long run; the percentage was 72 in 1901 and 73 in 1961, according to figures adjusted for comparability.<sup>210</sup>

121. Estimates of trends in the period since 1950 have a sounder statistical basis than those for earlier periods, though for many areas they are still subject to considerable error. According to the latest estimates of the International Labour Office for the world as a whole, the proportion of the labour force working in agriculture declined from 61 per cent in 1950 to 58 per cent in 1960. This change resulted from a sharp drop—from 38 to 28 per cent—in the proportion in agriculture in the more developed regions, and a more modest decline from 79 to 73 per cent in agriculture in the developing regions. However, in the latter, the absolute numbers in the agricultural labour force increased by 77 million during this decade. For example, in Mexico, where the number of workers engaged in agriculture and related activities rose by 17 per cent between 1950 and 1960, the proportion of these to the total labour force shrank from 61 to 55 per cent.<sup>211</sup> An analysis of the male working force in Panama revealed a 20 per cent increase in the number in agriculture between 1950 and 1960, while the

proportion that these workers constituted of the total male labour force fell only from 59 to 58 per cent.<sup>212</sup>

122. In less developed countries, there has been relatively little, if any, push out of agriculture due to labour-saving technological improvements. The push has come rather from the accelerating growth of population and the labour force within the confines of a stationary or slowly advancing agricultural technology, in many cases with little scope for expansion by bringing additional land into use. The labour-absorbing capacity of non-agricultural industries also has been relatively small and growing only slowly in many less developed countries. Thus the shrinkage of the proportionate share of agriculture in the labour force, where it has occurred recently in less developed countries, has been less closely linked with economic growth than it was in countries now at higher levels of development.

123. As rapid a shift as possible of the preponderance of manpower from agriculture to non-agricultural industries is generally recognized as a necessary condition for satisfactory progress in raising levels of income per head in less developed countries. Indeed, it is often held to be a necessity for high-density agricultural countries to avoid any further substantial increase in absolute numbers of the labour force in agriculture, or even to decrease the numbers, if problems of agricultural underemployment are to be solved in the foreseeable future.<sup>213</sup> But it is difficult to achieve such objectives in the circumstances which are typical of less developed countries, while expanding agricultural production as needed to reach satisfactory levels of food consumption and without glutting the markets for labour in the little developed non-agricultural sectors. The greater the present share of agriculture in the total labour force and the higher the rate of growth of the total labour force, the more difficult it is to absorb all this growth in the non-agricultural sector and so to stabilize the number in agriculture.<sup>214</sup>

#### (b) *Changes in shares of non-agricultural industries*

124. According to Clark's well-known theory, as the share of agriculture and other primary industries in the labour force of a country undergoing economic development decreases, there is initially an increase in the share of secondary industries (manufacturing and construction) and, at a later stage, a greater expansion of the tertiary sector (transport, communication, trade, finance and other service industries).<sup>215</sup> Fourastié described

<sup>208</sup> This simplified statement requires qualifications with regard to the conditions of economic development in different countries and periods of time. See Kuznets, *Modern Economic Growth* ... (1966), pp. 100-114; Macura, *Stanovništvo i radna snaga* ... (1958); Valkovics, "Miért csökken ..." (1964); Hatai, "Keizai seicho to nogyo jinko" (1962); Frenkel, *Zatrudnienie w rolnictwie polskim* ... (1968).

<sup>209</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), pp. 324-325.

<sup>210</sup> Kalra, "A note on working force ..." (1962); see also Thorner, "The secular trend in the Indian economy" (1962). In Jamaica, the share of agriculture in the labour force has been shrinking since 1891; see Roberts, *The Population of Jamaica* (1957), p. 87.

<sup>211</sup> International Labour Office, *Labour Force Projections* ... (1971), part III, p. 64 and part V, table 3. For earlier estimates see Baum, "The world's labour force ..." (1967).

<sup>212</sup> Jaffe, "Economic development and the growth ..." (1966), pp. 299-300.

<sup>213</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* (1960), p. 28; United Nations, *Processes and Problems of Industrialization* ... (1955), pp. 3-4; Hoselitz, "Agriculture in industrial development" (1962). See chapter XIII, section D.

<sup>214</sup> Dovring, "The share of agriculture ..." (1959). See also Jaffe and Froomkin, "Economic development and jobs ..." (1966), where the conditions required for holding the size of the agricultural labour force constant and for decreasing it by 15 per cent per decade are formulated mathematically in terms of the initial percentage of the labour force in agriculture, the rate of growth of the total labour force, and the rates of growth of productivity and total product in the non-agricultural sector.

<sup>215</sup> Clark, *The Conditions of Economic Progress* (1957), chaps. 9 and 10. See also the discussion in chapter XIV.

the transformation of labour force structure from an initial equilibrium characterized by the predominance of agriculture, through a transition period during which the primary sector steadily declines, the tertiary sector rises and the secondary sector, while at first increasing its proportion, later enters a period of stability and decline. Finally, in the future a new equilibrium is likely to be reached with both the primary and secondary sectors at a low level and the great preponderance of the labour force in the tertiary sector.<sup>216</sup>

125. Examining empirical data, Bairoch and Limbor found that, while the long-term trends in the structure of the labour force in the developed countries they studied fitted the pattern described by Clark fairly well, the stabilization in the manufacturing share which Clark had observed in the statistics available in the late 1930s was, in fact, only temporary, and a further rise occurred in this sector following the Second World War. These authors noted, however, that recent data for some highly developed countries suggested that a stabilization of the proportion in the manufacturing sector was likely in the medium term and a gradual reduction in the long run.<sup>217</sup>

126. Kuznets's comprehensive analysis of the sectoral distribution of the labour force included both cross-sectional comparisons for countries at different levels of development, as measured by income per head, and long-term trend data for twenty-eight countries. Using statistics from censuses taken around 1950, he found the following average percentage of industry groups in the labour force excluding unpaid family workers:

	Low-income countries	Medium- income countries	High-income countries
All industries .....	100.0	100.0	100.0
Agriculture, forestry and fishing	56.4	39.5	18.6
Manufacturing, mining and construction .....	17.6	25.5	37.8
Other industries, total .....	26.1	35.0	43.6
Other industries, total ...	100.0	100.0	100.0
Transport and communication	13.1	14.9	18.5
Trade and finance .....	25.0	27.7	30.7
Services .....	61.9	57.4	50.8

Note: Figures are unweighted means of percentages for countries in each income group.

As income rises, the relative rise in the secondary sector is seen to be greater than that in the tertiary sector, and this is true as income advances both from low to medium

<sup>216</sup> Fourastié, *Le grand espoir* ... (1963), pp. 131-148. Certain differences exist between the concepts of the sectors as defined by the author and those used by Clark. See *ibid.*, p. 83.

<sup>217</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), pp. 320, 322. Vimont's analysis of the structure of the male labour force in several industrialized countries also showed a substantial rise in the secondary sector after the Second World War. See his *La population active* ... (1960), pp. 44, 46-47. However, a later study, which compared data for the mid-1950s and mid-1960s, found only a slight increase in the secondary sector, and a much greater expansion in the tertiary sector. Bloch and Praderie, *La population active* ... (1966), pp. 137, 150-151. See also United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1969, Part 1* ... (1970), pp. 122-124; Frejka, "Développement séculaire de la structure industrielle ..." (1966), pp. 6-7.

and from medium to high. While the share of the labour force in the tertiary sector shows less variation internationally than in the other two sectors, its composition varies considerably at different levels of development. In high-income countries, it contains proportionately more workers in transport, communication, trade and finance, while in low-income countries there are more in "other services", including domestic servants.<sup>218</sup>

127. From his study of long-term trends, Kuznets found that the rise in the share of the secondary sector was not as large, or as consistent, as might have been expected on the basis of the cross-section comparisons. This was partly explained by the fact that many of the countries studied were already fairly highly industrialized at the beginning of the period under investigation. Kuznets concluded that an upper limit was imposed on the share of the labour force in the secondary sector, possibly because rapidly rising productivity makes it unnecessary to divert an increasing share of manpower into this sector beyond a certain point.<sup>219</sup>

128. In a study of the labour force in metropolitan areas of countries classified by "development scores", Collver and Langlois found the following average percentage shares of industry sectors, using data from the censuses taken around 1950:

	Class III (least developed)	Class II (inter- mediate)	Class I (most developed)
Manufacturing .....	26	28	34
Commerce .....	19	20	20
Services .....	38	35	27
Other industries (including construction, utilities, transport and communication) .....	17	17	19

As economic development advances, some tendency towards an increase in the share of manufacturing and a decrease in the share of service industries in the metropolitan labour force is apparent in these figures. The authors of the study found, though, that regional variations among countries within each class were at least as great as the differences between class averages.<sup>220</sup>

129. Economic growth is not achieved merely by shifting manpower from one sector to another, but by raising

<sup>218</sup> Kuznets, "Quantitative aspects ..." (1957), part 2, pp. 23, 26-27; see also his *Modern Economic Growth* ... (1966), table 8.1 and pp. 106-107, 131-132.

<sup>219</sup> Kuznets, "Quantitative aspects ..." (1957), part 2, pp. 27-31. Fourastié's study of trends from the beginning of the twentieth century or earlier in a number of highly industrialized countries such as Belgium, France, Germany, the Netherlands, the United Kingdom (Great Britain) and the United States of America, showed that, as the agricultural sector declined in importance, the proportion of the labour force in the tertiary sector rose more than that in secondary industries. See his *Migrations professionnelles* ... (1957), pp. 90, 119, 150, 175, 255. See also the same author's *La civilisation de 1975* (1953), pp. 25-26. On the composition of the tertiary sector and its changes with economic development, see Lengellé, *The Growing Importance of the Service Sector* ... (1966), particularly pp. 26-31.

<sup>220</sup> Collver and Langlois, "The female labor force ..." (1962), table 3, p. 377. The "development scores" were based on measures of *per capita* energy consumption and percentages of male labour force in non-agricultural industries.

productivity in all sectors;<sup>221</sup> yet shifts within each sector from less productive to more productive lines of activity are an important feature of the growth process. In agriculture, there is a shift from traditional, subsistence farming to modernized and more specialized commercial farming; in manufacturing, from handicrafts and cottage industries to mechanized factories of increasing scale; in transport, from human and animal carriers to mechanized vehicles; in trade, from peddling and small-scale family store-keeping to more highly organized and specialized commercial enterprises; in service industries, from domestic and low-paid personal services to more lucrative business and machine-repair services and so on. In less developed countries, the push out of agriculture resulting from rapid population growth and the pressure of underemployment in that sector tends to inflate employment in the least productive segments of the secondary and tertiary sectors, which are relatively easy for displaced agricultural workers to enter, as they require little capital.<sup>222</sup>

### (c) Changes in occupational composition

130. Some of the kinds of changes in the occupational composition of the labour force which go with economic growth are illustrated by the following comparison of the relative size of certain major occupation groups shown by the 1960 censuses of Thailand, Spain and the United States of America, selected as examples of countries at relatively low, intermediate and high levels of economic development, respectively:<sup>223</sup>

	Thailand	Spain	United States of America
	(Percentage distribution)		
All occupations .....	100.0	100.0	100.0
Farmers, fishermen and hunters	81.9	39.8	6.3
Professional, technical and related workers .....	1.2	4.1	11.1
Administrative, managerial and executive workers .....	0.1	1.0	7.7
Clerical workers .....	1.1	5.8	13.6
Sales workers .....	5.4	6.2	7.6
Craftsmen, production process workers, and labourers not elsewhere classified .....	5.9	26.4	31.9
Other occupations and not classified .....	4.5	16.6	21.7

131. The major group, "farmers, fishermen and hunters", in the occupation classification parallels closely the

<sup>221</sup> *Ibid.*, p. 376.

<sup>222</sup> Compare Kuznets, "Quantitative aspects ..." (1957), part 2; and his *Modern Economic Growth* ... (1966), passages cited in foot-note 218 above; Sauvy, *Théorie générale de la population*, Vol. I ... (1963), chap. 9; Macura, *Stanovništvo i radna snaga* ... (1958).

<sup>223</sup> Computed from data in United Nations, *Demographic Yearbook, 1964* ... (1965), table 10, where the classifications of the national censuses have been adjusted to conform roughly to the international standard. For the present purpose, the data for the United States have been further adjusted, by reference to the census publications, so as to exclude armed forces and unemployed persons seeking work for the first time, and to make an approximate division between "administrative, managerial and executive workers" and "clerical workers", who are combined in the *Demographic Yearbook*. The latter adjustment was also made for Thailand.

trend of agriculture and related activities in the industry classification. As this group's share of the labour force decreases in countries undergoing economic development, the professional, technical, administrative, managerial, executive and clerical occupations are among the principal gainers. The percentage of these groups taken together is well over ten times greater in the United States of America than in Thailand. Large differences occur also in the shares of the blue-collar and manual occupations included under the headings of "craftsmen, production process workers and labourers not elsewhere classified" and "other occupations". The comparison masks differences in the composition of the latter groups, which are an important aspect of occupational upgrading in the course of economic development.

132. A comparative study of occupational trends in England and Wales since 1841, the United States of America since 1870, and in Australia and Canada since 1901 has shown a picture of more or less continuous large gains in the shares of the professional, administrative and clerical groups in the labour force. The total of white-collar occupations, including the group of sales workers (which showed generally less impressive and more regular gains) was found to have increased in England and Wales from 9.2 per cent of the labour force in 1841 to 29.7 per cent in 1951, in the United States of America from 10.4 per cent in 1870 to 42.2 per cent in 1960, in Australia from 20.7 per cent in 1901 to 28.0 per cent in 1947, in Canada from 15.2 per cent in 1901 to 38.3 per cent in 1961. These gains more or less balanced the losses of farming occupations in their proportionate share of the labour force, while the totals for blue-collar and service occupations followed various trends in the four countries.<sup>224</sup>

133. Within the blue-collar and service occupation groups, important changes have also taken place with economic progress. For example, the nature of changes in the composition of these groups in the United States during the first half of the twentieth century is indicated by the percentages of the total labour force in each group (figures are adjusted for comparability):<sup>225</sup>

	1900	1950
Craftsmen, foremen and kindred workers ....	10.5	14.1
Operatives and kindred workers .....	12.8	20.4
Service workers, except private household ....	3.6	7.9
Private household workers .....	5.4	2.6
Labourers, except farm and mine .....	12.5	6.6

### (d) Changes in status composition

134. The transition from the "atomized" organization of a little developed, predominantly agrarian economy made up chiefly of small, personal or familial units of production to the highly integrated structure of the modern industrial economy with its large-scale enterprises is reflected by a radical change in shares of status

<sup>224</sup> Farrag, "The occupational structure ..." (1964). The author stressed that, in view of the problems of achieving even rough comparability in the statistics, the figures should be taken as indicators of only broad orders of magnitude.

<sup>225</sup> Computed from data in Kaplan and Casey, *Occupational Trends* ... (1958).



groups in the labour force. Own-account workers and their unpaid family helpers, initially constituting the great majority of the labour force, are reduced to a minor fraction while a growing majority gravitates to the status of employees.<sup>226</sup> Again, the process is illustrated by a cross-sectional comparison of 1960 census statistics for three countries at different levels of economic development:

	Thailand	Spain	United States of America
	(Percentage distribution)		
All status groups .....	100.0	100.0	100.0
Employers .....	0.4	3.6	11.9
Own-account workers .....	29.5	18.6	
Unpaid family workers <sup>227</sup> ....	57.7	12.1	1.0
Employees .....	11.8	65.7	87.1
Not classifiable .....	0.7	—	—

135. Excluding unpaid family workers and considering the relative shares of other status groups in the labour force of countries at different income levels, Kuznets found the following average percentages of employers and own-account workers in the statistics of censuses taken around 1950:<sup>228</sup>

	Low-income countries	Medium-income countries	High-income countries
All industries .....	53	30	22
Agriculture, forestry, fishing ..	66	41	61
Manufacturing, mining, construction .....	31	21	11
Other industries .....	35	25	17

136. Apart from the influence exerted by the stage of economic development in shaping the status composition of the labour force, the social organization of production existing in a given country is also of importance. Given the same level of economic development, the status composition of the labour force may be entirely different

<sup>226</sup> See, for example, Fourastié, *Les 40,000 heures* (1965), pp. 71, 73; Bloch and Praderie, *La population active* ... (1966), pp. 121-124, 147.

<sup>227</sup> The very high percentage of unpaid family workers in the labour force as enumerated in the census of Thailand is due partly to liberal reporting of women in farm households as economically active. If the statistics for males alone are considered, the percentage of unpaid family workers is reduced to 35 in Thailand, 10 in Spain, and less than 1/2 of 1 per cent in the United States of America—still an impressive contrast. In the statistics for Spain, this category includes paid as well as unpaid family workers. While Thailand may be an extreme case because of the inclusion of so large a number of unpaid family workers, other countries at an early stage of development also show that own-account workers and unpaid family workers constitute a very high proportion of the labour force. For example, according to 1960 census data, nearly three fourths of the labour force in Ghana, and about two thirds in the Philippines, consisted of such workers. United Nations, *Demographic Yearbook, 1964* ... (1965), table 12.

<sup>228</sup> Kuznets, *Modern Economic Growth* ... (1966), table 8.1, p. 404. It has been shown that in a number of advanced countries, the proportion of the agricultural labour force consisting of employees has declined with increased mechanization and an over-all decline in agricultural employment. Thus, the trend in status composition of the agricultural labour force in these countries has been opposite to that of the non-agricultural labour force. United Nations, *Report on the World Social Situation* (1957), p. 95.

in a capitalist and a socialist country.<sup>229</sup> Not only may the proportions in the different major groups differ, but the groups themselves are different. In many socialist countries the group "employers" either does not exist at all or is very small; on the other hand, there exist important groups such as members of producers' co-operatives that are absent in capitalist countries. A comparison of the status composition of the labour force is shown below for Bulgaria, Hungary and Poland:<sup>230</sup>

	Bulgaria 1965	Hungary 1963	Poland 1960
	(Percentage distribution)		
All status groups .....	100	100	100
Employees .....	58.0	74.2	52.0
Members of agricultural producers' co-operatives .....	38.2	19.7	0.2
Members of handicrafts producers' co-operatives .....	2.4	2.5	2.3
Individual peasants .....	—	1.6	43.8
Handicraft workers not members of co-operatives .....	1.4	1.6	1.7
Others .....	—	0.4	—

137. The classification of status recommended for international use is likewise not always appropriate for the conditions prevailing in some developing countries. For example, in some Asian countries like India, employment relations in agriculture are sometimes so complicated and interwoven in peculiar forms of tenancy and mutual interdependence that they cannot be adequately described by the status classifications developed for use in industrialized countries.<sup>231</sup>

#### (e) Occupation-industry relationships

138. The occupation composition of the labour force depends partly on the industry composition, and vice versa, since some occupations are mainly or wholly confined to certain industries while others are found in varying proportions in different industries. The relationship between the occupational and industrial distribution of the labour force is likely to be modified in the course of economic development as a result of the increasing diversity of occupational specialization within industries reflecting the growing complexity of economic organization and technology.<sup>232</sup> Interrelationships also exist between the distributions of occupation and status and of industry and status.<sup>233</sup> Study of the occupation-industry relationships is especially valuable for gaining

<sup>229</sup> For a discussion of classifications by status in capitalist and socialist countries, see Boyarsky *et al.*, *Kurs demografii* (1967), pp. 84-86; Rodzyalovskaya, "The range and limitations ..." (1967), p. 388.

<sup>230</sup> Degtyar, *Trudovye resursy i ikh ispolzovanie* ... (1969), p. 46.

<sup>231</sup> For a discussion of such problems, see Thorner and Thorner, *Land and Labour in India* (1962).

<sup>232</sup> United Nations, *Methods of Analysing Census Data* ... (1968), p. 69.

<sup>233</sup> In the comparison of average percentages of employers and own-account workers cited above it was found that roughly one half of the difference between low-income and high-income countries could be attributed to the difference in industrial composition of the labour force. See Kuznets, *Modern Economic Growth* ... (1966), p. 419.

knowledge of the factors which affect employment opportunities in various occupations, including the effects of changing technology and shifting demand on the products of various industries. Estimates of future trends in employment according to occupation are commonly based at least partly on the study of these relationships together with anticipated changes in employment in various industries.

139. A change in the share of a given occupation in the labour force (or a difference in this share between two areas) can be considered as the sum of two components: (a) the effect of any change (or difference) in the distribution of the labour force among industries (called the "industry effect"); (b) the effect of any change (or difference) in occupational composition of the labour force within various industries (called the "occupation-mix effect"). For example, in the United States of America, where the share of professional workers in total civilian employment increased from 8.8 per cent in 1950 to 11.8 per cent in 1960, Gnanasekaran found that four fifths of the change could be attributed to the industry effect (especially the rapid growth of employment in professional and related service industries) and one fifth to the occupation-mix effect (especially the increasing share of professional workers in employment within manufacturing, professional and related service industries).<sup>234</sup> In a study of changes in the occupational composition of the Canadian labour force between 1931 and 1961, the industry effect was subdivided into two parts: (a) change in industrial distribution of total output; (b) change in productivity of labour within industries.<sup>235</sup>

140. Such analyses may be misleading unless it is noted that the occupational composition of the labour force and of employment is not determined merely by factors of demand but also by more or less independent supply factors, including, among others, the kinds and extent of education and vocational training which workers receive and their preferences for different kinds of work. Moreover, there is a certain inertia in the occupational structure, as various inhibitions to occupational mobility prevent swift adjustments to changing conditions of demand. The occupational composition of available manpower may influence occupation mixes in various industries, as the relative scarcity in the supply of workers qualified and willing to work at certain occupations may cause substitution of other occupations or of capital. The growth of industries may also be significantly affected by the conditions of labour supply in the occupations on which the industries depend. For example, in less developed countries, shortages of certain kinds of professional, technical, managerial and skilled manpower are among the major hindrances to the quick development of modernized manufacturing and other industries. The growth of such industries in economically more advanced countries has been facilitated by progress in education,

feeding the growth of labour supply qualified for professional, technical, managerial and clerical jobs.<sup>236</sup>

#### (f) *Processes of change in labour force structure*

141. Each occupation and industry group is replenished annually by a share of the workers entering or re-entering the labour force from the inactive population; is depleted by deaths and retirements; and gains or losses by the balance of workers shifting to and from other occupations and industries as well as by the balance of immigration and emigration. The study of these components of change is helpful in gaining insight into the influences of supply and demand factors and improving the basis for projections.<sup>237</sup> Research in this field has been concentrated chiefly on occupational mobility, including the changes in occupation which occur during the lifetime of individuals (intragenerational mobility) and the differences between the occupations of fathers and sons (intergenerational mobility, which is reflected in the changing occupational distribution of new entrants into the labour force).<sup>238</sup>

142. In the United States of America, the findings of a study of occupational trends since 1900 suggest that intergenerational mobility—the changing proportions of successive cohorts of workers entering each occupation—has played the leading role in bringing about major changes in the long run. Intragenerational shifts have also made significant contributions, though their directions in some cases have been opposite to the long-range trends of structural change. The professional group has gained consistently both by intergenerational and intragenerational shifts, and so has the group of craftsmen (with exceptions in some periods), while non-farm and farm labourers have lost consistently by both processes of occupational change. The share of farmers in the labour force has diminished progressively through intergenerational shifts but has been relatively little affected by intragenerational movements, as most men who became farmers have remained in this occupation until retirement. The group of operatives, on the other hand, has increased its share of the labour force by drawing in increasing numbers of young workers in successive generations, enough to over-balance constant losses by intragenerational shifts to higher paid occupations. The patterns in

<sup>236</sup> In this connexion, it should be noted that the relationships between educational attainments and occupational distribution of manpower vary greatly in space and time. For example, see Layard and Saigal, "Educational and occupational characteristics ..." (1966).

<sup>237</sup> Estimates of the components have been derived from cohort analysis of statistics from successive censuses giving cross-classification of the labour force by occupation or industry with age. See Jaffe and Carleton, *Occupational Mobility in the United States* ... (1954); Jaffe and Froomkin, "Economic development and jobs ..." (1966); Jaffe, "Economic development and the growth ..." (1966); Okazaki, *Rodoryoku no hendo to sangyokozo* ... (1965); Frenkel, "Wychodźstwo zawodowe ..." (1966).

<sup>238</sup> The information on these components is derived from sample surveys inquiring into the work histories of individuals and the occupations of their fathers. For examples, see Pourcher, "Un essai d'analyse par cohorte ..." (1966); Duncan, "Occupation trends and patterns ..." (1966); Blau, "The flow of occupational supply ..." (1965); Matras, "Some data on intergenerational occupational mobility ..." (1963).

<sup>234</sup> Gnanasekaran, *Interrelations Between Industrial* ... (1966), tables 1, 5, 8.

<sup>235</sup> Meltz, *Changes in the Occupational* ... (1965). An attempt was also made in this study to distinguish between changes in the shares of various occupational groups due mainly to supply factors and those due mainly to demand factors.

the managerial, sales, clerical and service occupations are not so clearly defined.<sup>239</sup> The patterns of both inter-generational and intragenerational mobility have changed in the course of time and their evolution shows the influence of varying conditions of labour demand. During the 1930s, when unemployment rates were high in the United States of America, the long-range trend of occupational upgrading appears to have been slowed and at some points temporarily reversed.<sup>240</sup>

143. Intragenerational mobility in occupation and industry varies greatly according to age. For example, in the United States of America during the 1940s, the estimated rate of occupational mobility (percentage of male workers in each age group at the beginning of the decade who shifted during the decade from one major occupation group to another) declined from a maximum of 21 per cent for the ages 15-19 and 20-24 years to 16 per cent for 25-29, and progressively lower in each succeeding age group up to 60-64 years, where the rate was estimated at 1 per cent.<sup>241</sup> This observation lends some support to the hypothesis that the aging of a country's labour force tends to impair the adaptability of the occupational and industrial structure to changing conditions of labour demand and thus to aggravate the risks of structural unemployment.<sup>242</sup>

144. On the other hand, the seeming advantage for flexibility of manpower utilization inherent in the youthful age composition and rapid growth of the labour force in less developed countries may be illusory. Potential flexibility on this account is of little avail where the shortage of capital, deficiency of technology, and other obstacles severely limit the rate at which shifts in the occupational and industrial distribution of employment can be accomplished. On the contrary, in those circumstances, the greater the number of young workers added annually in proportion to the size of the labour force, the more difficult it becomes to expand the proportionate share of employment in industries and occupations which have high productivity, and to prevent the accumulation of excessive labour supply in agriculture. The point is well illustrated by the following comparison of components of change in the male agricultural labour force of Panama and Japan during the decade of the 1950s (rates per 100 males in the agricultural labour force as of 1950):<sup>243</sup>

	Panama	Japan
New entries .....	44.4	16.6
Net mobility .....	- 9.0	- 21.5
Deaths .....	11.0	11.8
Retirements .....	3.5	5.2
Net growth .....	20.9	- 22.0

## E. Unemployment and underemployment

145. Waste of labour resources takes the forms of unemployment (that is, a complete lack of employment for a part of the labour force) and underemployment (that is, employment which is deficient in quantity or quality, so that it does not sufficiently occupy the worker's time and productive capabilities or so that it yields inadequate earnings). The level of unemployment and underemployment in a country is primarily determined by economic conditions, though demographic trends affecting the size and composition of the labour force also exert an influence. The theoretical aspects of the relationship between demographic factors and different types of unemployment and underemployment are discussed in chapter XIII, section C. In the present chapter, some findings of studies on the volume and features of unemployment and underemployment in different parts of the world are presented, including estimates of surplus labour in agriculture.

### 1. MEASURES AND LEVELS OF UNEMPLOYMENT

146. The enumeration of unemployed workers in a census or demographic sampling survey requires a criterion of availability for employment whereby the unemployed are distinguished from persons not in the labour force.<sup>244</sup> Although population censuses and demographic sampling surveys have gained ground during recent decades as primary sources of unemployment statistics in many countries, social security and other kinds of administrative records also provide data on unemployment and are the main source in some countries.<sup>245</sup>

147. Unemployment represents the difference between labour supply and demand, but the level of unemployment is also influenced by a variety of factors, such as institutions, attitudes and patterns of behaviour relating to the security of job tenure, to the spatial and occupational mobility of labour and to the propensity of unemployed persons to accept what employment they can get or to continue seeking jobs better suited to their qualifications, aspirations and tastes. The policies of Governments and the measures which they take to deal with unemployment problems may have much to do with

<sup>239</sup> Duncan, "Occupation trends and patterns ..." (1966), particularly table 6. The findings of Jaffe and Carleton, *Occupational Mobility in the United States* ... (1954), with reference to the decades of the 1930s and 1940s are broadly similar.

<sup>240</sup> Jaffe and Carleton, *Occupational Mobility in the United States* ... (1954); Duncan, "Occupation trends and patterns ..." (1966). See also Palmer, *Labor Mobility in Six Cities* ... (1954); Parnes, *Research on Labor Mobility* ... (1954).

<sup>241</sup> Jaffe and Carleton, *Occupational Mobility in the United States* ... (1954), table 9, p. 37. The estimated rates for the decade of the 1930s describe an age curve of similar shape but on a lower level. On age differences in rates of shifting of workers from agriculture to other industries in Poland, 1950-1960, see Frenkel, "Wychodźstwo zawodowe ..." (1966).

<sup>242</sup> Theoretical arguments, *pro* and *con*, relating to this hypothesis are summarized in Stassart, *Les avantages et les inconvénients* ... (1965), pp. 167 ff., with citations of the views of various authors.

<sup>243</sup> Jaffe and Froomkin, "Economic development and jobs ..." (1966), tables 3 and 4.

<sup>244</sup> On the criteria recommended by international bodies, see United Nations, *Handbook of Population* ... (1958), vol. 2. See also International Labour Office, *International Standardization of Labour Statistics* (1959).

<sup>245</sup> Unemployment measures derived from such records are affected by the restrictions of coverage of the administrative operations as well as by the regulations which govern the recording of an individual as unemployed, for example with regard to eligibility for compensation. The international comparability of such statistics is poor on the whole. For a discussion of different types of unemployment statistics, see International Labour Office, *Employment and Economic Growth* (1964), p. 14.

the levels of these rates. Another important factor is the form of the economic structure as reflected by the proportionate shares of employees and other status groups in the labour force. The risk of unemployment bears primarily on employees; in fact, unemployment statistics in some countries are confined to workers having the status of employees. Self-employed workers and their unpaid family helpers are more likely to be underemployed than to face complete lack of employment in adverse circumstances.

148. Some unemployment is considered practically unavoidable in an industrialized market economy, even though the demand for labour may exceed the supply, and a certain minimal rate of frictional unemployment is considered to be consistent with full employment.<sup>246</sup> If the labour force tends to swell when unemployment decreases,<sup>247</sup> the unemployment rate tends to understate the extent of employment expansion which would be required either to do away with unemployment or to reduce it to a level regarded as satisfactory.<sup>248</sup>

149. The identification and measurement of types of unemployment pertinent to the study of its causes and remedies are among the chief preoccupations of theoretical and pragmatic works in this field. The main categories of unemployment are generally identified and their definitions are discussed in chapter XIII, section C. Briefly, these include: frictional unemployment, seasonal unemployment, cyclical unemployment, structural unemployment and unemployment which results from a chronic deficiency of the total demand for labour in relation to supply. It may be noted that these different types of unemployment do not have the same relative importance for more developed and less developed countries. In the former, there is commonly cause for concern over cyclical instability and structural maladjustments related to automation and other technological changes, the obsolescence of industries and occupational skills, and the imperfect mobility of labour. In the less developed countries, the chronic deficiency of total demand for labour (or, in terms more appropriate to the conditions of less developed countries, the deficient volume of opportunities for productive work) is commonly a major problem, related to the shortcomings of technology, the lack of capital, the poverty of developed natural resources, and the rapid growth of the labour force.

150. The unemployment rate is considered an important economic indicator. It is defined as the percentage of unemployed workers in the labour force or in the total of the group to which the statistics refer. Average unemployment rates in eight industrialized countries during the period 1959 to 1963, based on statistics from various

kinds of sources adjusted to conform to the definitions used in the United States of America, were as follows:<sup>249</sup>

Canada .....	6.3	France .....	2.7
United States of America .....	5.8	Sweden .....	1.6 <sup>250</sup>
Italy .....	3.9	Japan .....	1.4
Great Britain ....	2.8	Germany (Federal Republic)	0.7

Several different patterns were distinguished in the trend of unemployment rates in industrialized countries in the period following the Second World War. In Canada and the United States of America there were marked cyclical fluctuations, and the level of unemployment in the 1960s was higher than that of the previous decade. In Austria, the Federal Republic of Germany and Italy, unemployment rates moved gradually downwards during the post-war period, while in another group of countries including Australia, France, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland and the United Kingdom, unemployment rates showed little variation at a low level.<sup>251</sup>

151. Much higher unemployment rates than those of the 1960s were experienced in some industrialized countries during the economic depression of the 1930s. The rate in the United States of America is estimated to have reached a peak of 25.2 per cent in 1933; at the other extreme, it sank to 1.2 per cent as an average for the year 1944, under the pressure of extraordinary war-time labour demands.<sup>252</sup>

152. The sex-age composition of the labour force may also have some effect on the rate of unemployment. Other factors being equal, the greater the share of women in the labour force, the less unemployment is likely to be recorded, since women are more prone than men to withdraw into inactive status when they are out of jobs.<sup>253</sup> As noted previously, a large proportion of elderly workers in a country's labour force may aggravate the risks of unemployment associated with immobility in occupation and residence.<sup>254</sup> On the other hand, a large proportion

<sup>249</sup> Averages computed from annual rates shown in Neef, "International unemployment ..." (1965). See also Gendell, "International patterns of unemployment" (1968); Myers and Chandler, "Comparative levels of unemployment ..." (1962) and their "International comparisons ..." (1960); Galenson and Zellner, "International comparison of unemployment ..." (1956).

<sup>250</sup> Average of 1961-1963.

<sup>251</sup> International Labour Office, *Employment and Economic Growth* (1964), pp. 19-22.

<sup>252</sup> Lebergott, *Manpower in Economic Growth* ... (1964), table A-3, p. 512. For a comparison of unemployment levels in various Western countries, see Urlanis, *Naselenie mira* ... (1965), p. 162.

<sup>253</sup> See section B; also Wolfbein, "Gross change in unemployment 1957-1959" (1960); Kalachek and Westebbe, "Rates of unemployment ..." (1961), p. 345. Because of the tendency of women to drop out of the labour force when not employed, sex differences in recorded unemployment rates are likely to understate the relative vulnerability of women, as compared with men, to loss of employment. On variations of unemployment rates in the United States of America according to sex, age and other demographic characteristics, see Thurow, "The changing structure of unemployment ..." (1965); Hauser, "Differential unemployment and characteristics ..." (1957).

<sup>254</sup> Elderly workers are likely to have an advantage in job security on account of seniority, but when they lose their jobs they may be at a disadvantage in seeking re-employment as a result of employer

<sup>246</sup> See chapter XIII, section C.

<sup>247</sup> See the discussion in section B.

<sup>248</sup> Calculations of "corrected" unemployment rates intended to eliminate this understatement have been attempted in some studies. See, for example, Dernburg and Strand, "Hidden unemployment 1953-1962 ..." (1966).

of very young workers may make for a high incidence of another kind of unemployment, since it is generally found that the youngest age groups in the labour force are the ones which exhibit the highest unemployment rates.<sup>255</sup>

153. As mentioned elsewhere, levels of unemployment are related to the stage of industrial development and the proportion of the labour force which is composed of employees. Thus the fact that unemployment rates in recent years have been higher in the United States of America than in Japan, for example, is explained partly (though not mainly) by the larger share of employees in the United States labour force, which is related to the higher degree of industrialization and the smaller share of agriculture in the economy of the United States of America.<sup>256</sup>

154. In countries with a low level of industrialization, the problems of unemployment and underemployment are reflections of the poverty and low productivity to which these areas are subject.<sup>257</sup> Unemployment rates may be low in spite of wide gaps between the supply of labour and the volume of opportunities for productive employment, since what would be unemployment in a more industrialized economy is spread in the form of underemployment over a large number of workers. This substitution of underemployment for unemployment may result not only from the predominance of self-employed and unpaid family workers in the labour force but also from the low level of income and consequent pressure on breadwinners to be constantly engaged in work which will provide at least some means of support.<sup>258</sup> Yet high rates of unemployment are recorded in some less developed countries, particularly where there is a relatively large urban population or an important wage-labour sector in agriculture, as in Ceylon, for example, where 9.8 per cent of the rural and 14.4 per cent of the urban labour force were found to be unemployed in a survey conducted during the period 1959-1960.<sup>259</sup> The corresponding rates for India recorded in the eleventh and

discrimination in favour of younger men, as well as obsolescence of skills and educational handicaps. See Douse, "Discrimination against older workers" (1961); Sadie, "Discrimination against older workers in perspective" (1955); Ribas, "L'âge de la retraite..." (1961).

<sup>255</sup> While this observation suggests that a youthful age composition of the labour force might be conducive to a relatively high unemployment rate (see Barber, "Canada's unemployment problem" (1962), p. 96), it would be so only to the extent that the high unemployment rates in the youngest age groups reflect inherent difficulties in their absorption into steady employment and not merely that the young workers, on account of lack of experience and seniority, get a disproportionate share of the unemployment due to the relative deficiency of labour demand. For further discussion of the relation of age distribution to unemployment, see chapter XIII, section C.

<sup>256</sup> An assessment of some of the factors mentioned here and in the next paragraph, as partial explanations for differences between unemployment rates in the United States of America and those in several other industrialized countries, was attempted in Myers and Chandler, "Comparative levels of unemployment..." (1962).

<sup>257</sup> Coale, "Population and economic development" (1963), p. 65.

<sup>258</sup> Molinari, "Occupazione, disoccupazione e sottoccupazione..." (1954).

<sup>259</sup> International Labour Office, "A survey of employment, unemployment..." (1963).

twelfth rounds of the National Sample Survey were 6.0 and 7.4 per cent, respectively. The national unemployment rate estimated for the Philippines in November 1958 was 7 per cent, while that for Pakistan in 1955 was only about 3 per cent, though a rate of 10 per cent was found for large towns in East Pakistan. The low rate of only about 2 per cent estimated for Java and Madura in Indonesia in 1958 is attributable in part to the long reference period of one year,<sup>260</sup> since the longer the period, the fewer persons will be found having been without any employment. A compilation of statistics for ten Latin American countries around 1960 showed national unemployment rates ranging from 1.6 per cent in Mexico and 2.7 per cent in Argentina and Peru to 11.2 per cent in Panama and 13.7 per cent in Venezuela; and urban rates as high as 25 per cent in Peru and 28 per cent in Chile.<sup>261</sup> Despite rapid economic development, Puerto Rico has continued to experience an unemployment rate above 13 per cent throughout the 1950s. During this decade a number of developing countries in all regions reported increased numbers of unemployed.<sup>262</sup>

155. In most socialist countries, according to official information, the major problems of unemployment which existed under the former capitalist régimes were solved during the early years of socialist reconstruction and since then unemployment is said to have been nil.<sup>263</sup> In Yugoslavia, however, unemployment has remained a problem in spite of the change in the social organization of the economy. In 1968 it was estimated that 3.4 per cent of the total labour force, or 10.5 per cent of all those in the employee category, were unemployed.<sup>264</sup> While the

<sup>260</sup> International Labour Office, "Unemployment and underemployment in India..." (1962).

<sup>261</sup> Jones, "Underutilization of manpower..." (1968), table 2. See also Harewood, "Employment in Grenada in 1960" (1966).

<sup>262</sup> United Nations, *1963 Report on the World Social Situation* (1963), pp. 75-76. In Puerto Rico during the period 1951-1963, the unemployment rate was reduced only slightly in spite of the considerable expansion of industrial production and emigration, which syphoned off the greater part of the natural increase of the labour force. An analysis of this experience has pointed to the conclusion that rising wages and increasing efficiency in the use of labour in the expanding industrial sector tended to minimize the growth of employment and to perpetuate unemployment. In effect, it appears that much of the underemployment which existed previously in Puerto Rico was transformed into unemployment during this period; and it has been suggested that similar experiences might be in store for the future in less developed countries such as India. See Reynolds, "Wages and employment..." (1965); Jaffe, *People, Jobs, and Economic Development...* (1959), chaps. 5, 7, 9.

<sup>263</sup> See the reports of the Governments of the USSR and Byelorussian SSR cited in United Nations, *Inquiry among Governments on Problems...* (1964), p. 22. See also Pohorille, "Development and rural overpopulation..." (1964); Litvyakov, "Economic and social factors in ensuring full employment..." (1967); Paskhaver, "The rational utilization of rural manpower..." (1967); Sonin, "Manpower balance in the USSR" (1966). On the question of providing full and effective employment in socialist countries, see also Kabaj, "Racionalne zatrudnienie" (1965); Mikulsky, "Trudovye resursy..." (1967); Sonin, "Ratsionalnoe ispolzovanie..." (1966); Kudryavtsev, ed., *Ekonomika truda* (1967), p. 13.

<sup>264</sup> Wertheimer-Baletić, "Regionalni aspekt nezaposlenosti..." (1970), pp. 788-789. The author also estimated the rate of unemployment in a broader sense to include Yugoslav workers employed abroad. On this basis, the unemployed would have amounted to 5 per cent of the total labour force, or 15 per cent of employees, in 1968.

number of unemployed has varied at different periods, the main characteristics of the group have remained essentially the same, namely, a large proportion of first-job seekers, of unskilled workers and of women. The existence of unemployment in Yugoslavia is said to be closely related to the transfer of labour from agriculture, which suffered from overpopulation, and to structural changes in non-agricultural industries.<sup>265</sup>

## 2. MEASURES AND LEVELS OF UNDEREMPLOYMENT

156. Greater difficulties are involved in the measurement of underemployment than of unemployment. Even in defining the basic concept of underemployment and its various forms, there are difficulties which have not been fully resolved. An international group of experts identified two major categories: (a) *visible underemployment*, which involves persons involuntarily working for periods of work shorter than normal; and (b) *invisible underemployment*, which exists when a person's employment is inadequate in terms of abnormally low earnings or because his job does not permit the full use of his highest skills.<sup>266</sup>

157. Efforts to measure underemployment in population censuses and sample surveys have been confined for the most part to the visible type, although measures of invisible underemployment manifested by substandard earnings have also been attempted in some instances. The standards of full-time work and minimal adequate earnings adopted for the purpose of underemployment measures differ greatly in different countries. For example, the length of a normal work week has been defined in recent surveys as 25 hours in Malaysia, 30 in Indonesia and Guyana, 35 in Sweden, Thailand and the United States of America, 40 in Ceylon and the Philippines, 42 in China (Taiwan), and 45 in the Federal Republic of Germany. Different criteria of availability for additional employment are also used.<sup>267</sup> In some surveys, part-time workers are asked whether they are seeking work; in others, merely whether they want more work. The importance of the difference between the two questions is illustrated by the results obtained in the Philippines (survey of October 1962), where both were

asked; 12.6 per cent of employed persons were reported as having worked less than 40 hours during the reference week and wanting more work; 7.1 per cent of those were classified as seeking work and 5.5 per cent as not seeking work.<sup>268</sup>

158. It is obvious, in view of the variations in the definitions and scope of the measures, that much importance cannot be attached to comparisons of the amounts of underemployment reported for different countries. The reported figures make it all too plain, though, that the dimensions of underemployment in the less developed regions of the world are vast. In India, the national survey carried out during 1956-1957 showed 8.3 per cent of the urban and 12.1 per cent of the rural labour force to be visibly underemployed (working less than 42 hours during the reference week and available for additional work).<sup>269</sup> The corresponding measure for Ceylon obtained in the 1959-1960 survey, with 40 hours as the standard for a full-time week, was 18.8 per cent visibly underemployed in the labour force of the whole country.<sup>270</sup> In Panama, a 1963 survey limited to the non-agricultural labour force showed the visibly and invisibly underemployed combined amounting to 20 per cent of the total according to definitions of underemployment which were different for employees and for self-employed workers and were not applied to unpaid family workers.<sup>271</sup> In Greater Santiago, Chile, according to a 1962 survey, about 17 per cent of the male labour force was estimated to be underemployed.<sup>272</sup> In Colombia it was estimated that "invisible unemployment in the subsistence sector of agriculture and visible unemployment in the non-agricultural sectors" amounted to about one fifth of the labour force in 1963.<sup>273</sup> In Trinidad and Tobago, in a 1959 survey, while only 6 per cent of the labour force were reported as visibly underemployed (working less than 32 hours during the reference week and willing to work more), 44 per cent were classified as invisibly underemployed by a criterion of substandard earnings.<sup>274</sup> According to some estimates, underemployment has also affected as much as 40 per cent of the labour force in Barbados and Jamaica.<sup>275</sup> Underemployment exists in more than negli-

<sup>265</sup> Macura, *Stanovništvo i radna snaga* ... (1958), pp. 319-327; Mulina, *Nezaposlenost, uzroci i karakteristike* ... (1969).

<sup>266</sup> International Labour Office, *Report of the Meeting of Experts* ... (1963), para. 22. See also International Labour Office, *Concepts and Methods* ... (1963); Doctor, "Recent progress in underemployment ..." (1967); Myrdal, "A critical appraisal of ..." (1965); Islam, "Concepts and measurement of unemployment ..." (1964); Das Gupta, "An empirical approach ..." (1961); Jaffe, *People, Jobs, and Economic Development* ... (1959), appendix C. For a further discussion of definitions of underemployment, see chapter XIII, section C.

<sup>267</sup> Examples of definitions, scope, methods and results of inquiries on underemployment in various countries are compiled in: International Labour Office, *Selected Recent National Surveys* ... (1963). For additional examples of methodological variations, see International Labour Office, "Unemployment and underemployment in India ..." (1962); Islam, "Concepts and measurement of unemployment ..." (1964); Jaffe and Quesada, "Assessment of underemployment ..." (1967); Boutillier et al., *La moyenne vallée du Sénégal* (1962); France, Mission Economique Centre-Oubangi, *L'emploi du temps du paysan* ... (1961); Sylos-Labini, "Precarious employment in Sicily" (1964).

<sup>268</sup> There were as many persons reported as wanting more work and seeking work in the group having worked 40 hours or more as there were in the group having worked less than 40 hours. This observation underscores the point that the usual measures of underemployment do not represent shortcomings in relation to the total available labour supply, but only in relation to the specified standards of full-time work. It is also worth noting that many individuals may want less work than they actually put in; see Morgan, Sirageldin and Baerwaldt, *Productive Americans* (1966), chap. 7.

<sup>269</sup> International Labour Office, "Unemployment and underemployment in India ..." (1962).

<sup>270</sup> International Labour Office, "A survey of employment, unemployment ..." (1963).

<sup>271</sup> Jaffe and Quesada, "Assessment of underemployment ..." (1967).

<sup>272</sup> Elizaga, "The demographic aspects of unemployment ..." (1967), p. 266. A 1958 survey of the same area had shown that one quarter of all male workers had an income lower than the legal minimum salary. *Ibid.*, p. 267.

<sup>273</sup> Zschock, *Manpower Perspective of Colombia* (1967), p. 47.

<sup>274</sup> Harewood, "Overpopulation and unemployment ..." (1960).

<sup>275</sup> United Nations, *1963 Report on the World Social Situation* (1963), p. 76.



gible amounts in some industrialized countries also, although it is overshadowed by unemployment. For example, in the United States on the average for the year 1965, for every three unemployed persons there were two visibly underemployed (involuntarily working less than 35 hours a week).<sup>276</sup>

159. By weighting numbers of visibly underemployed persons according to the amounts by which their working-time inputs fall short of the full-time standard, an underemployment rate is obtained which may be added to the unemployment rate so as to measure the total shortcoming in relation to the full-time employment of the whole labour force.<sup>277</sup> For example, this shortcoming was estimated at 33 per cent in the rural areas of Indonesia (1958).<sup>278</sup> The complementary index, of the extent of employment in proportion to a full-time equivalent for the labour force as a whole, was estimated in Senegal at 59 per cent for urban and 66 per cent for rural areas.<sup>279</sup>

### 3. ESTIMATES OF "LABOUR SURPLUSES" IN AGRICULTURE<sup>280</sup>

160. Instead of attempting to identify and count unemployed and underemployed individuals, one may approach the question in a different way by comparing a measure of available labour supply with an estimate of labour requirements. This approach has been taken mostly in studies of the utilization of labour supply in agriculture, although methods of macro-economic analysis have been devised for the global assessment of labour requirements and supply in an economy as a whole.<sup>281</sup>

161. The amount of labour required in agriculture under the conditions existing in a country at a given time depends on labour inputs per unit of land, livestock and the like, or per unit of product. Even if the norms for these inputs are founded on a thorough study of conditions and experience in the country concerned, they are essentially arbitrary, since they must refer to some specified level of efficiency among the different levels achieved on the country's farms. The higher this level is placed, of course, the smaller will be the estimate of labour requirements and the larger the estimated labour surplus. The norms which have been specified for various countries and time periods differ immensely. For example, in one study, norms for annual labour inputs in wheat production around 1960 were put at 260 man-days per hectare in Mediterranean areas with traditional farming,

91 days in Yugoslavia, and 10 days in the United States of America, and the figure for the United States of America as of 1910-1914 was put at 38 days.<sup>282</sup> The measure of available labour supply also depends on norms for annual inputs of labour per head of the population, which may be general averages for the agricultural population as a whole or specific figures for sex-age groups. These norms, too, are to some extent arbitrary although observed practices in farm households working under conditions considered to be satisfactory may be taken as a guide.<sup>283</sup>

162. The magnitudes of agricultural labour surplus estimates for various countries and time periods vary over a wide range. Such estimates are as a rule very rough and lack comparability, owing to the absence of satisfactory norms of labour requirements, as mentioned above. In one study of pre-war conditions in Eastern European countries, the surplus was found to be 22 per cent of the available agricultural labour supply in Hungary, about 50 per cent in Romania, Bulgaria and Poland, and nearly 73 per cent in Albania.<sup>284</sup> A surplus of 40 per cent was estimated for India as of 1960, and only 10 per cent for southern Italy as of 1952.<sup>285</sup> In the late 1950s the Food and Agriculture Organization of the United Nations (FAO) estimated that from 28 to 64 per cent of agricultural workers in various parts of the Middle East, North Africa and Southern Europe were surplus.<sup>286</sup> In more developed as well as less developed countries, such calculations have indicated the existence of sizable reserves of redundant labour supply in agriculture. In Denmark for example, the surplus was estimated at about one third of the available supply as of 1951 and, although the supply decreased by about one fourth during the next eight years, the amount of labour required in Danish agriculture decreased more, so that the proportion of excessive supply increased somewhat. Findings were generally similar with regard to other Western European countries and the United States of America.<sup>287</sup> Attempts to calculate labour surpluses in Polish agricul-

<sup>282</sup> Dovring, *Problems of Manpower* ... (1964), table 4, p. 42.

<sup>283</sup> On the methodological problems in such calculations, and ways of resolving them, see *ibid.*; also Communauté Economique Européenne, *Le chômage et la main-d'œuvre* ... (1965); Coutin, "Réflexions sur la population ..." (1964); dell'Angelo, *Note sulla sottoccupazione* ... (1960); Doctor, "Recent progress in underemployment ..." (1967), pp. 351-352. In some studies, attention has been directed more towards the size of agricultural population which could be supported on a country's land resources, and the question of overpopulation, than toward labour requirements and labour surplus. For example, see Issawi and Dabiezis, "Population movements and population pressure ..." (1951); Hayashi, *Results of an Investigation* ... (1949); Clark, "What constitutes rural overpopulation?" (1955).

<sup>284</sup> Moore, *Economic Demography of Eastern* ... (1945), pp. 63-64. Other authors have made different estimates; see Baum, *Population, Manpower, and Economic* ... (1961), pp. 7-8. Estimates of labour surpluses in Polish agriculture for the pre-war period varied greatly. For a critical survey of such estimates, see Stańczak, "Przeludnienie agrarne w Polsce ..." (1955).

<sup>285</sup> Sundaram, "Utilization of idle manpower ..." (1961); dell'Angelo, *Note sulla sottoccupazione* ... (1960).

<sup>286</sup> Food and Agriculture Organization of the United Nations, Mediterranean Development Project, *The Integrated Development of Mediterranean* ... (1959), p. 43.

<sup>287</sup> Dovring, *Problems of Manpower* ... (1964).

<sup>276</sup> United States, Department of Labor, *Manpower Report of the President* ... (1966), tables A-1, A-21. See also Flanagan, "Disguised unemployment ..." (1965).

<sup>277</sup> Unless information is obtained on the amount of working time which each person is willing and able to put in, such a calculation depends on the assumption that all unemployed and visibly underemployed workers are available for full-time work.

<sup>278</sup> International Labour Office, "Unemployment and underemployment in India ..." (1962).

<sup>279</sup> Debeauvais, "Manpower planning in developing countries" (1964).

<sup>280</sup> See also the discussion in chapter XIII, section C.

<sup>281</sup> For examples of the latter, see Correa, ed., *Technology, Employment, and Economic Growth* ... (1963); and his "A method for evaluating ..." (1964).



ture after the war have yielded substantially varying results.<sup>288</sup>

163. Many economists have called attention to the inadequacies of the methods used to calculate labour surpluses.<sup>289</sup> Such estimates may greatly exaggerate the quantities of manpower actually available in existing circumstances for transfer from agriculture to other employments. Commonly, much of the excess of agricultural labour supply over requirements is seasonal and there may be little or no excess over the requirements at

the seasonal peaks, even where a majority of the workers are idle during most of the year.<sup>290</sup> Moreover, it cannot always be taken for granted that labour inputs corresponding to the assumed norms would be forthcoming if ample opportunities for employment were present, nor that the norms for efficiency in the utilization of labour could be attained in existing circumstances on the less efficient farms. The estimates may represent to a large extent a technically possible rather than an actually existing surplus of labour, and the actual availability of the potential surplus may require profound changes in traditional technologies, ways of life and aspirations of the people.<sup>291</sup>

<sup>288</sup> Adamowski, *Ewolucja zatrudnienia w rolnictwie polskim* ... (1964), p. 357, foot-note 1. In the USSR, though certain areas suffer from agricultural labour shortages, others have labour surpluses; for example, in 1959 the surplus was estimated at about 28 per cent in the Ukraine and Moldavia, 42 per cent in Byelorussia, and as high as 99 per cent in Georgia. Moreover, it is reported that the surpluses in some of these areas increased during the next few years as the cohorts born during the years of highest post-war birth rates reached working age. See Perevedentsev, "Migratsiia naseleniia i ispolzovanie trudovykh resursov" (1970).

<sup>289</sup> For example, see Schmidt, "Drogi podniesienia produkcji ..." (1957), p. 141.

<sup>290</sup> For an example referring to East Pakistan, see Islam, "Concepts and measurement of unemployment ..." (1964).

<sup>291</sup> Brewster, "Beliefs, values and economic development" (1961); Lipton, "Population, land and decreasing ..." (1964). On problems in turning actual labour surpluses in agriculture to productive uses in less developed countries, see also Myint, *The Economics of the Developing Countries* (1965), chap. 6; Paglin, "Surplus, agricultural labor ..." (1965); United Nations, Economic Commission for Asia and the Far East, "The supply of rural labour ..." (1964).

## FAMILIES AND HOUSEHOLDS

1. Demographers study population composition in terms of individual traits such as sex, age, labour force status, occupation, urban-rural residential groups etc., but this is an abstract and incomplete way of viewing the population. All human activities involve participation in groups, the single most important human grouping being the family or household. Unfortunately, so much of demography is focused on the study of individuals that the study of groups is comparatively neglected.<sup>1</sup>

2. Individuals and their personal characteristics serve as the statistical units for analysis of the sex and age structure of population and the process of population replacement. They represent the atomistic units of the society. On the other hand, families and households constitute its molecular units, which are of vital importance in many aspects of human life.<sup>2</sup>

3. It is through the family that each generation is replaced by the next generation. Through the family, children are brought into the world and cared for until they can assume their own responsibilities in society. It is also through the family that each generation fulfils a major portion of its responsibilities to the ill, the dependent, and the aged of the preceding generations.<sup>3</sup>

4. In addition, the household occupies a single housing unit and is therefore the most relevant population concept for use in analysis of housing trends and planning for future needs. The family or the household, and not the individual, is the primary unit of consumption used in various marketing and cost-of-living studies. The family or household as the unit of statistical enumeration is also central to the study of income maintenance, economic dependency, saving, fertility, migration, social welfare and social adjustment etc.

5. Trends and variations in the size and structure of families and households, their dynamic changes according to phases of the family life cycle and factors affecting them, constitute a comparatively new field of demography and have been treated relatively little in the literature. True, there is an enormous volume of sociological and anthropological literature concerning the family, some of which has relevance for demographic analysis.<sup>4</sup> But

most of these writings are non-demographic in nature and treat the family in terms of a small social group or a kinship network. Their authors, therefore, are mainly interested in the interpersonal, social-psychological relationships among the members of the family and in the functions of the family, particularly in respect of the importance of child-rearing and family problems such as parent-youth conflicts and family instability.

6. Although there have been a good number of studies in economics relating to average household size and household composition by size-class and by age of head, practically all of them regard the household factor simply as an independent variable to explain other economic variables.<sup>5</sup> In fact, only scattered efforts have been made to analyse variations of the size and structure of families and households and factors affecting them. The study of families and households, including that of marriage and divorce, is perhaps the most under-developed branch in demography.

7. One of the major contributions of demography to the study of families and households has been the development of the concept of "life cycle of the family" as a frame of reference, and a set of related definitions that facilitate comparable research internationally. The basic idea is that families go through a definite sequence of stages, and that at each stage the size and composition of the family undergo changes which have widespread social and economic effects in such areas as consumption and savings patterns, economic participation and social welfare and which call for adjustments on the part of individuals. The second important trend in the theoretical development of the demography of families and households is found in a series of studies on interrelationships between the changes in size and structure of the family and household and the demographic transition in the face of the processes of modernization, industrialization and urbanization. This involves studies of the relative importance of declining fertility and the trend towards "nuclearization" of families in bringing about the recent reduction in the size of household and family. The development of simulation models with the aid of computers—which permits the study of the effects of various demographic components, such as fertility, mortality, age at

<sup>1</sup> Bogue, *Principles of Demography* (1969), p. 367.

<sup>2</sup> Tachi, *Keishiki Jinko-gaku* (1960), pp. 247-251. The atomistic unit corresponds to the primary statistical unit and the molecular unit to the secondary unit in demographic statistics. See also Spiegelman, *Introduction to Demography* (1968), p. 1.

<sup>3</sup> Taeuber and Taeuber, *The Changing Population ...* (1958), p. 169.

<sup>4</sup> Among them, the studies made by George P. Murdock, Marion J. Levy Jr., William J. Goode, Talcott Parsons and Reuben Hill

are particularly pertinent for studies of demographic aspects of the family in view of their interesting conceptualization of the nuclear family, their interpretation of the family within the societal context and especially in relation to industrialization, urbanization and modernization.

<sup>5</sup> For example, see Prais and Houthakker, *The Analysis of Family Budgets ...* (1955); David, *Family Composition and Consumption* (1962).

marriage, pattern and timing of family fission, and the like, on family building—constitutes still another important trend.

8. The chapter first outlines in section A basic concepts and definitions of families and households which differ among countries and regions. Sections B and C summarize regional variations and trends, respectively, in the size and structure of families and households. Section D deals with the headship rate as an important measure of household formation and discusses its patterns by sex, age and marital status and regional variations. Section E is devoted to a summary of factors affecting the number and size of households and families, while section F briefly considers dynamic changes in the family and household structure from the viewpoint of the family life cycle.

### A. General definitions and concepts

9. As in many other areas of demography, data relating to families and households are affected by variations in definitions and concepts. Various publications of the United Nations have dealt comprehensively with concepts, definitions, and classifications of families and households used in the censuses of different countries.<sup>6</sup>

10. The concepts of the "family" and "household" are often confused because of their close relationship to each other and because of the lack of unambiguous definitions of either one of them. According to the United Nations *Multilingual Demographic Dictionary*, the household is a socio-economic unit, consisting of individuals who live together. On the other hand, the *Dictionary* defines the "family" primarily by reference to relationships which pertain to or arise from reproductive processes and which are regulated by law or by custom.<sup>7</sup> There is no uniform and universally acceptable definition of the family as a sociological-anthropological concept, partly due to differences in the structure and function of family organization existing in various parts of the world and partly due to many varieties of approaches and schools of thought conceived and worked out by different sociologists, anthropologists, social psychologists etc.<sup>8</sup>

<sup>6</sup> The following publications also present the internationally recommended standards for household and family statistics and treat problems in application of the standards in national censuses. United Nations, *Handbook of Population Census Methods*, vol. 3 ... (1959), pp. 67-68; United Nations, *Principles and Recommendations for the 1970 Population Censuses* (1969), pp. 14, 20-21, 24-25, 33-34; United Nations, *Principles and Recommendations for the 1970 Housing Censuses* (1969), pp. 20-21, 26-27 and 29-30.

<sup>7</sup> United Nations, *Multilingual Demographic Dictionary* ... (1958), p. 4.

<sup>8</sup> Reuben Hill and his associates classify various approaches to the study of the family within a sociological framework as follows: (1) the institutional approach, (2) the structural-functional approach, (3) the interactional approach, (4) the situational approach, and (5) the developmental approach. Under the first approach, the family is dealt with as an institution, which establishes the practices by which societies control the association of the sexes in marriage and family and sanction the reproduction and socialization of human generations. Under the structural-functional approach, "family" means the "nuclear family" made up of only husband and wife and their children, if any. This approach views the family as a social system, with constituent parts bound together by interaction and interdependence. The interactional approach describes the family as a unit of interacting personalities. It interprets family

11. According to Murdock, the family is a social group characterized by common residence, economic co-operation and reproduction. It includes adults of both sexes, at least two of whom maintain a socially-approved sexual relationship, and one or more children, own or adopted, of sexually cohabiting adults.<sup>9</sup> This definition, which embodies the concept of "nuclear family", has been the most widely cited definition in the sociological literature of the family, particularly in view of its emphasis on morphological characteristics of the family in terms of having a residential base and having its coherent members tied by blood, marriage or adoption.<sup>10</sup>

12. With regard to the basic notions of the family and household and their components, fairly substantial differences exist in the various censuses, despite the international recommendations in this field. The United Nations definition of household recommended for international use is as follows:

"The concept of 'household' is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either: (a) a one-person household, that is, a person who makes provision for his own food or other essentials for living without combining with any other person to form part of a multiperson household, or (b) a multiperson household, that is, a group of two or more persons who make common provision for food or other essentials for living. The persons in the group may pool their incomes and have a common budget to a greater or less extent; they may be related or unrelated persons or a combination of both."<sup>11</sup>

phenomena in terms of role playing, status relations, communication problems and the like. The situational approach also views the family as a unit of interacting personalities, but also as being subject to external stimuli which influence behaviour of family members. Finally, the developmental approach, too, views the family as a unity of interacting personalities, but its point of departure is the family life cycle or stages of development through which the family and its members travel. This approach deals specifically with the unifying theme of family change through the time dimension. See Hill and Hansen, "The identification of conceptual frameworks ..." (1960), pp. 299-311; Sirjamaki, "The institutional approach" (1964); Pitts, "The structural-functional approach" (1964); Christensen, "Development of the family field of study" (1964); Duvall, *Family Development* (1962).

<sup>9</sup> Murdock, *Social Structure* (1949). Murdock postulated that the nuclear family was universal and that it had four essential functions which it always and everywhere fulfilled. These four functions are: (1) socialization, (2) economic co-operation, (3) reproduction, and (4) sexual relations. *Ibid.*, pp. 4-11.

<sup>10</sup> For example, Levy's recent work is concerned with the residential family—that is, a group of persons usually related by blood or marriage, living together in a common residence or dwelling. Therefore his generalizations may not be taken to apply to family and kinship units defined in terms of interaction or reciprocal obligations among kin living in different households. See Levy, "Aspects of the analysis ..." (1965).

<sup>11</sup> United Nations, *Principles and Recommendations for the 1970 Population Censuses* (1969), p. 14; ———, *Principles and Recommendations for the 1970 Housing Censuses* (1969), pp. 21, 29-30. Households usually occupy the whole, part of, or more than one housing unit, but they may also be found in camps, in boarding houses or hotels, or as administrative personnel in institutions, or they may be homeless. Households consisting of extended families which make common provision for food, or of potentially separate households with a common head, resulting from a polygamous union, may occupy more than one housing unit.

13. On the other hand, the family is defined in United Nations recommendations as follows:

"The family is defined as those members of the household... who are related, to a specific degree, through blood, adoption or marriage. The degree of relationship used in determining the limits of the family is dependent upon the uses to which the data are to be put and so cannot be precisely set for world-wide use."<sup>12</sup>

14. The term "family" may also refer to the "extended family" or "joint family" which would include, in addition to a couple with their minor children, their married children and their families and other relatives as well. This type of family is often found in countries with a predominantly rural economy, though it is not as common as is sometimes assumed. Such a family may be scattered or may live together and share a housing unit. For statistical purposes, it would not be practical to deal with the "family" in this wider sense of including persons tied to each other by kinship but residing in different households. Therefore, in conformity with the United Nations definition, the family can be interpreted in a limited sense as a group of two or more persons mutually related who live together and share the same housing unit.<sup>13</sup>

#### B. Regional variations in the size and structure of families and households

15. The term "size of household" is fairly unambiguous, but the term "size of family" is commonly used in two different ways. In the literature on fertility, it usually refers to the number of children ever born alive; the unit of measurement may be a married couple, a woman in her current marriage, or an ever-married woman. For a woman who has passed her reproductive period, the number of children she has borne is sometimes called her "size of completed family". In the literature on family composition, the term "size of family" generally refers to the number of persons who are related to each other and who live together, including adults as well as children.<sup>14</sup> According to the current United Nations

<sup>12</sup> United Nations, *Principles and Recommendations for the 1970 Population Censuses* (1969), p. 20. A family cannot comprise more than one household; a household can, however, consist of more than one family, of one family together with one or more non-related persons, or entirely of non-related persons. In practice, most households are composed of a single family consisting of a married couple without children, or of one or both parents and their unmarried children.

<sup>13</sup> The joint or composite family generally consists of more than two generations of a biological family and is found in countries where it is not the custom for children to leave the parental home on marriage. United Nations, *Multilingual Demographic Dictionary* ... (1958), p. 6. Generally, sociologists, anthropologists and social psychologists have emphasized interactional, institutional, functional and social psychological aspects of the family within a society, so that its scope is much broader than and somewhat different from this statistical approach. To those social scientists, especially family sociologists, the family is a form of social organization and institution through which a baby grows up, develops his personality and acquires socialization. Therefore, the family's scope of activities and influences, and its implications are far greater than those of the censal "family household". For the sociological literature, see, for example, Kirkpatrick, *The Family as Process* ... (1963); Sussman, ed., *Sourcebook in Marriage* ... (1963).

<sup>14</sup> Glick, *American Families* (1957), pp. 29-30.

recommendations, a family must include at least two mutually related persons.<sup>15</sup> In this chapter, the term "size of family" is used as a measure of family composition rather than that of fertility. Since statistical data on families are relatively scarce, the present chapter is devoted mainly to analyses of the size and structure of households.

TABLE X.1. ESTIMATED AVERAGE HOUSEHOLD SIZE FOR MAJOR AREAS AND REGIONS OF THE WORLD: 1965

Major areas and regions	Average household size
World total .....	4.54
Developing regions .....	5.22
More developed regions .....	3.54
Africa .....	4.99
Western Africa .....	4.94
Eastern Africa .....	4.93
Middle Africa .....	4.89
Northern Africa .....	5.15
Southern Africa .....	5.04
Asia (excluding the USSR) .....	5.17
East Asia .....	5.08
Mainland region .....	5.21
Japan .....	4.08
Other East Asia .....	5.84
South Asia .....	5.25
Middle South Asia .....	5.25
South-East Asia .....	5.16
South-West Asia .....	5.54
Europe (excluding the USSR) .....	3.30
Western Europe .....	3.03
Southern Europe .....	3.94
Eastern Europe .....	3.31
Northern Europe .....	3.03
Latin America .....	5.09
Tropical South America .....	5.33
Middle America (Mainland) .....	5.62
Temperate South America .....	4.19
Caribbean .....	4.43
Northern America .....	3.44
Oceania .....	3.99
Australia and New Zealand .....	3.68
Melanesia .....	5.92
Polynesia and Micronesia .....	6.33
USSR .....	3.86

SOURCE: *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

16. Table X.I shows the average household size for the world as a whole and its major areas and regions. The average household size for the world in 1965 was estimated at 4.54 persons according to a recent United Nations assessment.<sup>16</sup> It was about 5.22 in the developing countries and 3.54 in the developed. Among the developing regions, the average household size was estimated to be highest in South Asia (5.25), as compared with Latin

<sup>15</sup> United Nations, *Principles and Recommendations for the 1970 Population Censuses* (1969), pp. 20-21.

<sup>16</sup> *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

TABLE X.2. DISTRIBUTION OF COUNTRIES BY AVERAGE HOUSEHOLD SIZE AROUND 1960, BY MAJOR REGION<sup>a</sup>

Average household size (persons)	World total	Less developed	More developed	Africa	Asia (excluding USSR)	Middle and South America	Europe (excluding USSR)	Northern America	Oceania	USSR
Total .....	114	72	42	19	29	28	31	2	4	1
Under 2.5 .....	1	—	1	—	—	—	1	—	—	—
2.50-2.99 .....	4	—	4	—	—	—	4	—	—	—
3.00-3.49 .....	15	—	15	—	—	1	12	1	—	1
3.50-3.99 .....	15	3	12	2	2	1	8	—	2	—
4.00-4.49 .....	20	14	6	6	1	7	5	1	—	—
4.50-4.99 .....	19	18	1	7	7	5	—	—	—	—
5.00-5.49 .....	21	21	—	3	10	8	—	—	—	—
5.50-5.99 .....	15	12	3	—	8	5	1	—	1	—
6.00-6.49 .....	2	2	—	—	1	1	—	—	—	—
6.50 and over .....	2	2	—	1	—	—	—	—	1	—

SOURCE: United Nations, *Demographic Yearbook*, 1955, 1962, and 1963. The data for the countries which were not listed in the above United Nations yearbooks are taken from individual population censuses. United Nations, *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>a</sup> Excluding countries having fewer than 100,000 inhabitants and those having no satisfactory data.

America (5.09), East Asia (5.08) and Africa (4.99). Among the developed regions both Western Europe and Northern Europe show very low figures of 3.03, respectively.

17. The countries with average household size above 4.5 are found almost exclusively in the developing regions of Asia, Africa, Latin America, and Oceania, excluding Australia and New Zealand. In addition to the latter two countries, the countries with average household size below 4.0 are located mainly in Northern America and Europe. As shown in table X.2, among thirty-three European and Northern American countries, only seven countries had a household size larger than 4.0 around 1960. In Europe, Albania had an average household size of 5.8, which is extraordinarily large, even by inter-regional standards. In Asia, some Middle Eastern countries, namely Cyprus and Israel, have relatively low average household sizes of 3.96 and 3.83 respectively. In Latin America, Argentina and Uruguay in the Temperate region have an average household size of less than 4.0 persons, and seven out of ten Caribbean islands for which data are available indicate a figure between 4.0 and 4.5. In Africa, out of nineteen countries, eight show average household sizes smaller than 4.5 and two countries—Central African Republic and Gabon—report a size even smaller than 4.0. Some of these figures are considered to be somewhat dubious, however, perhaps due to vague census definitions of household and family and defective census results.<sup>17</sup>

18. In addition to the United Nations analysis, international comparative studies have been made by Burch and Bogue. Burch undertook a pioneering work in 1967, using data published in United Nations *Demographic Yearbooks* as well as more detailed census materials from selected countries, mostly in Latin America.<sup>18</sup> His main

purpose was to test the recent hypotheses of Levy regarding the essential similarity of family structures, including average size of families in all societies.<sup>19</sup> He also examined the conventional notion that extended families are prevalent in rural-agricultural societies and over time industrialization and urbanization bring about their breakup into nuclear families and non-family households. The findings showed that the extended family is surprisingly less frequent than is commonly expected in pre-industrial societies of the contemporary world. Burch concluded that the most striking feature of the frequency distributions of the data on average household size for the sixty-four countries in his study was their limited range. The vast majority of nations have averages falling within the range of three to six persons, only three cases in his study falling beyond these limits.<sup>20</sup> Burch's study substantiated Levy's broad sociological-demographic proposition that the general outlines and nature of actual family structures have been virtually identical in certain strategic respects in all known societies in world history for well over half of the members of these societies.<sup>21</sup> Backed by the empirical data, Burch pointed out that in no society has the very large residential family become the modal form.<sup>22</sup>

19. As shown in table X.2, in the United Nations study, only nine of 114 countries were found to have an average household size outside the limits set by Burch. As also indicated in Burch's study, notably absent are countries with the average household size which might be expected if ideal extended family patterns were adopted as a matter of course in any of the nations represented. Extended families of large size were thought to be typical of devel-

<sup>19</sup> Levy, "Aspects of the analysis . . ." (1965).

<sup>20</sup> Burch, "The size and structure . . ." (1967). See particularly p. 353.

<sup>21</sup> Levy, "Aspects of the analysis . . ." (1965), pp. 41-42. According to Levy, these strategic respects have to do with the following factors: (a) size of membership, (b) age composition and relationship of the membership through time, (c) composition by sex, (d) generational composition, (e) number of marital pairs, and (f) number of siblings.

<sup>22</sup> Burch, "The size and structure . . ." (1967), p. 34.

<sup>17</sup> For example, African censuses show wide fluctuations with respect to the percentage of one-person households. See United Nations, *Manual VII: Methods of Projecting Households and Families* (1973), p. 12.

<sup>18</sup> Burch, "The size and structure . . ." (1967).

oping nations such as India and Pakistan, traditional China and Tokugawa Japan, but Levy regarded such beliefs and expectations as largely pertaining to ideal types and he distinguished them from actual realities.<sup>23</sup>

20. Family sociologists have generally held the view that a close inverse relation exists between the level of industrialization and urbanization on the one hand, and the incidence of the "extended family" system, on the other. Furthermore, extended families are believed to be much more prevalent in rural than in urban areas. It is maintained that as a society develops, the extended family tends to be replaced as a modal form by the independent nuclear (or conjugal) family consisting of husband, wife, and children, if any.<sup>24</sup>

21. Since extended families were known to be prevalent in rural, pre-industrial societies, it had been assumed that family size in those societies was substantially larger than that in the developed countries, not only because of their higher fertility and subsequently larger number of living children, but also because of the doubling-up of nuclear families within the extended families. The typical residential family in non-industrial societies was seen as being large and complex, containing representatives of three or more generations, more than one nuclear family, and perhaps several collateral relatives. The favourite example of such a family system is that of traditional China, where all males in a direct line of descent, together with their wives and unmarried daughters, were supposed to occupy a common household, forming a social and economic unit under the authority of the oldest able-bodied male, the patriarch. The implied size of such a family group is large, perhaps ten persons or more on the average.<sup>25</sup>

22. More than twenty-five years ago, Hsu and Lang respectively questioned whether such a family was frequently found in practice. They argued that economic limitations, among other things, prevented all but the fairly well-to-do from actually maintaining such large households.<sup>26</sup> The masses in traditional China were

presumed to have lived in residential families closer in size, if not in all other respects, to those found in modern Western societies.<sup>27</sup> In Sjöberg's study it was pointed out that in pre-industrial societies, the extended family was more common in urban than in rural areas.<sup>28</sup> Also Levy argued that, because of economic or demographic limitations, in no society has the extended family become predominant in actual practice.<sup>29</sup> Goode further pointed out that such extended families require considerable managerial skills and leadership which are rather difficult to find and stresses and strains may occur and eventually lead to break-up of the family in cases where the formal leader and the ablest family member are not the same person.<sup>30</sup> Levy's viewpoint is that the "nuclear family" may not be the universal one in all societies, as Murdock or Parsons suggested,<sup>31</sup> but he argued that although ideal structures of the family vary considerably from one society to another, the actual family size, generational composition etc., vary much less than ideal types.<sup>32</sup>

23. On the basis of empirical research, a good number of demographers and family sociologists have agreed that the extended or joint family is an ideal or polar type,<sup>33</sup> though it is not the most frequent. For example, Goode commented that the belief that the Arab family is extended may be accepted as a description, not of reality, but only of ideals. He also observed that in the urban setting in Sub-Saharan Africa, housing facilities are in such short supply that very large households are difficult to arrange.<sup>34</sup>

24. Relatively modest sizes of household have been reported in surveys carried out in different parts of Africa. For the Union of South Africa, Hellman reported that in the recent Keiskammahoe survey, the household averaged 5.95 persons. The Orando survey showed an average of 5.38 and another survey taken in Springs found an average of 5.02 persons.<sup>35</sup> According to a survey in the eastern part of Sierra Leone, average household size was 5.4 persons.<sup>36</sup>

<sup>23</sup> Levy, "Aspects of the analysis ..." (1965), p. 49.

<sup>24</sup> Burch, "The size and structure ..." (1967), p. 347. For typical statements of this classic view pertaining to the relation between industrialization and family, see Kirkpatrick, *The Family as Process* ... (1963), pp. 137-139; Kephart, *The Family, Society* ... (1966), pp. 58-60; Davis, *Human Society* (1949), pp. 414-418. Noting that the conjugal type of family or organization had become generally dominant throughout Western civilization, Kephart (p. 60) noted that: "Despite the apparent stresses and strains involved, the conjugal family system seems to be the one most compatible with modern society. If the trend toward urbanism, industrialism, and mobility spreads to other parts of the world, it is just possible that the consanguine type of family organization will tend to disappear—along with polygamy". Davis (p. 418) observed that: "Marriage became increasingly a private matter beyond the control of the parents, and each new family unit tended to be independent of its predecessors. With the decline in mortality, fertility also declined. The small family, occupying its own small living space and moving as a free unit, became the dominant pattern. This small family system originated in Western industrial civilization and is now being diffused, along with other features of industrialism, to the rest of the world. It seems likely that eventually the whole of mankind will have a family organization roughly similar to that found in the United States today."

<sup>25</sup> Burch, "The size and structure ..." (1967), p. 349.

<sup>26</sup> Hsu, "The myth of Chinese family size" (1943); Lang, *Chinese Family and Society* (1946), pp. 134-154.

<sup>27</sup> Tao, *Livelihood in Peking* ... (1928), p. 42; Smythe, "The composition of the Chinese family" (1935); Buck, *Land Utilization in China* ... (1937), p. 19; Burch, "The size and structure ..." (1967).

<sup>28</sup> Sjöberg, *The Pre-Industrial City* ... (1960), pp. 157-163.

<sup>29</sup> Levy, "Aspects of the analysis ..." (1965), pp. 40-63.

<sup>30</sup> Goode, *The Family* (1964), p. 53.

<sup>31</sup> Murdock, *Social Structure* (1949); Parsons, "The incest taboo ..." (1954).

<sup>32</sup> Levy, "Aspects of the analysis ..." (1965), p. 63. Many sociologists have criticized or questioned the thesis of the universality of the nuclear family. See Reiss, "The universality of the family" (1965); Spiro, "Is the family universal? ..." (1968); Gough, "Is the family universal? ..." (1959); Greenfield, "Industrialization and the family ..." (1961); Levy and Fallers "The family ..." (1959); Levy, "Some questions about Parsons' treatment ..." (1955).

<sup>33</sup> Goode, *World Revolution and Family Patterns* (1963); Burch, "Size and structure of families ..." (1967); Leslie, *The Family in Social Context* (1967), pp. 61-80.

<sup>34</sup> Goode, *World Revolution and Family Patterns* (1963), p. 123.

<sup>35</sup> Hellmann, "The development of social groupings ..." (1956), particularly p. 733.

<sup>36</sup> Little, *The Mende of Sierra Leone* ... (1951), pp. 65-66.

25. It has also been shown that household size in India was smaller than generally thought. Dandekar and Unde observed that no census data support the widespread notion that the joint family was a rule in the Indian society in the past and that it was giving way. In fact, more than 77 per cent of the households sampled in the State of Maharashtra were only one-couple or non-couple households.<sup>37</sup> Industrialized countries, on the other hand, did not have such large household size in the past as was commonly believed.<sup>38</sup>

26. Bogue observed that while the so-called "extended family", where three or four generations live together under one roof or within one compound, is a part of the cultural standard of many countries, particularly in South Asia and East Asia, it occurs in fact primarily among the upper and upper-middle classes. Although there may be elaborate patterns of mutual aid and family solidarity extending over larger kinship groups, where this exists, it is primarily an interhousehold, and not a single residential unit, arrangement. The joint family as described and discussed in the literature of family sociology and cultural anthropology appears to be more a sociological tradition than a statistical reality.<sup>39</sup>

27. It is also of considerable demographic interest that in Burch's study, as well as in the United Nations study, the distribution of average household size is bimodal, suggesting that despite the limited range, there are two basically different groups of countries as regards household size, namely those with averages between 3 and 4 and those with averages of 5 or more (table X.2.). If the distinction is made between the developed and the developing regions according to the conventional dichotomy adopted by the United Nations, each of the subgroups shows a smoother normal curve than when the two subgroups are combined, the lower tail of the developing group and the upper tail of the developed group being overlapping to some extent. Interregional variations generally follow respectively the developed and developing group patterns. While the frequency distribution for Latin America exhibits a rather complex pattern, those for African and Asian countries are fairly normally distributed over higher size classes and those for European nations are normally distributed over lower size classes.

28. Burch pointed out that the occurrence of a bimodal distribution in this context is particularly interesting in the light of the similar but even stronger bimodal pattern that appears in distributions of countries by current fertility level (gross reproduction rate or crude birth rate).<sup>40</sup> In the United Nations study of world fertility levels around 1960, two groups of countries are clearly distinguished: a high-fertility group and a low-fertility group, with remarkably few countries on the borderline between them. The distributions for the world as a whole are strikingly bimodal.<sup>41</sup>

29. Such an observation leads to an inference that relatively high average household sizes in developing countries may be due in large part to their high fertility rather than to the extension of residential families. Of course, unlike the gross reproduction rate, the average size of household as an index is not free from the effects of changes and variations in age structure and it must be considered whether the developing countries have age structures contributing to somewhat larger household size than the developed countries, other things being equal. Various factors affecting the size and structure of families and households, including changes in age structure, are examined in section E.

### C. Trends in the size and structure of families and households

#### 1. MULTIPHASIC CHANGES IN STRUCTURE

30. Several salient features, patterns and trends have been noted in the demographic and sociological literature with respect to changes in the size and structure of families and households. Although irregularities and reverses are found in specific cases, the general trend is unmistakably in close association, or parallel with the long-range process of demographic transition in the face of modernization, industrialization and urbanization. Indeed, such secular family changes could not have occurred except in the context of societal modernization, although recently some students of these phenomena have pointed out that such a general interpretation of this relationship has sometimes led to over-simplifications.<sup>42</sup>

31. More specifically, certain characteristic features of households may be distinguished for each of the two major stages of demographic transition, namely (a) the stage of declining mortality, whether rapid or moderate, combined with relatively constant and very high fertility, and (b) the stage where a substantial decline in fertility has been attained and mortality shows further slow decline. Regarding stage (a) in which most developing countries of Africa, Asia and Latin America now find themselves, prominent features are likely to include:

- (1) Moderate increases in average size of household and family,
- (2) Moderate increases in relatively large-size (six persons or more) households and families and moderate decreases in relatively small-size households and families, with say, three persons or less,
- (3) Very small increases or stability in the proportions of heads of households for the different sex and age groups, and
- (4) Small increases or stability in the proportions of nuclear families and moderate increases in the proportions of one-person households in many countries.

<sup>37</sup> Dandekar and Unde, "Inter-state and intra-state differentials ..." (1967), p. 326.

<sup>38</sup> Laslett, "Size and structure of the household ..." (1969).

<sup>39</sup> Bogue, *Principles of Demography* (1969), pp. 369-370.

<sup>40</sup> Burch, "The size and structure ..." (1967), p. 353.

<sup>41</sup> United Nations, *Population Bulletin* ... (1965), especially p. 2.

<sup>42</sup> For example, see Goode, *World Revolution and Family Patterns* (1963); Bell and Vogel, *A Modern Introduction to the Family* (1968), pp. 2 and 7; and Burch, "The size and structure ..." (1967), pp. 347-348.



32. On the other hand, developed countries which have completed stage (b) have been characterized by more distinct and sweeping trends. These include:

- (1) General secular decline in average size of household and family,
- (2) Increases in the proportion of small-size households and families, with, say, three persons or less, and decreases in large-size households and families, say, six or more persons,

- (3) Over-all increases in proportions of heads of households specific for sex and age, except in some middle-aged groups among females, and
- (4) Increases in the proportion of nuclear families and one-person households and decreases in the proportion of multi-generational extended families.

33. The above-mentioned features are only different facets of the dynamic process taking place in families and households as multiphasic responses to a changing

TABLE X.3. TRENDS OF AVERAGE HOUSEHOLD SIZE AND GROSS REPRODUCTION RATES IN TWELVE SELECTED COUNTRIES

United Kingdom (England and Wales)			United States of America			Canada		
Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate
1801	4.60		1790	5.79		1871	5.92	
1811	4.64		1850	5.55		1881	5.40	
1821	4.72		1860	5.28		1891	5.37	
1831	4.68		1870	5.09		1901	5.07	
1851	4.73	2.3	1880	5.04		1911	4.86	
1861	4.38	2.3	1890	4.93		1921	4.63	1.6
1871	4.40	2.4	1900	4.76		1931	4.56	1.4
1881	4.54	2.3	1910	4.54	1.8	1941	4.25	1.4
1891	4.60	2.0	1920	4.34	1.4	1951	4.11	1.7
1901	4.49	1.7	1930	4.11	1.3	1956	4.10	1.9
1911	4.36	1.4	1940	3.77	1.1	1961	4.00	1.9
1921	4.14	1.3	1950	3.52	1.5	1966	3.86	1.4
1931	3.72	0.9	1960	3.38	1.8			
1951	3.19	1.0	1965	3.31	1.4			
1961	3.04	1.4						
1966	3.01	1.3						

Federal Republic of Germany			Belgium			Sweden		
Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate
1871	4.63		1846	4.87		1860	4.28	2.2
1900	4.49		1856	4.84		1870	4.07	2.0
1905	4.45		1866	4.65		1880	3.94	2.1
1910	4.40		1880	4.59		1900	3.72	1.9
1925	3.98		1890	4.56		1910	3.72	1.4
1933	3.61		1900	4.30	1.9	1920	3.64	1.6
1939	3.27		1910	4.05	1.5	1930	3.47	1.0
1950	2.99	1.0	1920	3.73	1.2	1945	2.80	1.3
1956	2.95	1.1	1930	3.41	1.1	1950	2.90	1.1
1957	2.94	1.1	1947	3.00	1.2	1960	2.83	1.1
1961	2.82	1.2	1961	3.03	1.3	1965	2.80	1.2
1967	2.69	1.1						

Japan			France			Netherlands		
Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate
1920	4.99	2.56	1881	3.7	1.7	1899	4.51	2.3
1925	4.98	2.51	1901	3.6	1.4	1909	4.41	2.0
1930	5.08	2.30	1911	3.5		1920	4.28	1.8
1935	5.13	2.13 <sup>a</sup>	1921	3.3	1.3	1930	4.00	1.4
1940	5.10	2.01	1926	3.3	1.1	1947	3.75	1.8
1950	5.02	1.76	1930	3.2	1.1	1956	3.60	1.5
1955	4.97	1.15	1940	3.8	1.0	1960	3.50	1.5
1960	4.52	0.97	1962	3.2	1.4			
1965	4.08	1.04						
1970	3.72							

TABLE X.3. (continued)

Denmark			India			Yugoslavia		
Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate	Year	Average household size	Gross reproduction rate
1901 .....	4.33		1901 .....	5.2		1921 .....	5.10	
1911 .....	4.14		1911 .....	4.9		1931 .....	5.14	
1921 .....	3.99	1.5	1921 .....	4.9		1948 .....	4.37	1.8
1930 .....	3.66	1.2	1931 .....	5.0		1953 .....	4.29	1.7
1940 .....	3.24	1.0	1941 .....	5.12		1961 .....	3.99	1.4
1950 .....	3.14	1.2	1951 .....	4.98				
1960 .....	2.90	1.2	1961 .....	5.21				

SOURCES: In general, household and population data were taken from the population and housing censuses of each country. Data on household size for the United Kingdom (England and Wales) are from Laslett, "Size and structure of the household ..." (1969); Nixon, "Size and structure of the household ..." (1970); Laslett, "The decline of the size of the domestic group ..." (1970). United States data on the average size of household from 1790 to 1950 inclusive are taken from United States, Bureau of the Census, *Historical Statistics of the United States* ... (1960), p. 16. Generally, gross reproduction rates are from United

Nations, *Interim Report on the Conditions and Trends* ... (1972). Gross reproduction rates for 1965 and 1966 are from United Nations, *Demographic Yearbook, 1969* ... (1970), table 31. For the United Kingdom for 1851 to 1881, reproduction rates are from Wrigley, *Population and History* (1969), p. 195. The Japanese reproduction rates were obtained from Institute of Population Problems, *Selected Statistics* ... (1970), p. 3.

\* For 1937.

configuration of demographic, economic and social factors.<sup>43</sup> These features are by no means mutually exclusive, but are rather interlocked with each other. In this section, trends in household size are discussed while other aspects of household change are considered in the following sections.

## 2. SECULAR CHANGES IN AVERAGE SIZE AND STRUCTURE

34. Table X.3 shows historical trends in average size of households and families for the twelve countries for which the pertinent data are available, at least from the beginning of the twentieth century.<sup>44</sup> As the table shows, data for a few of these countries are available even from the beginning of the nineteenth century.<sup>45</sup> Data for all of these countries, except India, show persistent and very remarkable secular declines in average household size for periods of more than fifty years or more. While these eleven countries are all economically developed, India, which belongs to the group of less developed countries, has shown no significant decrease in household size during the past sixty years, since population census taking was initiated in that country.

35. The general trends of declining average household size are considered to be parallel to the secular declines in fertility, and broadly in association with the global process of industrialization and urbanization,<sup>46</sup> though sudden or short-term fertility changes are not necessarily and immediately reflected in changes in household size.

<sup>43</sup> On the concept of multiphasic response, see Davis, "The theory of change and response ..." (1963).

<sup>44</sup> They are the United Kingdom, the United States of America, Canada, the Federal Republic of Germany, Belgium, Sweden, Japan, France, the Netherlands, Denmark, India and Yugoslavia, listed in order according to the number of years for which the data are available.

<sup>45</sup> Six countries, namely, the United Kingdom, the United States of America, Canada, Belgium, Sweden and the Federal Republic of Germany show trends for more than 100 years.

<sup>46</sup> This point is further elaborated later in this section.

In most situations, the decline in average size of household accompanied fertility decline, but in a minority of cases the household size decline lagged a few decades behind the onset of substantial fertility decline, as in the United Kingdom before the twentieth century and Japan before the Second World War. Conversely, short-term fertility increases have not been followed by increases in household size as seen in the United Kingdom, the United States of America, Canada, the Federal Republic of Germany, Sweden and France in the post-war years.

36. The data on household size for France, Sweden, the United Kingdom (England and Wales), and, particularly, Japan, show some reverses and irregularities in the course of their declines, though long-range trends are indisputably clear. India provides very rare and valuable historical data, since the trend displayed may be representative of other less developed countries. The Indian data show that household size has been increasing, instead of decreasing, since 1921. The same type of trend was also observed in Japan at an early stage in that country's development, as well as in many Latin American countries, and the Republic of Korea for which trend data over a short period are available.

37. Sweeping declines in average household size among the more developed countries have been well documented in the literature. In a world-wide review, Levy formulated three developmental types of societies according to their predominant family structure with or without modern medical technology. He hypothesized that a society undergoes transformation from one type to another, suggesting long-run declines in family and household size in the course of modernization. According to Levy's hypothesis, among the individual countries average household size gradually becomes smaller and the international variation narrows.<sup>47</sup>

<sup>47</sup> Levy, "Aspects of the analysis ..." (1965), pp. 48-60. The first type includes "societies devoid of modern medical technology", the second type refers to those "with highly developed modern medical technologies", and the third type is that of "transitional" societies.

TABLE X.4. PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY SIZE, FOR THE UNITED STATES OF AMERICA:  
1790, 1900, 1950 AND 1960

<i>Census year</i>	<i>All households</i>	<i>1 person</i>	<i>2 persons</i>	<i>3 persons</i>	<i>4 persons</i>	<i>5 persons</i>	<i>6 persons</i>	<i>7 persons</i>	<i>8 persons</i>	<i>9 persons</i>	<i>10 or more persons</i>
1790 .....	100	3.7	7.8	11.7	13.8	13.9	13.2	11.2	9.0	6.5	9.0
1900 .....	100	5.1	15.0	19.6	16.9	14.2	10.9	7.7	5.2	3.2	3.1
1950 .....	100	9.3	28.1	22.8	18.4	10.4	5.3	2.7	1.4	0.8	0.9
1960 .....	100	14.7	28.2	18.7	17.5	11.0	10.0				
(6 or more persons)											

SOURCES: For the years 1790, 1900 and 1950, percentage figures were taken from Winnick, *American Housing and its Use* . . . (1957), p. 79. The percentage distribution for the year 1960 was computed from data in United States, Bureau of the Census, *U.S. Census of Population: 1960, Persons by Family* . . . (1964).

38. Taeuber and Taeuber, Glick, Winnick and others agree that the decline in household size in the United States of America has been an outstanding demographic fact, that it has been widespread since 1790 and that the long-term decline in average size has been accompanied by sharp increases in the proportion of very small households—those composed of one and two persons—and by even more dramatic decreases in the proportion of very large households.<sup>48</sup> Since the early days of the nation, the relative numerical importance of small households has more than tripled, their combined share in the total number of households rising from 11.5 to 41.9 per cent by 1960 (see table X.4). Also, the increase has occurred at the same time as the declines in extended families and in multigenerational families.<sup>49</sup>

39. In the United Kingdom (England and Wales) average household size before 1801 was somewhere between 5.1 and 4.6. It appears not to have changed markedly between the pre-industrial era and that which succeeded it in the nineteenth century. Thus, it is interesting to observe that average household size changed little during the period of demographic transition associated with industrialization<sup>50</sup> and the fall in the average size came late, starting somewhere around 1901 (see table X.3).

40. As table X.3 indicates, the gross reproduction rate in England and Wales dropped from 2.3 to 1.7 between 1851 and 1901, whereas during the same period the average household size fluctuated around 4.4-4.6, but did not show any clear sign of declining. By 1911 a downward trend in household size had clearly set in, and it later became rapid and consistent. By 1966, the average size of household had shrunk to 3.01.

41. Thus, the persistent decline in average household size started about 20 to 30 years later than the inception of fertility decline in England and Wales. This suggests

that the considerable fertility decline which would otherwise have contributed to reducing household size had been offset by the decline in mortality which normally has the effect of increasing average household size. In fact, mortality decline had already started well before 1851<sup>51</sup> and the onset of the decline in the net reproduction rate took place only around 1881, having lagged 10 to 20 years behind the decline in the gross reproduction rate.<sup>52</sup>

42. The British experience outlined above further suggests that the nuclearization of families caused usually by rural-urban migration and associated with the general rise in the standard of living did not take place during the nineteenth century to such a degree that it combined with the force of fertility decline to offset the effect of mortality decline and produce a real decline in the average household size. Nuclearization, it appears, set in only after the beginning of the twentieth century, and it gathered momentum only after the Second World War.<sup>53</sup> Even during the post-war period when fertility was substantially increased (the gross reproduction rate being raised from 1.0 to 1.4 and the net reproduction rate from 1.0 to 1.3 between 1951 and 1961), household size still decreased appreciably, from 3.19 in 1951, to 3.04 in 1961, and to 3.01 in 1966.

43. The fundamental changes in the size distribution of households that caused the secular decline in the average household size are shown in table X.5, which summarizes the changes in the percentage distribution of private households by size group in England and Wales for the period 1911 to 1966. These tables show a persistent and very remarkable increase in the proportion of small size

<sup>51</sup> Petersen, *Population* (1961), p. 393. Also, data compiled by Glass show that the decline in the crude death rate in England and Wales took place around 1750, while the birth rate started to decline after 1870. See Glass, "Population and population movements in England . . ." (1965).

<sup>52</sup> Wrigley, *Population and History* (1969), p. 195.

<sup>53</sup> Laslett hypothesized that the decline was largely due to the disappearance in the twentieth century of domestic servants, who had constituted a large number in pre-twentieth century British society. See Laslett, "Size and structure of the household . . ." (1969); and his *Household and Family in Past Time* (1972). In the present chapter, the term "nuclearization" may be broadly interpreted not only to denote the process of undoubling or separating off of multigenerational families into nuclear families and one-person households, but also to include the process of disappearance of domestic servants from their employers' households.

<sup>48</sup> Taeuber and Taeuber, *The Changing Population* . . . (1958), pp. 170-171; Glick, *American Families* (1957), pp. 21-23; Winnick, *American Housing and its Use* . . . (1957), p. 79. Also see Morton, *Housing Taxation* (1955), pp. 70-73.

<sup>49</sup> Kirkpatrick, *The Family as Process* . . . (1963), pp. 137-138.

<sup>50</sup> Laslett, "Size and structure of the household . . ." (1969), pp. 210-211. Some data are available from as far back as 1564. However, the data available between 1564 and 1801 constituted a rather small sample, and average household sizes for these years may not be comparable to the figures available since 1801 based on the population censuses.

TABLE X.5. PERCENTAGE DISTRIBUTION OF PRIVATE HOUSEHOLDS BY SIZE CLASS  
IN THE UNITED KINGDOM (ENGLAND AND WALES), 1911-1966

Size class of household	Year					
	1911	1921	1931	1951	1961	1966
Total .....	100	100	100	100	100	100
Small (one to three persons) ..	40.8	44.5	52.7	63.6	65.4	67.2
One-person .....	(5.3)	(6.0)	(6.7)	(10.7)	(11.9)	(15.4)
Two to three persons .....	(35.5)	(38.5)	(46.0)	(52.9)	(53.5)	(51.8)
Medium (four to six persons) .	42.9	41.9	39.1	33.0	32.0	30.4
Large (seven persons) .....	16.3	13.6	8.2	3.4	2.6	2.5

SOURCES: For 1911: Nixon, "The size, constitution and housing standards ..." (1935), p. 144. For 1921: Laslett, "Size and structure of the household ..." (1969), p. 212. For 1931 and 1951: Nixon, "On the size, constitution and housing standards of households ..." (1952), p. 136. For 1961: United Kingdom, General Register Office, *Census, 1961, England and Wales; Household ...* (1966), p. 28. For 1966: United Kingdom, General Register Office, *Sample Census 1966, Great Britain ...* (1967), p. 46.

households (1-3 persons), from 40.8 per cent in 1911 to 67.2 per cent in 1966. Up to 1931, the increase was more prominent in the 2-3 person households, but thereafter it was more striking in one-person households, from 6.7 per cent to 15.4 per cent between 1931 and 1966. From 1931 to 1951, the number of these households more than doubled<sup>54</sup> and by 1966 had more than tripled.<sup>55</sup> Between 1961 and 1966, although the 2-3 person household group showed a decrease in its percentage share, the substantial increase in the one-person households enabled the share of the small-size household group as a whole to show a further increase.

44. As opposed to these trends, the medium size households (4-6 persons) show a gradual but substantial decline, the reduction being particularly large between 1931 and 1951. A large decline is evident in large size households of seven persons and over. In fact, this category is shown to have almost disappeared, falling from 16.3 per cent in 1911 to 2.5 per cent in 1966. These features are similar to those observed in the United States of America, as well as in Western and Eastern European countries and Japan, as seen below.

45. In many of the Eastern European countries, statistics on households and families have been developed only after the Second World War, thus not permitting the study of long-term trends. Moreover, numerous territorial changes in this part of Europe make it rather difficult to compare pre-war and post-war data.

46. In all Eastern European countries—with the exception of Poland and Yugoslavia—household size declined continuously throughout the period for which data are available. Although the decrease in the average size of households between the period 1930-1931 and the post-war census years can be ascribed partly to the changes in the definition of households,<sup>56</sup> there is no doubt that

in all the countries studied the decrease constitutes a long-term social and demographic process. The extent of these changes can be best seen in Czechoslovakia and Yugoslavia, where average household size declined during a forty-year period from 4.31 to 3.13 in the former country and from 5.10 to 3.99 in the latter (table X.6). It is interesting, however, to note that in Yugoslavia the decrease was not linear between 1921 and 1948 and that during the period 1921-1931 there was an increase in average household size.

TABLE X.6. TRENDS OF AVERAGE HOUSEHOLD SIZE  
IN CZECHOSLOVAKIA AND YUGOSLAVIA

Czechoslovakia		Yugoslavia	
Year	Average size	Year	Average size
1921 .....	4.31	1921 .....	5.10
1930 .....	3.93	1931 .....	5.14
1950 .....	3.38	1948 .....	4.37
1961 .....	3.13	1953 .....	4.29
		1961 .....	3.99

SOURCES: For Czechoslovakia, 1921 data computed from Sestavil Státní úřad statistický, *Statistický přehled ...* (1930); 1930 data from Státní úřad statistický, *Statistická ročenka ...* (1957); 1950 data supplied by Federální statistický úřad; 1961 data from Federální statistický úřad, *Statistická ročenka ...* (1969). For Yugoslavia, Rančić, "Utjecaj nekih demografskih i socio-ekonomskih faktora ..." (1966), p. 200.

47. Increases in household size, which are rather unusual in the recent history of Europe, occurred in Poland after the Second World War. The average size of households in Polish cities increased from 2.84 to 3.09 between 1950 and 1960. At the same time, the proportion of small households—those containing one to three persons—declined from 68.0 to 60.9 per cent, while that of households with four or more members increased from 32.0 to 39.1 per cent.<sup>57</sup> Further analysis shows that not only average household size, but also the number of adults per household rose—from 1.81 to 1.90 during this period. Viewed in a different way, this means that the headship rate per adult population, i.e., the number of households per adult population at each census

<sup>54</sup> Nixon, "On the size, constitution and housing standards of households ..." (1952), p. 136.

<sup>55</sup> *Ibid.* See also United Kingdom, General Register Office, *Sample Census 1966, Great Britain ...* (1967), p. 3.

<sup>56</sup> The new definitions of households adopted in the censuses taken after the Second World War have in practically every country led to a marked increase in the number of one-person households. This was dealt with explicitly by Litterer-Marwege, *Rozwój Ludności Polski a planowanie ...* (1967), pp. 237-239.

<sup>57</sup> Poland, Główny Urząd Statystyczny, *Rocznik statystyczny, 1964* (1964), p. 39.

year, dropped from 55.2 to 52.6 per cent.<sup>58</sup> While interpretation of these changes is complicated, three major factors appear to be involved: first, the considerable decrease in one-person households owing to socio-economic changes;<sup>59</sup> secondly, the cumulative effects of high fertility between 1950 and 1955 which resulted in a higher proportion of children in the population in 1960 as compared to 1950;<sup>60</sup> and thirdly, the effects of long-term declining mortality which caused an increase in the average number of adults, as well as of children, per household in Polish urban communities.<sup>61</sup>

48. As in the United States of America, and the United Kingdom, the general trend of decreasing household size in Eastern Europe has been accompanied by considerable changes in the distribution of households by size, namely an increase in the proportion of small households and a decrease in that of large households. In Czechoslovakia substantial increases are noted both in the one-person and two-person households—from 10.8 to 14.3 per cent and 23.4 to 26.8 per cent, respectively, between 1950 and 1961. On the other hand, the medium-size and the large-size households show downward trends.<sup>62</sup>

49. In Hungary, also, substantial increases are observed in the two-person and three-person families and decreases in the four-and-more-person families. Already in 1949, Hungary was noted for its small proportion of large families, as those of six persons and over constituted only 10.7 per cent, but this figure had further decreased to 5.8 in 1960 and to 5.3 in 1963.<sup>63</sup>

50. The experience of Japan with regard to changes in average household size is of special importance because of its implications for developing countries, since Japan is the only Asian country which has completed the stages of demographic revolution in response to socio-economic transformation from a rural-agricultural to an urban-industrial society, and since these demographic and socio-economic changes took place so recently and so dramatically within a short time.

51. As shown in table X.3, at the time of Japan's first national census in the modern sense in 1920, the average household size was 4.99 persons.<sup>64</sup> The 1930

census revealed, however, an increase to 5.08 persons and a further rise to 5.13 was recorded at the 1935 census. After 1935, however, there was a slow decline which persisted until 1955, when the average reached the level of the 1920s. After 1955, the downslope suddenly steepened, with a fall to 4.52 in 1960, 4.08 in 1965, and 3.72 in 1970.

52. The gross reproduction rate declined considerably from 2.56 to 2.13 between 1920 and 1935, the latter being the census year when the average household size reached its peak at 5.13 persons. In other words, average household size was increasing, while fertility declined considerably. This implies that although the effect of the fertility decline towards reducing average household size was substantial, other forces operating in an opposite direction were stronger. Thus, there appears to have been a time lag between the start of fertility decline and the reduction of the average household size.

53. In the case of pre-war Japan, the forces which cancelled out the effect of fertility decline were a perhaps more significant decline in mortality<sup>65</sup> and the tenacity of the extended family system in some sectors of the Japanese society.<sup>66</sup> According to Tachi, during the 1920s and 1930s, the nuclearization of families did not take place in Japan, as had occurred earlier in the West, despite the fact that industrialization and urbanization were fairly well advanced and that a considerable fertility decline had occurred. He further argued that the effects of mortality decline can easily outweigh the effects of fertility decline on household size since the effects of annual fertility change upon the age structure of population are limited to the age group under one year and, therefore, they are only cumulatively effective in influencing the whole population structure, whereas those of annual mortality change have direct effects upon all ages even though they are normally greatest in ages under five.<sup>67</sup>

54. Changes in the distribution of households by size in Japan also follow the general patterns observed in Europe and Northern America. That is to say, they show a considerable increase in one-person households, a sizable increase in the medium-sized households (two to five persons), and a marked decrease in the large-sized households (six persons and over). The changes in percentage distribution of private households are shown in table X.7.

<sup>58</sup> Computed from census data.

<sup>59</sup> One-person households declined from 25.7 to 21.1 per cent of all households. Poland, Główny Urząd Statystyczny, *Rocznik statystyczny*, 1964 (1964), p. 39.

<sup>60</sup> United Nations, *Demographic Yearbook*, 1970 ... (1971), table 6.

<sup>61</sup> Between 1952-1953 and 1960-1961, life expectancy at birth for males rose from 58.6 to 64.8. United Nations, *Demographic Yearbook*, 1966 ... (1967), table 21.

<sup>62</sup> 1950 data supplied by Federální statistický úřad; 1961 data from Jureček, "Velikost a struktura domácností ..." (1963), p. 195.

<sup>63</sup> Tamásy, "A Magyar családok nagysága és összetétele" (1964), p. 411; Szabady, "A Magyar családok demográfiai sajátosságai" (1966), p. 1062.

<sup>64</sup> Official data on average size of households are not available before 1920, but Hayami made estimates for some provinces in Tokugawa Japan from the seventeenth to nineteenth centuries. Although there were considerable variations from region to region, most households were reported to have been surprisingly small, mostly between four and five persons in the eighteenth and nineteenth centuries. See Hayami, "The population at the beginning of the Tokugawa period ..." (1966-1967); Hayami and Uchida, "Analysis of trends in the mean size of households ..." (1972).

<sup>65</sup> The crude death rate decreased substantially from 25.4 per 1,000 in 1920, to 20.3 in 1925, to 18.2 in 1930, and to 16.8 in 1935. Japan, Ministry of Health and Welfare, *Showa 42-nen jinko dotai tokei*, vol. 1 (1970), p. 86. At the same time life expectancy at birth rose from 42.1 for males and 43.2 for females in the period 1921-1925 to 46.9 and 49.6 years, respectively, in the period 1935-1936. Japan, Ministry of Health and Welfare, *Dai 9-kai seimeihyo* (1955), pp. 78-81 and pp. 86-89.

<sup>66</sup> This does not mean, however, that Japanese families even in 1920 were predominately of the extended family form consisting of three or more generations. In fact, they were more dominantly of the nuclear family type. See Toda, *Kazoku kosei* (1953); Koyama, "Kazoku kosei no henka" (1962); and Morioka, "Kazoku no keitai" (1966), pp. 6-9. According to a sample of 11,216 households from the 1920 national population census, the average household size was 4.9 persons and the average family size was 4.5 persons. See Toda, *Kazoku kosei* (1953).

<sup>67</sup> Tachi, "Jinko tenkan katei kara mita ..." (1967), especially pp. 78-81.

TABLE X.7. CHANGES IN PERCENTAGE DISTRIBUTION OF PRIVATE HOUSEHOLDS  
BY MAJOR SIZE-CLASS IN JAPAN, 1920-1965

Size-class of household	Year					
	1920	1930	1950	1955	1960	1965
Total .....	100	100	100	100	100	100
One person .....	5.7	5.5	5.4	3.5	5.2	7.9
Two to five persons .....	57.6	56.1	56.2	58.6	64.4	71.4
Six persons and over .....	36.7	38.4	38.4	38.0	30.4	20.7

SOURCE: Based on the 100-per cent count of respective censuses. See Kono, "Changes in households and family structure ..." (1971).

55. From table X.7 it is clear that the distribution of households by size-class was remarkably stable from 1920 to 1955, except for some slight decreases in the percentage of one-person households and small increases in that for the medium-size and large-size households which were partly due to the consequences of the post-war marriage and baby booms, and partly due to changes in the definition of "household", which particularly affected the number of households.<sup>68</sup> Since 1955 the distribution has changed suddenly and substantially. It is observed that the percentages of the small- and medium-size households have increased, and conversely the percentage of large households with six persons or more has declined, the latter trend being particularly significant.

56. For the past sixty years India has shown a relatively stable average household size, although it has been increasing more recently. For instance, household size was found to be larger in many states of India in 1941 than

in 1931. Though definite trends had not been observed in the past, they were obvious for the decade 1951-1961, when household size increased in the rural and urban areas of many states, as well as in the national average (see table X.3). Thus, it would appear that much of the discussion in the sociological literature on the prevalence of the joint family in the past and its gradual break-up in recent years does not find substantial support from the census data.<sup>69</sup>

57. Orenstein also examined similar data from the successive decennial censuses by individual states from 1911 to 1951 and found that, contrary to expectation, there was no sign of a decrease in household size in the period 1911-1951. Data for earlier years are sporadic, but a review of them offers little to contradict this finding. The longest time-series given in Orenstein's study, for the State of Punjab, shows the following trend:<sup>70</sup>

<sup>68</sup> Dandekar and Unde, "Inter-state and intra-state differentials ..." (1967), pp. 325-326.

<sup>70</sup> Orenstein, "The recent history of the extended family ..." (1961), p. 345.

Year	1855	1868	1881	1891	1911	1921	1931	1941	1951
Average household size	4.5	4.3	4.6	4.7	4.5	4.6	4.8	5.2	4.9

Sampling data from many other states, the author concluded that household size in India up to 1951 had not declined.<sup>71</sup>

58. Orenstein recognized that the relative constancy in average household size did not necessarily imply that the long-maintained joint family system was still intact, since it was possible that the effects of its decline were obscured by the substantial declines both in crude death rates and infant mortality rates which had been realized in India<sup>72</sup> and which tended to expand family size. He found, however, that the proportions of married and widowed men per household, instead of declining as would be expected with a decline in extended families, had shown some increase from 1911 to 1951 in most of the states. The weighted average ratio, which could be

taken to roughly represent India as a whole, was 1.31 in 1911, 1.26 in 1921, 1.38 in 1931 and 1.33 in 1951. These data support the conclusion that the joint family had not decreased in significance.<sup>73</sup> While there are some growing tendencies in India's recent history, such as a growth of individualism, an increase of rural-urban migration and a rise in the standard of living, which would tend to encourage a disintegration of joint or extended families, such factors were apparently offset by the effects of mortality decline, unaccompanied by fertility decline. Dandekar and Unde maintain that the increase in average household size in India recently has been due mainly to the decline in mortality.<sup>74</sup> Because mortality improvements have followed an uneven pattern, being concen-

<sup>71</sup> *Ibid.*, p. 346.

<sup>72</sup> See, for example, estimates in Davis, *The Population of India and Pakistan* (1951), pp. 34-35.

<sup>73</sup> Orenstein, "The recent history of the extended family ..." (1961), pp. 347-348.

<sup>74</sup> Dandekar and Unde, "Inter-state and intra-state differentials ..." (1967), pp. 316-317.

trated heavily among the young, the size of the child population has increased relatively more than that of the adult population.

### 3. DEMOGRAPHIC TRANSITION AND DECLINE IN AVERAGE HOUSEHOLD SIZE

59. The foregoing review of historical trends in selected countries reveals some interesting features of the interactions between demographic factors and average household and family size. When data became available in the West, the process of modernization, the decline in fertility and the reduction in average size of household and family were already in progress. During the period for which observation is possible, substantial reductions in household and family size parallel with fertility declines are seen to have occurred, although certain exceptions and fluctuations are noted, particularly in France, Sweden, the United Kingdom and Yugoslavia (see table X.3). On the other hand, in the case of Japan, the demographic transition and historical changes in household and family size began quite differently, and the initiation of a trend towards modernization in Japanese families, as expressed in shrinking family size, lagged almost half a century behind the inception of fertility decline.

60. In the developing societies of Asia and Latin America, where doubled-up households are still of some numerical importance, rapid mortality decline without substantial fertility decline has currently been causing increases in average household and family size. Burch noted that in Panama, for example, average household size rose from 3.9 in 1940 to 4.5 in 1950 and then to 4.7 in 1960. In Nicaragua it increased from 5.9 to 6.1 between 1950 and 1963, and in Mexico from 5.0 to 5.4 between 1950 and 1960.<sup>75</sup> Moreover, in El Salvador, family size grew from 5.1 to 5.4 between 1950 and 1961, and in Costa Rica, from 5.6 in 1950 to 5.7 in 1963. In Asia, average household size increased in the Republic of Korea from 5.66 in 1955 to 5.71 in 1960; in India, from 5.0 to 5.2 between 1951 and 1961; in Iran, from 4.8 to 5.1 between 1956 and 1966; in Ceylon, from 5.0 to 5.4 between 1953 and 1963; and in the Philippines, from 5.5 to 5.8 between 1948 and 1960.<sup>76</sup> It may be expected that these increases will halt eventually, and family size will start to decrease after the demographic transition has proceeded further, and fertility decline overtakes mortality decline.<sup>77</sup> Application to the developing countries of Tachi's interpretation of the interrelationship between demographic factors and average household size in the framework of the demographic transition theory<sup>78</sup> is completely in agreement with Levy's general hypothesis,<sup>79</sup> as outlined above. Developing Levy's sociological framework,<sup>80</sup>

Burch also generalizes that a rise in average household size could occur as an early response to modernization simply because of the rise in the average number of surviving children. As fertility levels begin to fall in developing countries, in response to lower mortality levels and changed living conditions, the demographic transition is likely to have its parallel in family and household structure.<sup>81</sup>

### D. Patterns and differentials in headship rates

#### 1. NOTION OF THE HEADSHIP RATE

61. The headship rate denotes a ratio of the number of heads of households by sex, age, marital status etc., to the corresponding categories of population.<sup>82</sup> The concept of the headship rate is very important since it is a pivot around which the modern method of projecting households and families turns.<sup>83</sup> It also serves as a good indicator for measuring the degree of housing privacy enjoyed by each segment of the population<sup>84</sup> and has been used as an index for measuring the extent of joint family.<sup>85</sup>

62. As pointed out earlier, the family is viewed as a product of purely demographic factors such as fertility, mortality, nuptiality and divorce, but the household is considered a product of those demographic factors plus conditioning or intervening socio-economic factors. Accordingly, the gap between the household headship rate and family headship rate in a certain sex-age group signifies the degree of doubling-up of families within households.<sup>86</sup>

63. In a recent United Nations study, forty-three different sets of census household headship rates by sex and age pertaining to thirty-three countries have been examined.<sup>87</sup> To facilitate analysis, the data were first divided according to the dichotomy of more developed and less developed regions and secondly by three *per capita* income groups (see tables X.8 and X.9).

<sup>81</sup> Burch, "The size and structure ..." (1967), pp. 360-361.

<sup>82</sup> Of course, the headship rate can also be computed for families as well as households. However, the household headship rate is far more meaningful and far more frequently employed in analyses and projections than the family headship rate. Therefore, unless otherwise mentioned, headship rates given in the present chapter are household headship rates.

<sup>83</sup> United Nations, *Manual VII: Methods of Projecting Households and Families* (1973), p. 31.

<sup>84</sup> Beresford and Rivlin, "Privacy, poverty, and old age" (1966), p. 247. According to these authors, privacy can be measured statistically by the proportion of households containing only one person or one nuclear family. Changes in the proportion of persons over a specified age reported in the census as "head" or "wife of head" of the household also reflect changes in the degree of privacy.

<sup>85</sup> Dandekar and Unde, "Inter-state and intra-state differentials ..." (1967), p. 331.

<sup>86</sup> The United Nations statistical definition assumes that the family is always included within a household and not vice versa. Also, it should be noted that households may consist of only one member, whereas there can be no one-member families. See United Nations, *Principles and Recommendations for the 1970 Population Censuses* (1969), pp. 20-21.

<sup>87</sup> United Nations, *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>75</sup> Burch, "The size and structure ..." (1967), p. 360.

<sup>76</sup> *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>77</sup> *Projections of the Number of Households and Families*, to be issued as a United Nations publication.

<sup>78</sup> See Tachi, "Jinko tenkan katei kara mita ..." (1967), p. 80.

<sup>79</sup> Levy, "Aspects of the analysis ..." (1965), especially p. 49.

<sup>80</sup> *Ibid.*, p. 56. Levy correctly notes that the major initial effect of declining mortality would be to increase the number of surviving children.



TABLE X.8. UNWEIGHTED AVERAGE AGE-SPECIFIC HOUSEHOLD HEADSHIP RATES FOR MALES AND FEMALES IN THE THIRTY-ONE COUNTRIES WITH AVAILABLE HEADSHIP DATA CLASSIFIED ACCORDING TO THE LEVEL OF DEVELOPMENT, AROUND 1960<sup>a</sup>

(Percentage of heads among population of given age group)

Degree of development	Age (years)					
	15-24	25-34	35-44	45-54	55-64	65 and over
<b>Males</b>						
More developed <sup>b</sup> .....	10.8	68.5	87.4	91.3	90.6	79.0
Less developed <sup>c</sup> .....	13.3	59.6	81.3	87.0	87.3	77.5
<b>Females</b>						
More developed <sup>b</sup> .....	2.7	5.4	8.8	15.5	23.3	34.5
Less developed <sup>c</sup> .....	2.4	8.5	15.9	24.6	32.7	37.0

SOURCE: United Nations, *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>a</sup> Data for six countries were available only for years around 1950.

<sup>b</sup> Includes data for twenty countries.

<sup>c</sup> Includes data for eleven countries. Of the thirteen developing countries included in the study, Guadeloupe and Martinique are here excluded partly because of their rather abnormal age patterns and partly because of their small populations.

## 2. SEX-AGE-SPECIFIC HEADSHIP RATES IN COUNTRIES AT DIFFERENT LEVELS OF DEVELOPMENT

64. Table X.8 shows unweighted average age-specific headship rates for the more developed and less developed country groups. The age patterns of headship rates closely resemble those of economic activity rates. As in the latter, the male headship rates are higher than the female rates at all age groups.<sup>88</sup> This simply reflects the fact that in all societies man in his prime of life assumes the role of chief bread-winner in the household as well as the main responsibilities for family affairs, apart from domestic chores, child-bearing and child-rearing.

65. As in the case of labour force participation rates, the specific headship rate for males is low in the young ages, but it increases with increasing age and reaches a peak around 90 per cent sometime after age forty-five. For example, in the United States of America (1960) it occurred in the age group 45-49 years (90.8 per cent). In Sweden (1965), it fell in the age group 60-64 years (92.8 per cent); in Japan (1965) in the age group 50-54 years (93.8 per cent); in Hungary (1960) in the age group 50-54 years (89.3 per cent); in Panama (1960) in the age group 55-64 years (86.4 per cent). Indeed, of thirty-one countries included in the present analysis, nearly all showed peak headship rates for males either in the ten-year age group 45-54 or 55-64 years. These are ages when men generally reach the apex of social power and prestige, bolstered by the highest earnings of their lifetime.<sup>89</sup> Noting that decreasing employment opportunities and declining health with advancing age increasingly limit the possibilities for maintenance of separate households by elderly men, Winnick pointed out that whereas more

than nine out of ten men in their sixties in the United States are listed as household heads, after age seventy-five the proportion was only about seven out of ten.<sup>90</sup>

66. Differences in age-specific headship rates between the more developed and less developed countries are less significant for males than for females. In all except the youngest age group, male headship rates are uniformly higher in the more developed than in the less developed countries. For the 15-24 age group, the higher average headship rate found in the less developed countries is largely influenced by the high levels reported in India (West Bengal, 1951) and to a lesser extent in Brazil. India, of course, is noted for very early marriages of boys still in their teens.<sup>91</sup> Indeed, of the thirty-eight censuses studied, a very high correlation (+0.80) was found between the headship rate for this young age group and the percentage of the population who were married. For the other five age groups, coefficients of correlation were much less significant.<sup>92</sup>

67. The patterns for females show much wider differences than do those for males between the more developed

<sup>88</sup> Winnick, *American Housing and Its Use* ... (1957).

<sup>91</sup> For example, see Agarwala, *Age at Marriage in India* (1962), chaps. 4, 5, 9; and Collver, "The family cycle in India and the United States" (1963).

<sup>92</sup> On the other hand, between the headship rate and the percentage of agricultural workers as indicating the degree of economic under-development, the correlation is negative and relatively insignificant for this youngest age group of 15-24, while the other age groups show negative values, varying from considerably significant (-0.57 for age group 35-44 and -0.54 for 45-54) to insignificant (-0.20 for 65 years and over). It might be hypothesized that higher male headship rates for age group 15-24 in the less developed countries are attributable to higher economic activity rates in the less developed countries than in the more developed ones (see chapter IX). However, the coefficient of correlation between the headship rate and the economic activity rate for the age group 15-24 was only +0.17. Moreover, application of multiple regression analysis to assess relative importance of the level of development, economic activity rate and percentage ever-married showed that the factor of marital status could explain about 81 per cent of the variation of headship rates for the age group 15-24.

<sup>88</sup> This was pointed out by Winnick. See his *American Housing and Its Use* ... (1957), p. 94.

<sup>89</sup> Woytinsky, *Earnings and Social Security* ... (1943), pp. 228-249; Sweden, Statistiska Centralbyrån, *Folk-och bostadsräkningen den 1 November 1965; IX* ... (1969), pp. 46-47, 54-55; United States, Bureau of the Census, *Income in 1969 of Families and Persons* ... (1970), p. 85.

TABLE X.9. UNWEIGHTED AVERAGE SEX-AGE-SPECIFIC HOUSEHOLD HEADSHIP RATES FOR THIRTY-ONE COUNTRIES CLASSIFIED ACCORDING TO THREE LEVELS OF *per capita* INCOME, AROUND 1960<sup>a</sup>  
(Percentage of household heads among population of each sex-age group)

<i>Sex and age (years)</i>	<i>High per capita income group<sup>b</sup> (13 countries)</i>	<i>Medium per capita income group<sup>c</sup> (10 countries)</i>	<i>Low per capita income group<sup>d</sup> (8 countries)</i>
<i>Males</i>			
15-24 .....	11.9	9.2	14.4
25-34 .....	71.3	62.8	58.9
35-44 .....	88.4	84.9	80.5
45-54 .....	91.5	90.6	86.1
55-64 .....	92.1	87.8	87.1
65 and over .....	82.3	73.5	78.5
<i>Females</i>			
15-24 .....	3.2	1.7	2.5
25-34 .....	5.9	5.7	8.6
35-44 .....	8.6	11.1	16.1
45-54 .....	15.5	18.3	24.7
55-64 .....	25.3	23.6	32.6
65 and over .....	39.8	28.0	37.6

SOURCE: United Nations, *Manual VII: Methods of Projecting Households and Families* (1973), p. 76, table 42.

<sup>a</sup> Data for six countries were available only for years around 1950.

<sup>b</sup> \$ U.S. 800 and over.

<sup>c</sup> \$ U.S. 400-799.

<sup>d</sup> Under \$ U.S. 400.

and less developed countries. There is a similar tendency in both country groups for headship rates to be very low in the youngest age group, and then to increase with the advancement of age. But, beyond this point there are few analogous features between them. Except for the youngest age group, the less developed countries show higher rates than the more developed countries in all age groups—precisely opposite to the pattern found among males. The difference between the two groups is slight at the youngest ages, but it widens at middle age, and at ages 35-44 the rate for the less developed is almost twice as high as that for the more developed countries. At ages 55-64 years, the rate for the less developed countries exceeds that for more developed by 9.4 per cent. Curiously enough, for the age group 65 and over, the difference narrows to only 2.5 per cent.

68. Of various correlation coefficients that were calculated, only that between the headship rate and the percentage of women not currently married was found to be very significant, particularly for the middle age group of 45-54 (+0.74) and to a lesser degree for the surrounding age groups of 34-44 years (+0.43) and 55-64 years (+0.47). On the contrary, in the youngest age group, marital status was found to be scarcely relevant to the level of headship rate.

69. Demographic studies of the determinants of sex-age specific headship rates are virtually non-existent. From the United Nations preliminary analyses, it appears that female headship rates are not significantly related to marital status except in the middle age groups where, if women are widowed, divorced or single, they are more likely to have their own households. In other age groups, the marital status factor is insignificant. On the whole, the probabilities of women becoming heads of house-

holds appear to be much more unpredictable than those of men.

### 3. SEX-AGE-SPECIFIC HEADSHIP RATES BY THREE MAJOR *per capita* INCOME GROUPS

70. Table X.9 shows unweighted average sex-age-specific household headship rates for three groups of countries classified by income level.<sup>93</sup> As far as the male rates are concerned, a typical uni-modal curve is observed in each of the three groups of countries. It is noted that intergroup variations are small in the age groups 45-54 and 55-64 years, where rates in the vicinity of 90 per cent are observed, whereas variations are large in the age groups 65 and over, and particularly at ages 25-34. At ages from 25 to 64, rates are highest in the highest-income countries and lowest in the low-income countries. In the age group 15-24, on the other hand, rates for the low-income countries are higher than those for the countries with high or medium income. And at ages 65 and over, the low-income countries show higher rates than the medium-income countries. It must be emphasized, however, that the medium-income and low-income countries for which data are available are probably not very

<sup>93</sup> Thirty-one countries for which data are available have been classified as follows:

(a) High *per capita* income: Australia, Belgium, Canada, Denmark, Federal Republic of Germany, Finland, France, Luxembourg, the Netherlands, Norway, Sweden, Switzerland and the United States of America.

(b) Medium *per capita* income: Argentina, Austria, Czechoslovakia, Greenland, Hungary, Italy, Japan, Puerto Rico, Singapore and Trinidad and Tobago.

(c) Low *per capita* income: Brazil, Costa Rica, El Salvador, Guatemala, Haiti, India, Nicaragua and Panama.

TABLE X.10. TRENDS OF SEX-AGE-SPECIFIC HOUSEHOLD HEADSHIP RATES  
FOR THE UNITED STATES OF AMERICA AND JAPAN  
(Percentage of household heads among population of each sex-age group)

Sex and age (years)	United States of America				Japan		
	1930	1940	1950	1960	1955	1960	1965
<b>Males</b>							
15-24 .....	11.2	10.6	17.0	19.8	4.1	4.3	6.9
25-34 .....	61.3	62.2	71.0	80.3	50.4	51.5	58.1
35-44 .....	79.2	79.5	83.4	89.3	84.1	81.7	81.8
45-54 .....	83.3	84.3	85.7	90.7	93.5	92.7	92.5
55-64 .....	83.4	84.2	85.2	89.9	90.6	91.1	92.0
65 and over .....	72.8	75.4	75.9	83.0	60.5	63.1	66.3
<b>Females</b>							
15-24 .....	1.0	0.9	1.5	2.7	0.7	1.0	2.1
25-34 .....	3.8	4.3	4.4	6.9	3.6	3.3	4.1
35-44 .....	8.0	9.6	8.6	10.0	12.7	10.5	8.9
45-54 .....	13.7	15.1	14.5	15.3	14.9	17.5	17.8
55-64 .....	20.7	22.4	21.3	24.0	13.2	14.4	16.6
65 and over .....	27.4	32.7	31.8	36.3	9.4	10.4	11.8

SOURCE: *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

representative of these groups as a whole.<sup>94</sup> The countries here included in the medium-income group are geographically and culturally heterogeneous, unlike the high-income group. If the thirty-one countries are classified by region, the average rates for all age groups, except for the group 15-24 years, are arrayed from high to low in the following order: Europe and North America (eighteen countries), Latin America (ten countries) and Asia (three countries).

71. For females the pattern is generally opposite to that for males. Except for the youngest age group, 15-24 years, and the oldest age group, 65 years and over, low-income countries show higher headship rates than high-income countries. In each income group, peak female headship rates occur at ages 65 years and over. A particularly sharp increase in rates between the age group 55-64 and the oldest age group studied is found in the high-income group. Regionally, the high female headship rates in Latin America above age 25 are noteworthy.

#### 4. CHANGE IN SEX-AGE-SPECIFIC HEADSHIP RATES

72. A number of studies in Europe, Japan and the United States of America have revealed that generally headship rates have increased over time in all sex-age groups except in the middle-age groups of females.<sup>95</sup> Increases are particularly notable at ages under 35 years for both sexes.

<sup>94</sup> These include only three countries in Asia and none in Africa.

<sup>95</sup> Winnick, *American Housing and Its Use* ... (1957), chap. 8; United States, Bureau of the Census, *Illustrative Projections of the Number of Households and Families* ... (1958); Cullingworth, *Housing Needs and Planning Policy* (1960), chaps. 1-4; Needleman, *The Economics of Housing* (1965), pp. 20-26; Japan, Institute of Population Problems, *Zenkoku todofuken betsu setaisu* ... (1966); Beresford and Rivlin, "Privacy, poverty and old age" (1966); Parke and Grymes, "New household projections for the United States ..." (1967); Kono, "Changes in households and family

73. Because of their striking contrasts, trends in sex-age headship rates for Japan and the United States of America are shown in table X.10. In both countries a remarkable increase in headship rates has occurred among males in the youngest age groups, 15-24 and 25-34 years. Significant increases have also occurred in headship rates for both males and females in the age group 65 years and over. These are the ages where the widest difference in headship rates is found between the two countries, those for the United States being substantially higher than those for Japan.

74. On the other hand, in the ages from 35 to 64 years, headship rates have been relatively stable for both sexes in Japan, and for females in the United States of America. Rates for males of these ages in the latter country have shown a moderately rising trend. Relatively lower headship rates for these age groups among United States males than among Japanese males may be due to the fact that the United States has been using the housing-unit approach, while Japan has been employing the housekeeping-unit approach: the housing-unit approach usually excludes lodgers and roomers as heads of households, while the housekeeping-unit approach includes these persons in the category of household heads.<sup>96</sup>

structure in Japan" (1971). Valuable studies have also been issued by the Governments of Denmark, Finland, the Netherlands, Norway and Sweden in mimeographed form. The above publications do not constitute an exhaustive list of studies concerning the world-wide phenomena of general increases in sex-age headship rates, but they do document the major trends in this area.

<sup>96</sup> The housekeeping-unit approach regards the household as a person or group of persons living in the same housing unit and having common provisions for essential living needs, particularly food, whereas the housing-unit approach is concerned only with one aspect—living in the same housing unit; hence, an application of the housing-unit concept obviously does not provide information for the direct analysis of two or more separate housekeeping groups sharing the same dwelling unit.

TABLE X.11. SEX-AGE-MARITAL STATUS-SPECIFIC HOUSEHOLD HEADSHIP RATES  
FOR SWEDEN, 1965

(Percentage of household heads among population of each sex-age group)

Sex and age (years)	Marital status				All marital statuses
	Single	Married	Widowed	Divorced	
<i>Males</i>					
15-24 .....	4.8	87.7	61.5	29.4	12.9
25-34 .....	28.4	95.7	76.9	46.4	74.8
35-44 .....	43.2	97.8	86.1	55.2	87.6
45-54 .....	55.9	98.6	90.4	63.7	91.3
55-64 .....	63.6	99.0	90.4	69.7	92.6
65 and over .....	61.7	96.7	73.6	70.0	86.7
<i>Females</i>					
15-24 .....	7.3	1.7	70.4	54.9	6.1
25-34 .....	40.1	1.5	85.2	73.4	9.8
35-44 .....	49.7	1.4	89.3	79.4	10.5
45-54 .....	54.9	1.4	90.3	82.0	15.2
55-64 .....	60.6	1.1	90.4	83.7	26.0
65 and over .....	64.2	1.1	77.1	79.4	47.2

SOURCE: Data for household heads from Sweden, Statistiska Centralbyrån, *Folk- och bostadsräkningen, den 1 november 1965; VIII...* (1969), p. 86; population data from Sweden, Statistiska Centralbyrån, *Folk- och bostadsräkningen, den 1 november 1965; III...* (1967), p. 3.

TABLE X.12. SEX-AGE-MARITAL STATUS-SPECIFIC HOUSEHOLD HEADSHIP RATES  
FOR JAPAN, 1965

(Percentage of household heads among population of each sex-age group)

Sex and age (years)	Marital status				All marital statuses
	Single	Married	Widowed	Divorced	
<i>Males</i>					
15-24 .....	4.2	68.9	26.6	27.7	6.9
25-34 .....	18.1	74.1	47.3	36.5	58.1
35-44 .....	25.5	84.2	66.6	49.6	81.8
45-54 .....	27.1	94.2	81.4	57.8	92.5
55-64 .....	29.1	94.4	77.7	57.1	92.0
65 and over .....	25.7	74.6	44.2	44.0	66.3
<i>Females</i>					
15-24 .....	0.2	0.9	17.1	25.0	2.1
25-34 .....	15.3	1.2	60.4	43.4	4.1
35-44 .....	25.1	2.5	76.7	57.8	8.9
45-54 .....	30.8	3.4	68.8	63.0	17.8
55-64 .....	32.3	2.4	39.6	48.4	16.6
65 and over .....	23.7	1.4	15.8	28.1	11.8

SOURCE: Data on households from Japan, Bureau of Statistics, *Showa 40-nen kokusei chosa hokoku*, vol. 5, part 1 ... (1969), pp. 62-69; population data from *ibid.*, pp. 26-27.

## 5. PATTERNS OF SEX-AGE-MARITAL STATUS-SPECIFIC HEADSHIP RATES

75. In addition to sex and age, marital status is an important characteristic for the analysis of household and family headship. Tables X.11 and X.12 show sex-age-marital status-specific headship rates for Sweden and Japan, two countries which represent different stages with regard to "nuclearization" of families or "undoubling" of households.

76. While there are certain similarities in the pattern of rates for males in the two countries, there are also

important differences. In both Japan and Sweden, the highest headship rates are shown for married men, followed by widowed, divorced and single men. The headship rates in Sweden exceed those in Japan in each age-marital status group, the difference being particularly great for single males and for men 65 years of age and over in all marital status groups. Higher headship rates at advanced ages are typical of highly developed countries with a long history of industrialization.

77. The pattern among females is quite different in the two countries, though widowed women in each have the highest headship rates, followed by divorced, single

TABLE X.13 UNWEIGHTED AVERAGES OF HOUSEHOLD SIZE AND OTHER DEMOGRAPHIC INDICATORS  
FOR EIGHTY-SEVEN COUNTRIES CLASSIFIED BY REGIONS

Indicator	Northern America, Europe and Oceania (twenty-eight countries)	Latin America (twenty-three countries)	Asia (twenty-one countries)	Africa (fifteen countries)
Average household size (persons) . . . . .	3.36	4.94	5.13	4.81
Percentage of households with two to four persons . . . . .	61.7	39.9	39.2	45.7
Percentage of households with two to six persons . . . . .	78.2	63.6	67.3	67.7
Headship rate <sup>a</sup> . . . . .	53.2	46.3	43.5	46.5
Gross reproduction rate . . . . .	1.35	2.85	2.80	2.94
Expectation of life at birth for males (years) . . . . .	67.1	54.6	55.0	43.7

SOURCE: *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>a</sup> Number of private households per 100 population aged 20-64 years.

and married women. The extremely low rates for married women in both countries reflect the universal tendency to consider the husband as head of household in cases where a married couple are living together.

78. It is interesting to note that for Sweden the female headship rates for the single, widowed and divorced are at least as high as the male rates for most age groups, and for the divorced group in particular, the female rates are substantially higher than the male rates. For Japan, on the other hand, for the widowed and divorced groups, the female rates are substantially lower than the male rates in the advanced ages. High rates for single, widowed and divorced women also prevail in other countries of Western Europe and Northern America where such women frequently live in independent households, particularly in urban areas. Such living arrangements are less common in Asia and other areas.<sup>97</sup> The relatively low headship rates for single women in Japan, as well as for widowed and divorced women above age 55, show a considerable contrast with the patterns prevailing in Sweden. Even lower headship rates are found among women in these age and marital status categories in a country like India.<sup>98</sup>

#### E. Factors affecting the number and size of families and households

79. One of the most important purposes in studying demographic aspects of households and families is to gain knowledge of factors affecting their dimensions and trends. Such knowledge is useful in dealing with many questions of policy and formulation of action programmes in the economic and social fields. In particular, it provides

<sup>97</sup> Caplow, *The Sociology of Work* (1964), especially pp. 230-247; *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>98</sup> Japan, Bureau of Statistics, *Showa 40-nen kokusei chosa* . . . (1970), pp. 178-183; Dandekar and Unde, "Inter-state and intra-state differentials . . ." (1967), pp. 332-333. The Indian data were available only for the state of West Bengal in the 1951 census.

a basis for projections of numbers of households and families which are of vital importance for the planning of economic and social development, especially in the field of housing.

#### 1. MAJOR REGIONAL DIFFERENCES

80. Regional averages of household size and other demographic indicators are presented in table X.13. This table confirms the well-known dichotomization between the more developed and less developed countries of the world. A wide gulf is evident between the countries of Europe and European overseas settlement (except Latin America), on the one hand, and those of Latin America, Asia and Africa, on the other, in respect to demographic aspects of household and family structure as well as fertility and mortality indicators. The former group is seen to have (a) a distinctly smaller average household size, (b) a far greater percentage of households with two to four persons, (c) a substantially larger percentage of households with two to six persons, (d) a substantially higher total headship rate, (e) a far smaller gross reproduction rate, and (f) an unmistakably longer length of life.

81. Less variation is observed among the three developing regions, although apparently Africa is considerably different from the other less developed regions in that it has a higher percentage of small-sized households (two to four persons), and a lower average household size.<sup>99</sup> These findings are no doubt associated with the lower life expectancy compared to that in Asia and Latin America. At the same time, Africa's relatively high headship rate and large proportion of small households with two to four persons suggests that perhaps the nuclear family structure is more prevalent in Africa than in Latin America and Asia, and certainly more prevalent than previously

<sup>99</sup> This is also shown in the United Nations estimates of average household size, in 1965, for the three regions (see table X.1).

believed.<sup>100</sup> The paucity of available data, however, precludes definite conclusions. The smaller average household size in Latin America than in Asia, in spite of approximately the same regional levels in fertility and mortality, may be explained by Latin America's noticeably higher headship rate for the population aged 20-64.

## 2. SEX-AGE STRUCTURE

82. The number and size of households and families can be considered as determined, on the one hand, by the size and sex-age-marital status composition of the population and, on the other, by the schedule of sex-age-marital status-specific headship rates. In some statistical assessments of the effect of these two factors, marital status may have to be omitted from consideration because of the unavailability of relevant data. In the foregoing discussion on the patterns of headship rates by sex and age (see section D), it was seen that the chances of becoming a household head are high at ages 25-64 years for the male population as well as for the single, widowed and divorced female population. It was further noted that this age group constitutes a much lower proportion of total population in the less developed than in the more developed countries. On this account, with identical schedules of sex-age-specific headship rates, the less developed countries would have relatively smaller numbers of heads of households and families and, therefore, smaller numbers of households and families than the developed countries.

83. The size and composition of the population is determined, in turn, by the conditions of fertility, mortality and nuptiality and by their changes in the course of time. The social, economic and other factors affecting the changes in fertility and mortality have already been treated in the previous chapters of this volume. The sex-age specific headship rates can be considered as representing the net result of economic, social and cultural influences such as the level of living, degree of industrialization and urbanization, demands for various consumer durables, which are all relevant to the propensities to become the head of household or family among persons in each demographic category.

84. A simple way of assessing the relative effect of (a) sex and age structure of the populations; and (b) differing schedules of headship rates on the number and average size of households is illustrated in table X.14. This table shows the results of a two-way standardization procedure whereby two different schedules of sex-age specific headship rates based on data for twenty developed, and eleven developing countries, respectively, are applied to the sex-age structure, first, of the more developed regions and, second, of the less developed regions. The results show that the differences in sex-age structure of the population of the two regions has a much greater influence on average household size than do differing headship rates. As the table shows, when the data are

standardized for sex-age composition, differences in average household size between developing and developed regions are greatly reduced, whereas standardization by sex-age-specific headship rates reduces differences only to a small extent. While there are differences in sex-composition between the populations of developed and developing regions, as shown in chapter VIII, the age structure is the major factor accounting for differences in average household size.

85. The standardization approach has also been used to examine the relative influence of demographic factors and headship rates on changes in household numbers and size between census dates in some countries. For example, Bamas, using such techniques, found that changes in headship rates accounted for most of the increase in the number of households in France between 1954 and 1962. Changes in sex-age structure and marital status, on the contrary, had relatively little effect and tended in the opposite direction. The general increases in headship rates were attributed to increased nuclearization of households, including the establishment of increasing numbers of one-member households as a result of internal migration etc.<sup>101</sup>

TABLE X.14. AVERAGE HOUSEHOLD SIZE, ACTUAL AND STANDARDIZED, FOR SEX-AGE COMPOSITION AND SEX-AGE-SPECIFIC HEADSHIP RATES, ON THE BASIS OF THE 1965 ESTIMATED DATA

(Persons per household)

Sex-age composition of population for :	Sex-age-specific headship rates for	
	More developed	Less developed
More developed .....	3.54 (actual)	3.74
Less developed .....	4.85	5.22 (actual)

SOURCE: Population data from *World Population Prospects as Assessed in 1968*, to be issued as a United Nations publication. Data on headship rates from thirty-one population censuses (for twenty more developed and eleven less developed countries). See *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

86. In Japan, where the average size of private households declined from 4.97 in 1955 to 4.05 in 1965, the change was attributed to three factors as follows: (a) a decline of 70 per cent to changes in the sex-age composition of the population which had resulted from fertility decline; (b) a decline of 40 per cent to changes in sex-age-marital status-specific headship rates; and (c) an increase of 10 per cent to changes in marital status composition within each sex-age group.<sup>102</sup>

87. Of a 23 per cent increase in the number of private households in the Federal Republic of Germany, from 1957 to 1969, 17 per cent was attributable to changes in demographic factors, that is, in the sex-age-marital status composition of population, and 6 per cent to social and economic factors. During this period, one-person house-

<sup>100</sup> Citing several sources, Goode reported average household sizes so small that extended kin households could not be common. The shortage of housing facilities in urban areas has been cited as a factor. See Goode, *World Revolution and Family Patterns* (1963), pp. 188-189.

<sup>101</sup> Bamas, "L'évolution du nombre des ménages ..." (1966), particularly pp. 9-12.

<sup>102</sup> Kono, "Changes in households and family structure in Japan" (1971), particularly pp. 2225-2227.

TABLE X.15. TOTAL MALE HEADSHIP RATES IN MODEL STABLE POPULATIONS WITH VARIOUS LEVELS OF FERTILITY AND MORTALITY AND TWO SCHEDULES OF MALE AGE-SPECIFIC HEADSHIP RATES  
(Male heads of households as percentage of total male population)

Gross reproduction rate	Expectation of life of thirty years		Expectation of life of fifty years		Expectation of life of seventy years	
	A	B	A	B	A	B
4.0 .....	29	25	26	22	24	21
3.0 .....	35	31	32	28	30	26
2.0 .....	45	39	42	36	40	35
1.0 .....	62	54	59	52	58	51

SOURCE: Stable populations were based on the "West" model of Coale and Demeny, *Regional Model Life Tables* ... (1966). Headship rates were computed on the basis of thirty-one available sex-age-specific headship schedules and were later adjusted to the estimated total numbers of heads of households for 1965 for the more developed and less developed countries respectively. Such age-specific male headship rates are shown below. It may be noted that these schedules differ from the unweighted averages for the thirty-one countries shown in table X.8.

	Age group (years)						
	15-24	25-34	35-44	45-54	55-64	65 and over	
More developed .....	11.1	70.5	90.0	94.0	93.3	81.3	
Less developed .....	12.6	56.6	77.2	82.6	82.9	73.6	

Column A. Average age-specific headship rates for more developed countries.

Column B. Average age-specific headship rates for less developed countries.

holds increased by 72 per cent, while the multimember households increased only by 12 per cent. In the case of the latter, demographic factors account for the entire increase since, in their absence, the total number of multimember households would have decreased, owing to the negative influence of non-demographic factors.<sup>103</sup>

88. For the United States, Winnick demonstrated that changes in sex-age structure between 1890 and 1950 could have caused a decline of 27 per cent in average household size, while social and economic influences on headship rates could account for only about 5 per cent.<sup>104</sup>

89. Other similar studies have nearly all shown that the structural changes in population and not changes in headship rates have been predominantly responsible for large increases in numbers of households and the corresponding declines in their average size that have occurred since the beginning of this century.<sup>105</sup> Thus, Needleman concluded that the two main elements accounting for the declining average size of household during the last fifty years or so are the rise in the proportion of adults in the population and the increase in the number of people who are, or have been, married.<sup>106</sup>

### 3. FERTILITY AND MORTALITY

90. The eventual effects of varying fertility, mortality, and age-specific headship rates upon the total male

headship rate have been analysed by means of a stable population model. The total male headship rate denotes the total number of male household heads per 100 total male population. The results, summarized in table X.15, show the importance of fertility as the primary determinant of the total male headship rate, and therefore the size of the household, in the long run.<sup>107</sup>

91. Under given conditions of mortality and age-specific headship rates, when the gross reproduction rate drops from 4.0 to 1.0, the total male headship rate in this model more than doubles. Lowering mortality rates (i.e., increasing expectation of life) with other factors constant has an opposite, but much less pronounced effect. On the other hand, with fertility and mortality constant, the shifting from the schedule of age-specific headship rates for the less developed countries to that for the more developed countries causes moderate increases in the male headship rate, particularly in the case where fertility is very low (gross reproduction rate of 1.0). While the latter effect is much smaller than that of a large decrease in fertility, it appears to be generally stronger than that of mortality change.

92. There has been little systematic investigation of relations of demographic variables of fertility, mortality and nuptiality to the structure and size of households. Coale calculated variations in average household size from a stationary population, with high fertility, high mortality and early age at marriage, according to various family systems. He found that in the family system involving maximum extension of households, average house-

<sup>103</sup> Federal Republic of Germany, Statistisches Bundesamt, "Statistisches Umschau: Bevölkerung—Entwicklung ..." (1970), pp. 346-348.

<sup>104</sup> Winnick, *American Housing and Its Use* ... (1957), p. 82.

<sup>105</sup> For example, see Japan, Bureau of Statistics, *Nihon no jinko, Showa 35-nen* ... (1963), pp. 222-223; Needleman, *The Economics of Housing* (1965), p. 25; Szabady, "Demographic characteristics of the Hungarian families" (1967); Wander, "Demographic aspects of housing conditions in the Federal Republic of Germany" (1967), p. 448; Tamásy, "Age structure of Hungarian families" (1968), pp. 409-415.

<sup>106</sup> Needleman, *The Economics of Housing* (1965), p. 25.

<sup>107</sup> Changes in fertility are not immediately reflected in the numbers of families and households. Actually, for about twenty years a fall in the number of births has very little effect on the number of families and households; it merely diminishes the number of children and adolescents in them. However, when the third decade after the number of births has undergone a material decline is reached, the size of the population in marriageable ages will begin to fall and will bring about a corresponding fall in the number of new families and households.



hold size was 75 per cent larger than for the nuclear family system under the same demographic conditions.<sup>108</sup>

93. Burch expanded the Coale model by using the model stable populations of differing mortality and fertility levels and applying to them a set of headship rate assumptions representing four family types: (a) nuclear family, (b) extended family with foster mother, (c) extended family without foster mother, and (d) stem family.<sup>109</sup> The distinctions between these four types are governed by the pattern of timing in the setting up of a new household by a woman after her marriage. A nuclear family results when a new household is established immediately upon the woman's marriage. An extended family form with foster mother is one where the woman continues to live with her own mother, and after her own mother's death, with a foster mother until the death of the foster mother. An extended family without foster mother refers to a situation where the woman establishes her own household after her own mother's death. Finally, a stem family is one established immediately upon the woman's marriage, her own mother being already dead. If her mother is still alive, she or one of her sisters remains in the mother's household until the death of the mother, and then succeeds to the mother's headship. The other sisters set up their own new households immediately after marriage.

94. According to Burch's models, in the nuclear family system, fertility, owing to its powerful influence on age structure, is a more important factor affecting household size than mortality and nuptiality. In the extended family type, the relative effects of fertility and mortality tend to be roughly equal, fertility having a slight edge. In the stem family system, with its rather complicated hypothetical conditions, mortality tends to have a slightly greater influence than fertility, particularly at high levels of fertility. The most important general conclusion to emerge from Burch's analysis is the strong independent effect of fertility on average household size. Burch also considered different variants of age at marriage in his models and found that later marriages tended to make for somewhat larger households on average, assuming that they did not result in lower fertility.<sup>110</sup>

95. While the use of stable population models for isolating the effects of fertility and mortality has obvious advantages, Burch's application has certain shortcomings, as the author himself admitted. First, the assumptions on age at marriage and family types are too simple and unrealistic. Moreover, the use of female, instead of male stable population as the basis for estimating household formation increases the chances of error in estimating average household size, since universally a great majority of household heads are males. This type of analysis may be better accomplished by computer simulation models of household formation and dissolution over the family

life cycle.<sup>111</sup> However, in order to construct a comprehensive simulation model, more must be known about the complex and dynamic mechanisms of formation, growth and dissolution of households, for example the probabilities of forming new households on the part of newly married couples at each age, the probabilities of maintaining one-person or non-family households among the young and aged populations etc. At the same time, it is also desirable to make use of multidecremental nuptiality and marriage tables, fertility tables by duration of marriage and parity, and family life tables.<sup>112</sup>

96. Empirical studies dealing with factors affecting the size and structure of households and families have also demonstrated that declining fertility has played the most important role in the secular decline in average household size among the developed countries since the turn of the twentieth century. For example, Glick's analysis for the United States shows that the decline has been largely the result of the long-term downward trend of the birth rate, even though the decline in the death rate and other factors have played a part. For example, the increase in the number of aging parents surviving beyond the time when their children left home, largely due to improvements in medical science and public health, and the increase in marriages of young persons after the Second World War, must have accounted for much of the long-term increase in the proportion of small households and, in turn, contributed to the declining trend of average household and family size.<sup>113</sup>

97. In a more recent study, Parke made a distinction between factors affecting family structure and those affecting household structure. In the case of the family, he maintained that since there had not been much further acceleration in nuclearization, recent changes in the average family size in the United States from the late 1940s to the mid-1960s had practically been governed by changes in fertility. On the other hand, in the case of households, it was argued that in addition to the important role of fertility, the increasing prominence of one-person households and the decreasing tendency for households to include non-relatives or employees living-in had helped to reduce the average size of households.<sup>114</sup>

<sup>111</sup> A pioneering micro-simulation of matching of marriages and formation of families and households was made by Orcutt, Greenberger, Korbel and Rivlin. See Orcutt *et al.*, *Microanalysis of Socio-economic Systems* ... (1961), pp. 232-256.

<sup>112</sup> Though the construction of family life tables has long been considered, few attempts have been made in this direction because of the complex nature of the processes of family formation and dissolution and the paucity of relevant data. Perhaps the closest approach is Brown's "Analysis of a hypothetical stationary population ..." (1951).

<sup>113</sup> Glick, *American Families* (1957), pp. 22-23. In his more internationally-oriented analysis, Bogue mentioned three factors as major determinants of average household size in a population. They are: (a) the level of fertility; (b) the extent to which elderly relatives, especially parents, are able to maintain themselves financially and can afford to live separately from their children in their own households; and (c) the extent to which unmarried persons leave home and establish "bachelor households" either alone or with one or more friends of the same sex. Bogue, *Principles of Demography* (1969), pp. 370-371.

<sup>114</sup> Parke, "Changes in household and family structure ..." (1971), pp. 2255-2256. See also Parke and Glick, "Prospective changes in marriage ..." (1967), pp. 255-256.

<sup>108</sup> Coale, "Appendix: estimates of average size of household" (1965), p. 68.

<sup>109</sup> Burch, "Some demographic determinants of average household size ..." (1970), pp. 62-64.

<sup>110</sup> Burch, "Some demographic determinants of average household size ..." (1970), pp. 64-68.

98. Schubnell and his colleagues have identified some of the major factors contributing to the shrinkage of the average household size in the Federal Republic of Germany, where the proportion of one-person and other small-sized households has been rising, while the proportion of large-sized households has been falling. These factors include declining fertility; the trend toward earlier marriage, resulting in the formation of more new households; increase in the proportion of older persons, many of whom live alone; the erosion with industrialization of the agrarian family where several generations may have lived together on a farm; and a general improvement in housing conditions which enables more older people to be accommodated in their own households.<sup>115</sup>

99. Most studies of households and families in Eastern European countries have stressed that the decline in the average household size has been caused primarily by demographic factors, chiefly by the declining fertility rate, and only secondarily by social and economic factors.<sup>116</sup>

100. The impact of the decline in fertility on average family size in Hungary has been cited by Tamásy. Between 1949 and 1963 average family size declined from 3.57 to 3.24,<sup>117</sup> and the percentage of families without children rose from 27 per cent in 1949 to 31 per cent in 1960. The number of families with only one child also increased, while the number with more than three children showed a significant decline. Other factors in the shrinking size of Hungarian households were also noted, such as the shifting of marriages to earlier ages, as well as increases in the number of marriages concluded at more advanced ages, in duration of marriage beyond the reproductive ages and in the proportion of children leaving parental families due to earlier marriages and increasing employment opportunities.<sup>118</sup>

101. In Yugoslavia, Rančić's studies confirmed the decisive importance of fertility. Of five demographic, social and economic variables tested, the birth rate and the percentage of illiterates in each republic were found to be most closely correlated with the average size of households, the correlation coefficients being 0.78 and 0.79, respectively.<sup>119</sup> Similar conclusions regarding the decisive influence of fertility on the size of households were drawn also by Jureček in Czechoslovakia. Analysing data from 109 Czechoslovak districts, he found a high correlation between the average number of persons per household and the average number of children under 15 years in the household.<sup>120</sup>

<sup>115</sup> Schubnell, Borries and Rupp, "The concept and use of household and family statistics . . ." (1971).

<sup>116</sup> Litterer-Marwege, who emphasizes social and economic factors, is an exception in this respect. See his *Rozwoj ludności Polski a planowanie* . . . (1967).

<sup>117</sup> Tamásy, "A Magyar családok nagysága . . ." (1964), p. 410.

<sup>118</sup> Tamásy, "Magyarország népességének család-összetétele" (1961).

<sup>119</sup> Rančić, "Utica nekij demografskih i socio-ekonomskih faktora . . ." (1966).

<sup>120</sup> Jureček, "Velikost a struktura demácností . . ." (1963), pp. 200-201. A high positive correlation (0.87) between the gross reproduction rate and average household size was found in a United Nations study which examined data for eighty-seven countries. Of all factors

102. The importance of marriage and marital status as factors influencing the size and structure of households and families is only too obvious and has been widely documented by demographers and sociologists.<sup>121</sup> This is especially so in the sense that marriage constitutes the first step in the formation of the biological family, and most newly wed couples establish their own households immediately after their wedding.<sup>122</sup>

103. Changes in the proportion of other marital status groups besides the "married" also have an important bearing on the size and structure of families and households. As has been seen in a foregoing section, a change in the proportion of single persons substantially affects the total headship rate and, therefore, the average household size in a complex way. Generally, the single population has lower headship rates than other marital status groups, excepting married females, whose rates are negligible. However, in the developed countries headship rates for single persons have become increasingly higher, sometimes surpassing 50 per cent, particularly among females, and those single persons having their own households form the bulk of one-person households.<sup>123</sup> Migration of single persons to urban areas often works in two ways toward a decline in average household size, first by reducing the size of the parents' households, and secondly by increasing the proportion of small-sized households in the area of in-migration.

104. In the case of women, divorces and deaths of husbands strongly affect headship status. As has already been seen, headship rates for married women are naturally close to the zero point, but in developed countries headship rates for widowed and divorced females are as high as those for widowed and divorced males, who have only slightly lower rates than the married. Therefore, increases in the proportion of widowed and divorced population generally produce a rise in headship rates among women and contribute to a shrinkage of average household size. It has been noted, however, that recently, particularly

tested, the gross reproduction rate showed by far the most significant correlation with household size. See *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>121</sup> For example, Glick, *American Families* (1957), pp. 53-60; Taeuber and Taeuber, *The Changing Population* . . . (1958), p. 166; Macura, "Contribution à l'étude des familles incomplètes . . ." (1959); Schubnell, "Introductory comments" (1963), p. 155; Tachi, *Jinko bunseki no hoho* (1963), p. 167; Needleman, *The Economics of Housing* (1965), p. 19; United Nations, *Methods of Estimating Housing Needs* (1967), p. 56; Dandekar and Unde, "Interstate and intra-state differentials . . ." (1967), pp. 317-321; Hajnal, "European marriage patterns in perspective" (1965), p. 132; Angenot, "Age structure and number of dwellings in the Netherlands" (1967), p. 398.

<sup>122</sup> For example, Glick, "The family cycle" (1947); and his *American Families* (1957), pp. 53-70; Kono, "Wagakuni setaisu no shorai . . ." (1961); Wander, "Demographic aspects of housing conditions . . ." (1967), pp. 447-448; Volkov, "The analysis of family structure in projecting the number . . ." (1967), pp. 106-107. Not all newly married couples immediately form their own families and households; a minority of them remain in the home of their parents or in-laws and share in the same household budget. This is sometimes referred to as a "doubling-up" of family and household.

<sup>123</sup> In all four Scandinavian countries including Finland, this tendency has been clearly observed.

in the developed countries, increases in length of life among men as well as women have reduced the proportions of widowed women in every age group, so that if other things were equal, this decrease in the proportion of widowed women would tend to reduce female headship rates, thus contributing to an increase in average size of household.

105. Studies carried out in a few countries have not revealed particularly significant effects of changes in marital status upon household size. This is not because the factor of marital status *per se* is unimportant, but because during the periods studied the sex-age composition of the population by marital status did not change substantially enough to override or offset the opposing forces of fertility decline and increases in headship rates (nuclearization). For example, as mentioned above, in Japan between 1955 and 1965, the marital status factor is estimated to have effected a slight increase in family size, while actually average household size decreased rather markedly, owing to fertility decline.

106. The most recent household projections for the United States under different marriage and headship assumptions can also serve to assess the effect of various factors on the number of households.<sup>124</sup> Growth of the adult population accounts for two thirds to three fourths of the increase in the number of households that occurs in the projection which combines household headship and marital status assumptions leading to the largest number of households. While population growth overshadows trends in marital status and household headship rates in its effect on the growth in household numbers, significant differences in future increases in the number of households are nevertheless produced by varying the household headship rate and marriage assumptions. The results show, however, that variations in household headship rates have a far more important effect on the total number of households than do variations in marriage assumptions. The latter factor has a significant effect on the projected increase in the number of young husband-wife households, but since these form a small fraction of all households, their effect on total household growth is not great.<sup>125</sup>

107. Several Eastern European authors, among them Tamásy, Litterer-Marwege and Rosset, have drawn attention to the decrease in the age at first marriage since the Second World War and its consequences for trends in household size.<sup>126</sup> The rapidly rising divorce rates in

Eastern Europe have also contributed to the decline in household size, although Czechoslovakian data, for example, show that the majority of divorced men remarry.<sup>127</sup> There remain, however, rather large numbers of divorced women who have children and who do not remarry, forming so-called incomplete families. For Czechoslovakia, statistical estimates show that the proportion of this type of household has been growing, from 7.9 per cent in 1961 to 8.1 per cent in 1964, and, further, to 8.3 per cent in 1967.<sup>128</sup> In Hungary recently there has also been a similar percentage increase in this type of household.<sup>129</sup>

108. In this connexion, attention should be drawn to an important phenomenon which helps to explain the very low average household size in Eastern Germany: 2.69 in 1950 and 2.50 in 1964. According to Strohbach and Triller, the great proportion of one-person households in Eastern Germany was and still is due to a disproportionately large number of war widows.<sup>130</sup> This factor probably also influenced the structure of households in Polish cities in the post-war period.

109. Relatively late marriage in the economically developed countries is accompanied by a high incidence of bachelorhood and spinsterhood, whereas in the less developed countries, where earlier marriage prevails, single persons at adult ages are relatively less numerous. The second striking feature of contrast is a much larger percentage of widowed persons, particularly among females in the older ages in the developing countries, owing to higher mortality. In the post-war period, opposing trends in age at marriage have been observed: in the developed countries where marriage had previously occurred relatively late, it tended to occur earlier, while in the developing countries, where it typically took place at an early age, the trend was towards later marriage.<sup>131</sup> The process of modernization and industrialization in the developing countries can be expected eventually to bring about further substantial changes in marital status by age which will produce important effects on average family and household size.<sup>132</sup> The question of marriage in the context of the family life cycle is discussed in more detail in section F.

## 5. ECONOMIC AND SOCIAL FACTORS

110. As already noted, in addition to the changes in population composition which have tended to reduce average household size in the more developed countries, social and economic factors also worked to the same end by increasing age-specific household headship rates. These increases, which occurred among all segments of the

<sup>124</sup> United States, Bureau of the Census, *Projections of the Number of Households and Families* ... (1968).

<sup>125</sup> Parke and Grymes, "New household projections for the United States" (1967).

<sup>126</sup> Tamásy, "A Magyar családok nagysága ..." (1964); Litterer-Marwege, *Rozwoj ludności Polski a planowanie* ... (1967); Rosset, "Wiek nowożeńców w Polsce" (1963). The decrease in age at first marriage was more pronounced in Eastern Europe than in Western Europe and is perhaps related to a lowering of legal age of marriage from 21 to 18 years in some of these countries. During recent years, however, average age at marriage among newly married couples has been stabilized, and efforts are even being made to postpone the marriages of young men.

<sup>127</sup> Kučera and Srb, "Rozvodovost v Československu v letech 1950-1959" (1962).

<sup>128</sup> Czechoslovakia, Federální Statistický Úřad, *Statistická ročenka* ... (1969), p. 86.

<sup>129</sup> Tamásy, "A Magyar családok nagysága ..." (1964).

<sup>130</sup> Strohbach and Triller, "Methodische Probleme der Schätzung der künftigen Zahl ..." (1967).

<sup>131</sup> Bogue, *Principles of Demography* (1969), pp. 362-363.

<sup>132</sup> See, for example, Parke and Glick, "Prospective changes in marriage and the family" (1967).

population except females in the middle age groups, are considered to be fundamentally related to trends in urbanization, the rise in *per capita* income, improved employment and housing conditions, and the like. The fact that demographic factors have generally assumed a more prominent role than socio-economic factors in affecting household size does not mean that the latter have lacked importance.

111. In the United States, socio-economic factors have been responsible for reducing the proportions of double-up households, as well as those which include lodgers, domestic servants and other non-related persons.<sup>133</sup> Winnick noted the decreases in doubling-up for younger married couples, even while one or both of the partners were still in college. Good job opportunities, veterans' military allowances and a high geographical mobility were among the factors providing strong incentives for the establishment of independent households. Winnick also observed that the tendency of young women not yet married to maintain their own apartments was increasingly becoming an American folkway, and was made possible by favourable employment conditions and greater social acceptance.<sup>134</sup> In the United Kingdom, the rise in real incomes of young people is said to have strongly influenced the trend towards earlier marriage, which in turn affected the average size of household.<sup>135</sup>

112. Various writers have identified a number of key social and economic factors which influence household formation. These are included in the following paragraphs.

#### (a) *The desire for privacy*

113. The desire for privacy<sup>136</sup> and independence and even physical insulation from others appears to have deep roots in the value systems of Western societies, being closely linked with the rise of individualism, political democracy, and instrumental rationalism ("Zweck-

rationalität").<sup>137</sup> On the other hand, such desires are relatively foreign to non-western cultures, which have rather tended to emphasize such concepts as continuity of the family, group solidarity and cohesion, respect and care for the aged, and group responsibility for the welfare and survival of kin.

#### (b) *Income and economic resources*

114. The ability of the individual or family to afford the type of household arrangement conforming to its desires is also of much importance. While this depends mainly on the family's or individual's income level, it is also related to the standard of living in the country or region and the housing market, which governs the relative levels of rentals, prices of houses and mortgages. Poor families must first spend their incomes on the main necessities of life: food and, to a lesser degree, clothing. They may choose to economize on housing by doubling up with other relatives. In such circumstances, privacy may be considered a luxury. As income increases, however, the percentage spent on food declines,<sup>138</sup> and once families rise out of the poorest income class, their income is spent on a wider variety of items of better quality, and privacy often comes to be considered one of the important items that money can buy.<sup>139</sup>

115. The relationship between income and household formation has been studied mainly in regard to relationships between total income or total consumption expenditure and housing expenditure. For the United States, Morton and Winnick show that the percentage of total expenditure for housing maintained a relatively stable figure even when income expanded.<sup>140</sup> This means that as income increased, a larger amount of money was spent on housing.<sup>141</sup> Certainly, a secular increase in income brings improvement in housing,<sup>142</sup> even though there is a considerable lag. A secular rise in national income, other things held constant, can be expected to be accompanied by an increase in demand for housing.<sup>143</sup> The expansion in effective demand for housing stimulates not only the undoubling of households to increase privacy but also the acquiring of more rooms or space per household or of higher-quality structures and facilities. In the higher income brackets, it may mean an increase in the proportion of second houses for use during weekends or vacations.

<sup>133</sup> Glick, *American Families* (1957), p. 23. As far back as 1938, the United States National Resources Committee noted some of the ways in which the number of families is influenced by economic conditions. See ———, *The Problems of a Changing Population* (1938), pp. 25-27.

<sup>134</sup> Winnick, *American Housing and its Use ...* (1957), pp. 96, 100. In 1940, whereas only one young unmarried woman in eight between the ages of 25-29 maintained her own household, by 1950 this figure had increased to one in five and by 1960 it had jumped to one in two. See United States, Bureau of the Census, *Census of Population: 1960*, vol. 1, part 1 (1964), pp. 436-437, 457-458. Young unmarried men also increased their headship rates, but not as dramatically as did women. *Ibid.*, p. 69. The role of socio-economic factors in increasing the proportion of one-member households is also discussed by Parke. See his "Changes in household and family structure ..." (1971), pp. 2255-2256. On similar trends in Japan and the Federal Republic of Germany, see Ueda, "Wagakuni setai kozo ..." (1969); Schubnell, Borries and Rupp, "The concept and use of household and family statistics ..." (1971).

<sup>135</sup> Needleman, *The Economics of Housing* (1965), p. 25.

<sup>136</sup> Reference to the desire for privacy was made by Winnick and later by Beresford and Rivlin. See Winnick, *American Housing and its Use ...* (1957), p. 7; Beresford and Rivlin, "Privacy, poverty and old age" (1966), pp. 247-258. The desire for privacy may also be identified with "taste", the concept often used by economists to refer to extra-economic factors, or it may be considered to fall in the realm of "social habits". On the latter, see United Kingdom, Royal Commission on Population, *Papers*, vol. 3 ... (1950), p. 22.

<sup>137</sup> See, for example, Mill, *On Liberty* (1859); 1956 ed.); Tönnies, *Einführung in die Soziologie* (1931); Parsons, *The Structure of Social Action ...* (1949); Davis, *Human Society* (1949); Riesman, *The Lonely Crowd ...* (1953); Freedman, "The sociology of human fertility ..." (1961/62); and Taeuber, "Demographic modernization ..." (1966).

<sup>138</sup> Engel, "Die Productions- und Consumptions ..." (1895); see also Lorimer and Roback, "Economics of the family ..." (1940), pp. 133-134.

<sup>139</sup> Beresford and Rivlin, "Privacy, poverty and old age" (1966), p. 247.

<sup>140</sup> Morton, *Housing Taxation* (1955), pp. 42-43; Winnick, "Housing; has there been a downward shift ..." (1955), pp. 87-88.

<sup>141</sup> See Muth, "The demand for non-farm housing" (1960), pp. 29-31.

<sup>142</sup> Gordon, "Population growth, housing and capital coefficients" (1956); Reid, *Housing and Income* (1962), p. 393.

<sup>143</sup> Atkinson, "Factors in the housing market" (1960); Reid, *Housing and Income* (1962), p. 390.

116. The lack of adequate time-series data precludes analyses of the relationship between income and household formation for many countries. Beresford and Rivlin noted that although incomes rose substantially between 1885 and 1940, Massachusetts census data do not indicate any significant shift towards undoubling of households between these two dates. Nevertheless, cross-sectional data for recent years in the United States suggest a high correlation between individual or family income and separate household maintenance. Within the young married group, for example, where the husband was under 25 years of age, the couples were considerably more likely to maintain a separate household if their joint income was high than if it was low. Young unmarried men were also more likely to maintain their own households in 1960 if their income was high than if it was low, and the same relationship persisted at older ages among the unmarried.<sup>144</sup> Glick found, moreover, that at a given age, a man is more likely to be married if his income is high than if it is low.<sup>145</sup>

117. Studies of patterns of living arrangements and income levels among unmarried elderly men and women based on 1952 and 1960 data showed in general that the higher the income the more likely were the individuals to maintain separate households. Moreover, for the women at least, the findings of the studies were not inconsistent with the hypothesis that rising income during the decade of the 1950s had led to more separate living on the part of the elderly.<sup>146</sup>

118. Swedish census data show a strong positive relationship between *per capita* income levels and household headship rates specific for sex-age and marital status groups. Correlation coefficients between headship rate and *per capita* income for each of twenty-six sex-age-marital status groups on the basis of the 1965 Swedish census data are generally very high, mostly more than 0.70, and in nine groups even higher than 0.90.<sup>147</sup> Higher income is clearly associated with higher headship rates and vice versa.<sup>148</sup>

119. A high negative correlation between *per capita* income and average household size was found in a United Nations study which examined data for eighty-seven countries. In fact, of all factors tested, income came next to gross reproduction rate in significance.<sup>149</sup>

### (c) Housing

120. General housing conditions in the community, the availability of vacant apartments or houses at reasonable prices, and government policies concerning the provision of housing all have a bearing on the numbers and

dimensions of households.<sup>150</sup> The availability of suitable housing is normally a limiting factor which slows down the spontaneous process of nuclearization and undoubling of households even if individuals have sufficient financial resources to spend for independent housing.

121. The limiting effects of housing formation have been observed in almost every European country, Japan, and the United States, immediately following war, especially the Second World War. In the United Kingdom, sex-age-marital status-specific headship rates were comparatively low in 1921 and, to a lesser extent, in 1951, and they rose appreciably between 1951 and 1961. These small variations can be explained, according to Needleman, almost entirely by the relative availability of housing accommodation. In both 1921 and 1951 there was a marked housing shortage which forced groups of persons who would otherwise have formed separate households to live together. Since 1951, the increase in house-building has enabled many of the concealed households of 1951 to set up on their own.<sup>151</sup> The same view was expressed by Paige, namely, that the increase in headship rates of about 5 per cent between 1951 and 1961 in the United Kingdom was mainly due to the reduction in the housing shortage over the period.<sup>152</sup>

122. In the Federal Republic of Germany, since 1950, the housing supply has expanded about three times as quickly as the demand and the extremely aggravated housing situation immediately after the Second World War has been greatly relieved. More than half of the dwellings existing in the Federal Republic of Germany in 1970 had been built since 1950 and during this span of time the quality of the dwellings improved. During the period between 1950 and 1970 the average household size further decreased from 2.99 to 2.63 and, aside from demographic factors, this reduction can be explained substantially by the increasing availability of dwelling units which either permit younger generations to marry earlier or to form one-person households and enable older generations to live by themselves.<sup>153</sup>

123. In the case of Japan, the situation is similar to the Federal Republic of Germany, though public and private household building to overcome the post-war housing shortage did not proceed as rapidly as in Germany. However, the decline in average household size, which has accelerated since 1960, undoubtedly reflects the rapidly expanding activities in housing construction which started around 1955. According to Takami's

<sup>144</sup> Beresford and Rivlin, "Privacy, poverty and old age" (1966), pp. 254-255.

<sup>145</sup> Glick, *American Families* (1957), pp. 156-158.

<sup>146</sup> Steiner and Dorfman, *The Economic Status of the Aged* (1957), p. 244; Beresford and Rivlin, "Privacy, poverty and old age" (1966), pp. 255-256.

<sup>147</sup> United Nations, *Manual VII: Methods of Projecting Households and Families* (1973), p. 56.

<sup>148</sup> Eversley and Jackson, "Problems encountered in forecasting housing demand ..." (1967), p. 419.

<sup>149</sup> *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>150</sup> The influence of the housing factor or housing policies on household formation has been stressed by many authors. See Cullingworth, *Housing Needs and Planning Policy* (1960), pp. 65-71; Steigenga "Family structure, age-composition and housing needs" (1963); Needleman, *The Economics of Housing* (1965), p. 25; Musil, *Housing Needs and Policy* (1966), pp. 105-126; Ueda, "Wagakuni setai kozo ..." (1969), pp. 64-65. See also Andrie, Pojer and Ullmann, *Byty a bydlení v Československu* (1967); and Musil and Pazderová, *Sociologie asanačních oblastí českých měst* (1966).

<sup>151</sup> Needleman, *The Economics of Housing* (1965), pp. 24-25.

<sup>152</sup> Paige, "Housing" (1965), p. 368.

<sup>153</sup> Wander, "Demographic aspects of housing conditions ..." (1967), pp. 447-450; Schubnell, Herberger and Borries, "Households and families ..." (1971), pp. 6-8. In fact, the 1961 population census revealed that the Federal Republic of Germany had one of the highest series of sex-age headship rates attained in the world.

estimates, during the period 1971-1975 the absolute shortage in housing will be virtually solved and after this period a greater number of new houses and apartments will be constructed not primarily to provide increasing numbers of households, but for renewing and replacing old buildings and improving the quality of housing.<sup>154</sup>

124. Glick noted for the United States that in addition to economic considerations, the available supply of apartments and houses was an important factor affecting household formation. During the period of housing shortage immediately following the end of the Second World War, the proportion of young couples without their own living quarters was two and one-half times as large as it was in 1954, by which time the housing situation had greatly eased. In 1940, after years of depression when housing construction was at a generally low ebb, close to twice as large a proportion of young couples shared the living quarters of others as in 1954.<sup>155</sup>

125. A large part of the world's population is housed in unfit, unhealthy and overcrowded dwellings; it has been estimated that in Africa, Asia and Latin America, half of the population is either homeless or living in entirely unacceptable dwellings.<sup>156</sup> One problem lies on the production side in the developing countries. Low incomes and low savings rates and the urgent need to deploy as much capital as possible in new productive enterprises combine to magnify the difficulty of investing adequate amounts in the essentially consumer-oriented activity of housing construction. During the 1960s, notwithstanding the fact that in most developing countries urban population was growing more rapidly than total production, there was no great tendency to devote a higher proportion of available resources to the construction of dwellings.<sup>157</sup> The fact that headship rates for married males in the prime of life, say between ages thirty-five and sixty-five, have never actually reached the level of 100 per cent in any country, but at best 98-99 per cent, and are frequently lower than 90 per cent, is probably at least partly due to the effects of the housing shortage as a limiting factor on the demographic demands for household formation.<sup>158</sup>

#### (d) Internal migration

126. Internal migration has a very important impact on household size, particularly in rapidly urbanizing countries such as Japan and some Latin American countries. The significance of this factor lies in the fact that massive internal migration can cause nuclear fission or

undoubling of families even in a country where the nuclearization process is otherwise rather limited owing to deep-rooted extended family tradition.

127. Migration is nearly everywhere highly selective, and migrants consist predominantly of young adults (see chapter VI above). A great number of young migrants to urban places live in boarding houses or one-room apartments, thus forming either one-person households or else becoming part of group quarters or institutional households. The formation of many new small-sized households in urban areas, concomitant with internal migration, clearly contributes to lower average household size both in cities of in-migration and in countries or villages of out-migration.<sup>159</sup> In Japan, it was found that about 27 per cent of the decline in average household size between 1955 and 1965 was due to the formation of new one-person households, as a result of internal migration.<sup>160</sup>

128. In the course of the family cycle, better economic and social opportunities in urban areas may induce the husband or couple to migrate, thus bringing about changes in average family size and composition and possibly even in the eventual number of children born to the couple. At the other end of the family life cycle, it is frequently common, particularly in the less developed countries, for elderly couples to return to their villages of origin to spend the latter years of their lives, after residing during their reproductive years and bringing up their children in the town or city.

129. Changes other than purely demographic ones are likely to occur as a result of internal migration, in that the migrants' attitudes towards privacy, secularity, rationality etc. also undergo alteration as a result of the influences of an urban environment, and such changes undoubtedly tend to enhance household formation. However, as yet few studies have been undertaken which throw light on such socio-psychological and motivational aspects of household formation.

#### (e) Industrialization and related factors

130. Industrialization is a complex economic and social process encompassing technological developments that has profound and far-reaching effects on economic organization and social structure. Practically every author who has dealt with the question of the relationship between household and family structure and socio-economic factors has pointed out, or implied, that industrialization has an important bearing on household and family structure, directly or indirectly.<sup>161</sup>

<sup>159</sup> Litterer-Marwege, *Rozwoj ludności Polski a planowanie ...* (1967), p. 243; Wander, "Demographic aspects of housing conditions ..." (1967), p. 449; Cabello, "Housing, population growth, and economic development" (1966), p. 117.

<sup>160</sup> Kono, "Changes in households and family structure ..." (1971), p. 2228. See also Yamaguchi, "Setai kibo no fukukan ..." (1969), pp. 38-42; Takami, "Jutaku mondai no shorai" (1965), pp. 76-80.

<sup>161</sup> See, for example, Glick, *American Families* (1957); Taeuber and Taeuber, *The Changing Population ...* (1957); Levy, "Aspects of the analysis ..." (1967), pp. 40-63; Tachi, "Jinko tenkan katei kara mita ..." (1967), pp. 78-81; Burch, "The size and structure ..." (1967); Litterer-Marwege, *Rozwoj ludności Polski a planowanie ...* (1967), p. 243. According to the United Nations multiple regression study, the beta coefficient for the factor of industrialization was

(Continued on next page)

<sup>154</sup> Takami, "Jutaku mondai no shorai" (1965), pp. 85-86.

<sup>155</sup> Glick, *American Families* (1957), p. 61.

<sup>156</sup> United Nations, *The United Nations Development Decade ...* (1962), p. 59; ———, *Methods for Establishing Targets ...* (1968), p. 5. While it is generally considered that housing shortages are concentrated in urban areas, in Latin America the housing problem is much more acute in rural areas than in cities. See Cabello, "Housing, population growth, and economic development" (1966), pp. 112-114.

<sup>157</sup> United Nations, *World Economic Survey, 1969 ...* (1971), p. 51.

<sup>158</sup> United Nations, *Manual VII: Methods of Projecting Households and Families* (1973), pp. 35, 38-39.



However, since industrialization is so inseparably intertwined with other socio-economic factors such as urbanization, rise in *per capita* income, and the like, it is impossible to disentangle it from other factors and to measure the effects of industrialization *per se* upon the changes in the size and structure of household and family.

131. As discussed earlier, the emergence of the small nuclear family is generally viewed in sociological theory as a consequence of the urban-industrial revolution. The dominant sociological hypothesis relating technology and social organization postulates a functional interdependence between industrialization and urbanization, and the small nuclear family as the unit of social organization.<sup>162</sup> For example, Ogburn and Nimkoff postulated that with increasing industrialization the consanguine (extended) family tended to disappear and to be superseded by the conjugal (nuclear) family. Thus, they argue that the small nuclear family found in the United States took its present form as a result of national industrialization and urbanization. Within a system in a state of change then, one part is the cause of the new form taken by another part.<sup>163</sup>

132. In Europe, the best example of this line of thinking is presented by Max Weber, who views changes in the family as a function of its changing economic position that, in turn, is a function of the changes in the total society stemming from the industrial revolution.<sup>164</sup>

133. As was noted in section B, this hypothesis has recently been challenged and criticized by some sociologists and anthropologists who argued that, in the first place, in the Western societies, notably in England and Wales (United Kingdom), average household sizes had been surprisingly small and relatively stable before the Industrial Revolution, implying the widespread existence of small nuclear families even then, although the influence of industrialization was absent. Secondly, in the rural-agricultural societies of Africa and Asia, the extended family system and polygamy are rarely characteristic of the majority of the population. Where they exist, they are largely confined to the upper class of population, who constitute only a small proportion of the total population.<sup>165</sup> According to Goode, the relationship between

industrialization and nuclearization is independent and interacting. There exists only the "fit" of the nuclear family to industrialization, not necessarily implying a cause-effect relationship.<sup>166</sup>

134. Nevertheless, smaller families are unmistakably more prevalent in the urban-industrial and high-income countries than in the rural-agricultural and lower-income ones. As already pointed out, this is due in part to the fact that the urban-industrial countries are characterized by low fertility, whereas the rural-agricultural countries have unequivocally high fertility. Moreover, in the urban-industrial countries there is generally a greater tendency for the grown-up children to leave their parental households early and for the older persons to retain their own households than is the case for the rural-agricultural countries.

135. Various economic changes associated with the process of industrialization may exert an influence on household size. While the participation of women in economic activities may have an influence on household size, the nature of this relationship is not entirely clear. On the one hand, high activity rates for women may tend to reduce average household size through their effect in lowering fertility.<sup>167</sup> On the other hand, it has been argued that high female activity rates can lead to a slowdown in the process of household fission and to a renewal of the functions of the doubled-up family. In Czechoslovakia, households with employed women are larger in size than those where wives are not employed. This is due mainly to the fact that the households with employed women often include grandparents or other relatives who help to run the households.<sup>168</sup>

136. In a study for England by Eversley and Jackson, income, social and economic status and educational attainment were identified as the main determinants of household size in the sense that these factors not only affect the household size directly, but also indirectly through changing fertility and consequent alterations in age structure.<sup>169</sup>

## F. The life cycle of the family

### 1. FAMILY LIFE CYCLE AS A DEMOGRAPHIC FRAMEWORK

137. The family undergoes a sequence of characteristic stages in size and structure and between formation and dissolution which lend themselves to demographic analysis. These stages include marriage, establishment of a household, bearing and rearing of children, marriage of

(Footnote 161 continued)

significantly and negatively related to average household size, but its numerical weight was not particularly large, for example as compared with the factor of fertility. However, since the measure of industrialization used in this analysis, *viz.* the percentage of the male labour force engaged in non-agricultural industries, is too simplified to adequately represent the complex process of industrialization, which is so closely interlocked with other socio-economic factors, no great significance can be attached to the findings. See, *Demographic Aspects of Households and Families*, to be issued as a United Nations publication.

<sup>162</sup> Greenfield, "Industrialization and the family ..." (1961), p. 312.

<sup>163</sup> Ogburn and Nimkoff, *Sociology* (1950), p. 469; ———, *Technology and the Changing Family* (1955).

<sup>164</sup> Weber, *General Economic History* (1950), p. 111. Also see Greenfield, "Industrialization and the family ..." (1961), p. 315.

<sup>165</sup> It is not possible to view non-Western family systems as basically like the Western systems of some undefined earlier historical phase just before industrialization. The evolutionary theory may be in error. For the past thousand years, the family systems of the West have been very different from those of China, India, Japan, Africa, or Islam. There has been no clan system or lineage

system in the West, and no ancestor worship has existed. Goode, "Industrialization and family change" (1966), p. 247. See also Greenfield, "Industrialization and the family" (1961).

<sup>166</sup> Goode, *World Revolution and Family Patterns* (1963), pp. 10-26.

<sup>167</sup> However, this effect is not certain since the high negative correlation often found between female activity rates and size of household may merely reflect the fact that women with more children are not free to take employment. Kučera, "Employment of women and reproduction" (1967), p. 26; Jureček, "Diferenční plodnost podle ..." (1966). See also chapter IV, section F.

<sup>168</sup> Musil and Prokopec, "Příspěvek k otázce skladby ..." (1961).

<sup>169</sup> Eversley and Jackson, "Problems encountered in forecasting housing demand ..." (1967), pp. 418-422.



children and their departure from the family, and the later years before the family is finally dissolved. Successive readjustments of behaviour patterns are required as the adult members shift their roles from newly married persons to parents of small children, parents of older children, older couples without children at home and surviving widows or widowers.

138. One of the major contributions of demography to the study of family life has been the development of the concept of "life cycle of the family" and a set of definitions that facilitate comparable research on a national and international basis.<sup>170</sup> Following initial work in the field of rural sociology,<sup>171</sup> Glick contributed greatly to the development of the concept of "life cycle of the family"<sup>172</sup> as a framework for the study of the nuclear family.

139. This orientation provides a means for analysing the changes which take place in the demographic composition and economic characteristics of families from marriage through child-bearing, the stage when children are leaving home, the "empty nest" period, and the final dissolution of the families.<sup>173</sup> In different countries and at different time periods in a single country, marked differences have been observed in the age at marriage, in the size of family at various stages of the life cycle and in life expectancies, and these changes have modified the characteristic ages at which husbands and wives reach the several stages of the family life cycle.<sup>174</sup>

140. The concept of the life cycle of the family has been widely accepted as a framework for various types of analysis of the nuclear family. The merits of applying the family life cycle approach in studying a variety of socio-economic phenomena have been noted.<sup>175</sup> As Lansing and Kish demonstrated, for several variables, such as home ownership, income levels, purchases of consumer durables, cars, savings etc. the family life cycle explains more of the total variations than can be explained by age.<sup>176</sup>

<sup>170</sup> Bogue, *Principles of Demography* (1969), p. 384.

<sup>171</sup> See Loomis and Hamilton, "Family life cycle analysis" (1936); Sorokin, Zimmerman and Galpin, *A Systematic Source Book* ... (1931).

<sup>172</sup> Glick, "The family cycle" (1947); ———, "The life cycle of the family" (1955, pp. 831-844; ———, "The life cycle of the family" (1955), pp. 3-9; ———, *American Families* (1957), chaps. 3-5; Glick, Heer and Beresford, "Family formation and family composition ..." (1963), pp. 37-40; and Glick and Parke, "New approaches in studying the life cycle ..." (1965).

<sup>173</sup> Glick and Parke, "New approaches in studying the life cycle ..." (1965), p. 187.

<sup>174</sup> Besides the sources cited above, see Nelson, *Rural Sociology* (1955), pp. 307-312; Duvall, *Family Development* (1962); Collver, "The family cycle in India and the United States" (1963); Hill and Rodgers, "The developmental approach" (1964); Morioka, "Kazoku no keitai" (1966); ———, "Life cycle patterns in Japan, China and the United States" (1967).

<sup>175</sup> See, for example, Duvall, *Family Development* (1962); David, *Family Composition and Consumption* (1962), especially chap. 3, pp. 20-30; Beyer, *Housing and Society* (1965), p. 259, pp. 282-284; Lansing and Morgan, "Consumer finances over the life cycle" (1955); Fisher, "Family life cycle analysis ..." (1955); Iochi, "Kakei no kahei juyo: (horon)" (1966); Praiss and Houthakker, *The Analysis of Family Budgets* ... (1955).

<sup>176</sup> Lansing and Kish, "Family life cycle as an independent variable" (1957), p. 518.

141. Perhaps, more importantly, this approach can be useful as a tool for shedding light on very complex and still largely unexplored areas of couple fertility patterns and dynamics of family building and it can be linked with the probability models of family building, which have come into use in recent years, with the aid of electronic computers.<sup>177</sup> Indeed, the family life cycle approach will undoubtedly be an integral part of the future development of stochastic demographic models concerning family building and family planning, including not only fertility and mortality factors but also nuptiality and household formation elements. This approach will be helpful for identifying the particular stages of the family life cycle where the introduction of family planning is most effective.

## 2. STAGES IN THE FAMILY LIFE CYCLE

142. The family life cycle may be divided into a few or many stages, depending on the specific interest. It is possible to envisage a two-stage family cycle: (1) the expanding stage, from the inception of the family until the time its children are grown; and (2) the contracting stage when grown children are leaving to establish families of their own.<sup>178</sup> Such a two-stage delineation is usually too crude for most analyses, however.

143. As early as 1931, Sorokin, Zimmerman, and Galpin discussed a four-stage family life cycle based on the changing constellation within the family:<sup>179</sup>

- (1) Married couples beginning their independent economic existence;
- (2) Couples with one or more children;
- (3) Couples with one or more adult self-supporting children; and
- (4) Couples growing old.

144. Many other sequences of the family life cycle have been formulated by family sociologists. The most complex breakdown elaborates twenty-four stages.<sup>180</sup> While such an elaboration may be useful for particular types of research design, it is unnecessarily detailed for

<sup>177</sup> See, for example, Henry, "Fécondité et famille, modèles mathématiques" (1961), pp. 27-46 and pp. 261-262; ———, "Mesure du temps mort en fécondité naturelle" (1964); Bourgeois-Pichat, "Les facteurs de la fécondité non dirigée" (1965), pp. 383-424; Sheps, "Applications of probability models ..." (1965); Sheps and Perrin, "Human reproduction: a stochastic process" (1964); ———, "The distribution of birth intervals ..." (1964); Potter, "Birth intervals: structure and change" (1963); Potter *et al.*, "A case study of birth interval dynamics" (1965); Potter and Sakoda, "A computer model of family building ..." (1966); Ridley and Sheps, "An analytic simulation model ..." (1966); Hyrenius and Adolfsson, *A Fertility Simulation Model* (1964); Vincent, *Recherches sur la fécondité biologique* (1961); Sheps, "Contributions of natality models ..." (1966), pp. 445-449; Matras, "The social strategy of family formation ..." (1965).

<sup>178</sup> Duvall, *Family Development* (1962), pp. 5-6.

<sup>179</sup> Sorokin, Zimmerman and Galpin, *A Systematic Source Book in Rural Sociology*, vol. 2 (1931), pp. 30-32. Generally speaking, studies in the 1930s and 1940s undertaken mostly by rural sociologists divided the cycle into four stages: (1) the pre-child family, (2) the growing family, (3) the contracting family, and (4) the aging family. See Morioka, "Life cycle patterns in Japan, China and the United States" (1967), p. 599.

<sup>180</sup> Rodgers, *Improvements in the Construction and Analysis of Family Cycle Categories* (1962), pp. 64-65.

TABLE X.16. MEDIAN AGE OF WOMEN AT SELECTED STAGES OF THE FAMILY LIFE CYCLE,  
UNITED STATES OF AMERICA, INDIA (BANARAS) AND JAPAN

Stage	Country				
	United States			India (Banaras)	Japan 1960
	1890	1950	1959		
First marriage .....	22.0	20.1	20.2	14.6	24.4
Birth of first child .....	23.0	21.8	21.6	18.2	26.3
Birth of last child .....	31.9	26.1	25.8	37.0	28.7
Marriage of last child .....	55.3	47.6	47.1	53.0	54.5
Death of husband .....	53.3	61.4	63.6	39.5	69.1

SOURCE: For the United States: Glick, "The family cycle" (1947); ———, *American Families* (1957), pp. 53-70; Glick, Heer and Beresford, "Family formation and family composition ..." (1963), p. 37. For Banaras (India): Collver, "The family cycle in India and the United States" (1963), p. 88. For Japan: Morioka, "Life cycle patterns in Japan, China, and the United States" (1967), p. 605.

Note: The data for the three countries are not strictly comparable because of slightly different definitions of events.

general use. The problems of delineating family life cycle stages suitable universally are many because of the variations in family type from one society to another. Duvall suggests the following stages of the family life cycle:<sup>181</sup>

- (1) Beginning families (married couple without children);
- (2) Child-bearing families (oldest child under 30 months);
- (3) Families with pre-school children (oldest child 30 months to 6 years);
- (4) Families with school children (oldest child 6 to 13 years);
- (5) Families with teen-agers (oldest child 13 to 20 years);
- (6) Families as launching centres (from the time first child leaves until the last is gone);
- (7) Families in the middle years ("empty nest" to retirement);
- (8) Aging families (retirement to death of both spouses).

145. It should be noted that the central concern of Duvall's scheme is children—their ages and attendance at school. Glick and Parke, on the other hand, present a more general, demographic type of family cycle, as shown below:

- (1) Family formation: first marriage;
- (2) Start of child-bearing: birth of first child;
- (3) End of child-bearing: birth of last child;
- (4) "Empty nest": marriage of last child;
- (5) Family dissolution: death of one spouse.<sup>182</sup>

The Glick-Parke family life cycle has been adopted as the standard for various later research studies both within and outside the United States.

### 3. LENGTH OF STAGES IN THE FAMILY LIFE CYCLE

146. Data on family life cycles are extremely scarce for most countries of the world. Four series of family

life cycle data are presented in table X.16 for comparison: the United States for 1890, 1950 and 1959, India (Banaras) for 1956 and Japan for 1960. The series of data for the United States clearly shows that between 1890 and 1959 substantial changes had taken place, tending towards earlier marriage, an earlier start to child-bearing, an earlier birth of last child, an earlier departure of children for homes of their own (an earlier marriage of last child), and a longer period where the couple (father and mother) live in an "empty nest" without co-living children. It is seen that in 1890, the probability was that by the time the last child had married and separated himself from the parental home, the father was already dead, but that in 1959, the father had a chance of surviving 16.5 more years after his last child's marriage.

147. The table also reveals the markedly different patterns of family life cycles in the three countries, as influenced by demographic and cultural conditions. Particularly striking are the disparities found in the length of different cycle stages between the United States and India, the latter showing a much earlier marriage of women, an earlier bearing of the first child, a much longer child-bearing period and a much longer period during which the children remained in the parental household. Moreover, the data for India show that a mother is likely to live as a widow for more than ten years before the marriage of her youngest child.

148. The family life cycle of Japan is characterized by late marriage and birth of first child, and by a surprisingly early termination of child-bearing. In fact, child-bearing is concentrated in a very short period of 2.4 years, since the first child is born on average when the mother is 26.3 years of age and the last at age 28.7 years. In contrast, the Banaras (India) data show the average child-bearing period extending over 18.8 years. Also owing to the substantial increase in longevity among men as well as women in Japan, a parental couple can expect to live together for almost fifteen years after the last child has married and set up his own household.

<sup>181</sup> Duvall, *Family Development* (1962), pp. 7-9.

<sup>182</sup> Glick and Parke, "New approaches in studying the life cycle ..." (1965).

## G. Summary

149. Studies of demographic aspects of families and households, analyses of their size and composition and of factors affecting them are relatively scarce and largely limited to developed countries. While there has been a great volume of literature dealing with family size, such studies generally refer only to the number of children ever born to a woman or a couple and are not concerned with total family size, including adults as well as children. The literature on family size in the former sense has been discussed in chapter IV; this chapter has considered aspects of the total size and composition of families and households among countries and regions, which are determined not only by the levels and patterns of fertility and mortality and the consequent sex-age structure of population, but also by the levels of nuptiality, and by the degree of doubling-up of families or conversely by the degree of nuclearization.

150. The paucity of demographic studies of families and households is due largely to the lack of pertinent census and survey data. The concept of the headship rate is a key to modern methods of projecting the number of families and households, and it may be a good indicator of the degree of family doubling-up or of the degree of nuclearization. However, aside from the developed countries, only certain Latin American countries, India and Singapore have so far provided census tabulations of heads of families and households classified by sex and age. Furthermore, because most of these countries have collected sex-age-specific headship data only recently, in many cases only since the 1960 round of censuses, it is not possible to undertake historical analysis of changes in headship rates and of their effects on average size of families and households. No country has ever collected "vital statistics" of families and households which register formations and dissolutions of families and households, their growth due to new births and in-migration, and their contractions due to deaths and out-migration. Such data, which would be useful for life cycle analysis of families and households, are at present of only academic interest.

151. It has been seen that the frequency distribution of countries according to their average household size appears to be bimodal, resembling the distribution of countries by current fertility levels (gross reproduction rates). The averages of household size in the developed countries are concentrated in a range between three and four persons, while those of the developing countries are found to be around five persons. These two groups of countries are polarized not only with respect to average household size, but also with respect to the distribution of households by size, degree of nuclearity, levels and age patterns of headship rates, and trends in average household size. Notably absent are countries with very large

average household size. Extended families of very large size have long been considered typical of less modernized societies such as India, Pakistan, traditional China or Tokugawa Japan, but much new empirical evidence with regard to size and form of families and households in developing countries has revealed that the predominance of very large extended families in those societies is not a reality, but largely an ideal type, perhaps confined only to upper strata of the societies.

152. One of the most interesting features of the trends in average household size is that, while all the developed countries with the available historical data have shown secular declining trends in size, a good number of countries in Latin America and South Asia have recently been experiencing substantial increases, reflecting considerable decreases in mortality for the past two decades or so without accompanying fertility declines. These findings indicate, moreover, that the size of mortality decline has been sufficient to offset the effects of the moderate degree of nuclearization which has taken place in many of these developing countries.

153. Because of the small number of countries with available sex-age-specific headship data, conclusions derived from the studies based on such a sample are naturally tentative. Nevertheless, correlation and regression studies generally show some meaningful positive relationships between levels of sex-age-specific headship rates and socio-economic conditions of the countries concerned. At the same time, changes in the size of household have been studied in relation to levels of fertility and mortality, patterns of marriage including age at marriage, variations in family type, and levels of sex-age-specific headship rates. In these studies, it has been clearly shown that historically as well as cross-sectionally, fertility plays the most important part in determining the average household and family size.

154. While overshadowed by other factors, the process of nuclearization nevertheless exerts a more than negligible influence in determining average size of family and household. This process is promoted by internal migration, especially rural-urban migration. In fact, the latter may be the main factor in nuclearization when it occurs on a massive scale, such as in the rapidly urbanizing countries of Latin America and South Asia where deep-rooted extended family traditions otherwise discourage an undoubling of families.

155. Other social and economic factors such as the level of living, degree of industrialization, degree of awareness and need for privacy, and degree of housing shortage (housing availability) are also regarded as important. But their interrelationships are so complex and the available data have been so insufficient for analysis that any meaningful measures of the influences of these factors remain to be seen in the future.

## Chapter XI

### POPULATION AND NATURAL RESOURCES

1. Throughout history, people have been concerned with the relationship between themselves and the land and other natural resources available to them.<sup>1</sup> All historical records attest to this pervading interest, which has found its reflections in oral and written traditions, institutions, philosophy and science.<sup>2</sup>

2. The possible implications of growing human numbers for the man-resource relationship were stressed poignantly in the writings of Malthus about a century and a half ago. The particular view taken by Malthus, however, was not borne out by subsequent developments in various parts of the world, mainly because Malthus failed to foresee the prodigious expansion in the efficiency of resource use and in the substitution of new resources for others, which the continuous unfolding of science and technology has rendered possible.<sup>3</sup> Improved plant-breeding and increased use of fertilizers, combined with irrigation and chemical control of weeds and insects have substantially raised crop yields.<sup>4</sup> Better methods of processing and using raw materials have stretched the usefulness of a given quantity. There have also been new techniques of finding mineral deposits and of mining those which were once inaccessible or of low-grade

nature.<sup>5</sup> Technological change has been the dynamic factor in the declining cost trend for agricultural and mineral products.<sup>6</sup> For these and other reasons, productivity in the United States' resource industries, for example, rose sharply during the period 1870-1960. While the working force in those industries numbered about 7 million both at the beginning and end of this period, its output in real value increased by more than five times.<sup>7</sup>

3. The limitation of the earth's surface for living space appears to constitute the limiting factor as regards the size of population. This is not, however, equivalent to the Malthusian doctrine of scarcity as it was conceived a century and a half ago. Man may eventually undertake to limit his numbers, not by the operation of positive Malthusian checks, but voluntarily. The space limitation is likely to reach a critical level in overcrowded urban areas, despite the abundance of unoccupied land and the technological possibilities for utilizing space above and below the ground and on the seas.<sup>8</sup>

4. National population and production data, so far as population, resources and environment are concerned, do not reveal the full story. Knowledge of the structure and spatial concentration of population is needed.<sup>9</sup>

<sup>1</sup> "Resources", "natural resources", and "Nature" have been conceived in a number of ways. "Nature", with a capital N, as a "unity" in the nineteenth century and before, was considered to have a fundamental ethical and social value and man "in a state of nature" was considered as "naturally good". More recently, these basic questions have been re-formulated in ecological terms, in which a state of ecological balance is distinguished from a development where disturbances can cause irreversible change, having unforeseeable consequences which may jeopardize human existence. More specifically, fear has also been expressed of the rapid depletion of particular essential resources, leading to a re-formulation of the Malthusian dilemma in new terms. Caulfield, "Welfare, economics, and resources development" (1965), p. 572. See also Ackerman, "Population and natural resources" (1966); Bates, "The human ecosystem" (1969), pp. 21-30; and Handler, *Biology and the Future of Man* (1970), pp. 431-473.

<sup>2</sup> Barnett and Morse, *Scarcity and Growth* ... (1963), p. 1.

<sup>3</sup> Landsberg, *Natural Resources for U.S. Growth* ... (1964), p. 3. According to Price, the rate of growth of international science, irrespective of field, may be put at an exponential annual 7 per cent, i.e., doubling about every ten years, over a period of 250 to 300 years, which is much faster than has been the rate of growth in either population or industrialization. Price, "The scientific foundations of science policy" (1965), p. 234.

<sup>4</sup> Brown, "Human food production ..." (1970). According to Brown, the central question is no longer whether we can produce enough food, but what the environmental consequences of attempting to do so are and how many people the biosphere can support without impairment of its operation. See also Brown, "Population, food and the energy transition" (1969). For a discussion of increases in grain yields as a result of the "green revolution", see chapter XII, section C.

<sup>5</sup> McGann, "Technological progress and minerals" (1961), p. 74; Brooks and Krutilla, *Peaceful Use of Nuclear Explosives* ... (1969), pp. 23-43. See the discussion in section D below.

<sup>6</sup> In the United States, the unit cost in agriculture declined by a compound annual rate of 0.4 per cent during 1870-1919, while in the period 1919-1957 it declined by 1.4 per cent a year. As regards minerals, despite the fact that the demand increased perhaps 40 times over the period 1870-1957, the cost of a unit of minerals in 1957 had fallen to a level only one-fifth of that in 1870. The decline in unit costs (which means an increase in productivity) was more rapid in the latter half of the period than in the earlier—a 1.2 per cent per annum drop to 1919, as against 3.2 per cent per annum from 1919 to 1957. See Barnett and Morse, *Scarcity and Growth* ... (1963), chap. 8. See also the Fisher-Potter study, which relates to the 1870-1960 period: Fisher and Potter, "Natural resource adequacy ..." (1969).

<sup>7</sup> Fisher and Potter, *World Prospects for Natural Resources* ... (1964), p. 11. See also Potter and Christy, *Trends in Natural Resource Commodities* ... (1962), particularly pp. 14-15; and Landsberg, Fischman and Fisher, *Resources in America's Future* ... (1963), pp. 11-13.

<sup>8</sup> According to 1960 census data for the United States, 96 million people—53 per cent of the nation's population—were concentrated in 213 urbanized areas that together occupied only 0.7 per cent of the nation's land surface. Quoted by Davis in "The urbanization of the human population" (1965), p. 41.

<sup>9</sup> Fisher has pointed out: "One has to know also a good deal about the distribution of population: how many live in metropolitan regions, and within them in central cities, and how many in non-metropolitan areas ... The tendency towards further concentration in metropolitan regions outside central cities seems certain to

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Overcrowding and spatial concentration of population raise many problems of resources and environment (e.g., spillover effects of wastes produced in urban areas and the resulting pollution of air, water and land). There is little indication, however, that the pattern of population distribution will undergo drastic changes in the near future on either a world or national scale. It rather appears likely that there will be an increased concentration of population resulting from coalescence of present nodes. The resource implications of concentration *versus* dispersion of population have already raised several complex questions.<sup>10</sup> Population growth may or may not become a real threat to the social welfare in the advanced developed countries, and if it does it will likely be first manifested in the deterioration of the quality of life<sup>11</sup> rather than as an inadequate rate of growth in material welfare. However, most developing countries, which are embarked upon long-term economic development, are confronted primarily with a severe shortage of capital per head of population. At current high rates of population growth, they can hardly achieve the desired rate of capital formation and the accompanying technological and institutional innovations which are required for the rate of economic growth to which they aspire.<sup>12</sup> It is

(Footnote 9 continued)

continue during the several decades ahead though perhaps not at as rapid a rate as during recent years. All this means that airshed, watershed, and urban solid waste kinds of pollution will be magnified in the future as population concentration continues to build up in metropolitan areas." See Fisher, "Impact of population on resources and the environment" (1971), p. 396.

<sup>10</sup> Two of the questions raised are: (a) whether, from a resource point of view, public policy should attempt to deal with the problems arising from ever-increasing concentration or whether it should seek to bring about a renewed dispersal; and (b) whether society prefers increasing technological innovations, population control, social revolution or some particular combination of these elements. See, among others, Chapman, "Interactions between man and his resources" (1969), p. 37.

<sup>11</sup> The deterioration which is taking place in the United States has been described in this way: "... the penalties for population expansion are far greater in an affluent society than in a marginal economy. This is already painfully evident in the United States. Rising *per capita* real income places decreasingly tolerable burdens upon the environment: vastly increased solid waste, non-degradable detergents, pesticides, containers and trash, more automobiles, thicker traffic, increased CO and CO<sub>2</sub> production, more smog, rapid erosion of fields for airports, highways, parking spaces, and suburbia, rapidly increased water usage for anything but drinking, viz., air-conditioning, swimming pools, metal fabrication, and paper production plants etc., while the same processes accelerate the depletion of all of our non-renewable resources, e.g., oil, iron ore, copper ore etc." See Handler, ed., *Biology and the Future of Man* (1970), p. 909.

<sup>12</sup> In this context, pertinent literature often emphasizes the exponential nature of population growth, which is to say that if a doubling occurs within one time period, successive equal periods would lead to a quadrupling, eightfold growth and so forth, hence an ever more rapid encroachment upon remaining reserves in resources. Actually, in modern times population growth accelerated, hence it grew with even greater momentum than that implied in a constant exponential rate. However, there are reasons to think that acceleration will come to an end and that, thereafter, the actual rates of growth will also diminish as a response to perceived pressures. The growth of a human population, as Maddox puts it, is "much more complicated and subtle than the growth of a population of bacteria in a set of Petri dishes". Maddox, "The doomsday syndrome" (1971), p. 15. Or, as Abelson remarks, "Concern about the population explosion and such matters as pollution has already had profound effects. ... Important segments of the middle and upper-middle classes are talking of a future 'no growth' society".

generally recognized that in these countries a relatively substantial part of resources is invested in education, public health and medical facilities, leaving thus very little to be allocated to the types of industrial investment that could in the long run achieve increased rates of savings, economic growth and population stability. It is said that in developing countries, science and technology and the economic adaptation of their accomplishments have been employed to offset, essentially, the effects of sheer increases in population.<sup>13</sup>

5. The essential global question appears to be what Landsberg has stated in the following manner: "How long can the natural resources of a finite world support growing populations at rising levels of living? Obviously there are physical limits to land surface; to amounts of fresh water moving through the hydrologic cycle ... and to mineral fuels and metallic ores".<sup>14</sup> Ecologically speaking, the question may be whether man can succeed in establishing a dynamic equilibrium with his environment and avoid a destructive imbalance resulting from further exploitation of resources. To meet man's mounting material needs, nature appears to offer only the ordinary rocks, minerals, soil, water, air and sunlight combined with human intelligence and ingenuity.<sup>15</sup> What is not yet known is the potential mineral wealth concealed in the crust of the earth (both continental and sea crust), how much new land can be brought under cultivation, to what degree fresh water supplies can be re-used with safety, and most important, the extent of human ingenuity in the continuous process of technological transformation.<sup>16</sup> The scientific and technological age has provided man with new means to challenge nature.<sup>17</sup> Since

Abelson, "Limits to growth" (1972), p. 1197. In a similar way Barnett argues that "... each future generation will choose its own birth rate. It will do so, not mindlessly as a grasshopper horde without regard for available vegetation ..." Barnett, "Environmental policy and management" (1967), p. 223. For an illustration of the implications of exponential population growth within a "closed system" as described in terms of "feedback loops", see Meadows *et al.*, *The Limits to Growth* (1972), chaps. 1 and 2. See also Nature, "The case against hysteria" (1972).

<sup>13</sup> Fisher and Potter, "Natural resource adequacy ..." (1969), p. 107.

<sup>14</sup> Landsberg, *Natural Resources for U.S. Growth ...* (1964), p. 4.

<sup>15</sup> Tilson, "The earth's crust" (1962), p. 22. See also Brown, *The Challenge of Man's Future* (1954), p. 218.

<sup>16</sup> See Landsberg, *Natural Resources for U.S. Growth ...* (1964), pp. 4-5. See also Tilson, "The earth's crust" (1962), p. 22. Regarding human fertility as related to human ingenuity, Teller has remarked: "Since he [Malthus] made his dire predictions, the rate of population increase has continued to reach higher and higher levels—and so has the standard of living throughout most of the world. It is true that conditions are wretched in many countries, but even where life is hard people are objecting not because they look back to a happier past but rather because they demand a better future—which they know can be realized. Human fertility is undoubtedly great, but so far human ingenuity has proved greater. I suspect that ultimately the population of the earth will be limited not by any scarcity but rather by our ability to put up with each other." Cited in Nolan, "The inexhaustible resource of technology" (1958), p. 66.

<sup>17</sup> White has stated that technology provides the means by which man may ever more effectively challenge nature and has concluded that "... we shall continue to have a worsening ecologic crisis until we reject the Christian axiom that nature has no reason for existence save to serve man". See White, "The historical roots of our ecologic crisis" (1967), p. 1207. In the same way Schaller has said: "For centuries man has attempted to set himself aside from the ecological system ... He is now only beginning to comprehend

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technological progress is built into the social processes of modern times, the increasing scarcity of particular resources is apt to foster the discovery and development of alternative resources, not equal in economic quality, but sometimes even superior to those replaced.<sup>18</sup> Scientific advance and technological change have created a virtually unlimited "knowledge bank" for an endless stream of cost-reducing innovations. Technological progress, instead of being the result of chance and lucky discoveries, appears to follow what Myrdal calls the principle of "circular and cumulative causation", or changes fostering further changes in the desired direction.<sup>19</sup>

6. The extent of a country's natural resources constitutes a limitation on the development which it can undergo. Given a country's resources, its rate of development is essentially determined by the behaviour, skill, and institutions of its human population.<sup>20</sup> In the less developed countries where a low rate of resource exploitation generally prevails, economic development tends to be hindered by the high rates of growth of population, which tend to adversely affect the accumulation of capital. As these countries advance in their development, they witness an acceleration in the consumption of their natural resources.<sup>21</sup> The importance of these resources inputs, however, tends to decline relative to total input and total output as economic development advances. This does not imply that the absolute volume of resources requirements declines; it merely means that, with an increase in total output, the total demand for resources inputs may grow less.<sup>22</sup>

(Footnote 17 continued)

that it is not enough to improve the political system or economic system, but that he must reach a healthy relationship with his environment." See Schaller, "Man's ecological environment" (1969), p. 116. Lenin also pointed out that man's new discoveries will increase his mastery over nature. Lenin, *Materializm i empirio-krititsizm* (1961), p. 298. See also Malin, *Zhiznennye resursy chelovechestva* (1967).

<sup>18</sup> "Few components of the earth's crust, including farm land, are so specific as to defy economic replacement, or so resistant to technological advance as to be incapable of eventually yielding extractive products at constant or declining cost. When coal, petroleum, hydroelectric power, and the atomic nucleus replace wood, peat, and dung as source of energy; when aluminum yields its secrets to technology and is made to exist, as never before, in the form of metal; . . . when all this happens, can we say that we have been forced to shift from resources of higher to those of lower economic quality?" See Barnett and Morse, *Scarcity and Growth* . . . (1963), p. 10.

<sup>19</sup> See Myrdal, *Economic Theory and Under-developed Regions* (1957), chap. 2. Medawar remarks in a more general way that: "One of the lessons of history is that almost everything one can imagine possible will in fact be done, if it is thought desirable; what we cannot predict is what people are going to think desirable." See his statement in Wolstenholme, ed., *Man and his Future* (1963), p. 362.

<sup>20</sup> Lewis, *The Theory of Economic Growth* (1955), p. 52.

<sup>21</sup> Fuller, "Natural and human resources" (1959), pp. 2-3.

<sup>22</sup> Adler stresses the effects of the changing structure of production and consumption in the process of economic development as tertiary activities become relatively more important and lead to a decline in the demand for inputs of material resources. See his "Changes in the role of resources at different stages of economic development" (1961), p. 50. According to Potter and Christy, the contribution of the so-called natural resources industries to GNP in the United States has declined from a third of the total in 1900 to some 13 per cent by the late 1950s. Potter and Christy, *Trends in Natural Resource Commodities* . . . (1962), p. 6.

7. In the early 1950s there was considerable fear of natural resource scarcity in the developed countries.<sup>23</sup> By the mid-1960s, however, many of the anxieties over the supply of natural resources appeared to have subsided, as there were few indications pointing to widespread and persistent shortages of materials in the next 20 or 30 years. Instead, the most troublesome problems were of an environmental nature, such as the cleanliness of the air and water, the effects of excessive use of pesticides upon soil and water, the availability of suitable surroundings for outdoor recreation and the effects of urban living upon the human body and spirit.<sup>24</sup> With the concept of the earth as a "spaceship", there has developed over the past few years new awareness of the complex ecological relationship of man to natural resources and environment.<sup>25</sup> Speculations and studies of the effects of environmental deterioration and pollution have included assertions that the accumulation of carbon dioxide from fossil fuel combustion, consequent to population growth and economic development, might warm up the earth's atmosphere and cause the polar ice to melt, thus raising the sea level and submerging coastal cities. There has also been warning of the possibility that particles emitted into the air from industrial and transportation sources

<sup>23</sup> For example, in January 1951, in the United States, President Truman established the President's Materials Policy Commission and entrusted it with the task of inquiring into whether there would be enough food and industrial raw materials at reasonable prices over the next 25 years to support continuing population and economic growth of the country. See United States, President's Materials Policy Commission (Paley Commission), *Resources for Freedom* (1952), 5 vols.

<sup>24</sup> Jarrett, "Editor's introduction" (1966). For detailed discussion see section E below.

<sup>25</sup> Boulding points out: "... in the spaceman economy, throughput is by no means a desideratum, and is indeed to be regarded as something to be minimized rather than maximized. The essential measure of the success of the economy is not production and consumption at all, but the nature, extent, quality, and complexity of the total capital stock, including . . . the state of the human bodies and minds . . . In the spaceman economy, what we are primarily concerned with is stock maintenance, and any technological change which results in the maintenance of a given total stock with a lessened throughput (that is, less production and consumption) is clearly a gain." See Boulding, "The economics of the coming spaceship earth" (1966), pp. 9-10. Gough and Eastlund have stated that "... future societies will be forced to develop 'looped', or 'circular', materials economies to replace their present, inherently wasteful 'linear' materials economies. . . Within these limits, however, the standard of living of the population would be higher if the rate of flow of materials were lower. This . . . could be accomplished in two ways: increasing the durability of individual commodities and developing the technological means to recycle the limited supply of material resources. The conclusion appears radical. Future societies must *minimize* their physical flow of production and consumption. Since a society's gross national product for the most part measures the flow of physical things, it too would be reduced. But all nations now try to *maximize* their gross national product, and hence their rate of flow of materials!" See Gough and Eastlund, "The prospects of fusion power" (1971), p. 50. The spaceship aggregate concept has recently been used to define a world model. The model is a first attempt to bring together the large body of information about causal relationships among five basic quantities or levels—population, capital, food, non-renewable resources and pollution—and to express that information in terms of interlocking feedback loops. The main purpose is to explore the degree to which man's attitude towards continual and accelerated growth—of population, land occupancy, production, consumption, wastes etc.—can be justified. See Forrester, *World Dynamics* (1971), chaps. 2 and 3; and Meadows et al., *The Limits to Growth* (1972), chap. 3, particularly fig. 26.



might prevent some sunlight from reaching the earth's surface, thus lowering the global temperature and beginning a new ice age. Similarly there have been increasing demands to ban DDT, as its effects on reproductive capabilities of birds have been determined, and as evidence is found of its cumulative effects on other species, including man. Serious questions have been raised as to the effects on oceans and terrestrial ecosystems of systematically discharging into the environment such materials as oils and radio-active substances, or nutrients such as phosphorous which can overenrich lakes and coastal areas.

8. "Residual" and "waste", resulting from consumption and production of goods and services, tend to increase as population growth and economic development proceed. They become environmental problems—pollutants—when they have harmful effects in the biosphere.<sup>26</sup> The environmental problem is said to depend upon: (a) the growth of population; (b) the development of technology and its application to natural resources; and (c) the priorities accorded respectively to the first-order effects of technology, and the second-order, third-order, or higher effects of technology (side-effects).<sup>27</sup>

9. From an economic standpoint, the environmental spillovers and the pollution of the atmosphere and water which have at times reached critical levels in recent years in developed countries are considered to be the outcome of the failure of the price system and many of them can be dealt with, at least in part, by corrective taxation.<sup>28</sup>

<sup>26</sup> The pertinent economic aspects of environmental problems and spillovers are that when considered as "external diseconomies" (i.e., those external to the firm but internal to the industry), their effects on the welfare of the population can be substantial. Formerly, economists concerned with environmental pollution had adopted a partial equilibrium approach and treated the pollution of particular environmental media such as air and water as separate problems. Recently, however, it has generally been argued that the production of residuals is an inherent part of the production and consumption processes and that the environmental media which receive and assimilate residual wastes are far from "free goods" but are natural resources of great value. A broad framework is generally considered in which environmental pollution and its control are viewed as a material balance problem for the entire economy. Of the wide literature on this subject, see, for example, Ayres and Kneese, "Pollution and environmental quality" (1969); Buchanan and Stubblebine, "Externality" (1962); Turvey, "On divergences between social cost and private cost" (1963); Ridker, *Economic Costs of Air Pollution* . . . (1967); Worcester, "Pecuniary and technological externality . . ." (1969); Mishan, "The postwar literature on externalities . . ." (1971); Fisher, "Impact of population on resources and the environment" (1971); Leontief, "Environmental repercussions and the economic structure . . ." (1970); Kneese, "Environmental pollution . . ." (1971); and Solow, "The economist's approach to pollution and its control" (1971).

<sup>27</sup> Matthews, *Man's Impact on the Global Environment* . . . (1970), pp. 224-226.

<sup>28</sup> A number of methods have been suggested for influencing production so as to reduce or eliminate external diseconomies of this type. Most familiar are: (a) outright prohibition; (b) regulation of production of goods generating externalities; (c) voluntary agreements; and (d) subsidy and tax methods, which, until recently, was the favoured solution. For a discussion of these and other methods, see Davis and Kamien, "Externalities, information and alternative collective action" (1969); Mishan, "The postwar literature on externalities . . ." (1971); Princeton University, Center of International Studies, *Ecology and Politics in America's Environmental Crisis* (1970), pp. 109-110; and Coale, "Man and his environment" (1970).

The immediate problems facing human population are generally recognized to be those relating to pollution rather than the depletion of natural resources.

10. Sections A and B of this chapter focus attention on important questions of definition, classification, and measurement of natural resources and briefly review recent opinions and doctrines hereto advanced. The classification of natural resources is discussed in detail in section C. The determinants of the demand for and supply of natural resources are considered in sections D and E, and finally, the relation of natural resources and population to development in section F.

#### A. Concept of natural resources and problems of measurement

11. It is generally recognized that the material level of living of the population of an area depends on several factors: natural resources; human resources, including *entrepreneurs*, management and the labour force; capital resources such as industrial plants, transportation facilities and housing; and institutional resources, such as science and technology, laws, social structure, and the educational system. It is difficult to isolate these fundamental factors. Thus, natural resources, before they take on economic significance, must have capital, labour and technology applied to them.<sup>29</sup>

12. The concept of natural resources has changed from time to time and from place to place. The role of technology is particularly important in defining natural resources. In fact, resources availability in time can hardly be defined but in terms of technology.<sup>30</sup> Since technology changes constantly and unpredictably over time, the definition and measurement of resources undergo constant changes, with the consequence that a static, well-defined quantitative limit to natural resources becomes untenable. Accordingly, when an area is said to be richly endowed in any of the natural resource categories,<sup>31</sup> the statement is empirically meaningful only in relation to a given time and a given state of knowledge and technology.<sup>32</sup> Similarly, an area which is poorly endowed in natural resources today may be considered rich in resources at some later time, not merely because unknown resources are discovered, but also because new uses are discovered for the known resources.<sup>33</sup>

13. The pioneering report of the United States President's Materials Policy Commission approached the

<sup>29</sup> Fisher, "The relationship of material resources and population to economic and social development" (1967), p. 313. See also Gurvich, *Rol' prirodnikh bogatstv* . . . (1961), pp. 20-21.

<sup>30</sup> Coal was not a valued natural resource until men learned to burn it; neither can anyone speak with certainty today as to its value in two hundred years' time. Lewis, *The Theory of Economic Growth* (1955), p. 52. Half a century ago, the air was for breathing and burning. But since 1913, as a result of the development of the Haber process by which the extraction of nitrogen from the air became feasible, the atmosphere has been promoted to an important natural resource. See Barnett and Morse, *Scarcity and Growth* . . . (1963), p. 7.

<sup>31</sup> See section D below.

<sup>32</sup> Lewis, *The Theory of Economic Growth* (1955), p. 52.

<sup>33</sup> United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952), chap. 4. See also Putnam, *Energy in the Future* (1953).



concept of resource scarcity more in terms of cost than of physical depletion, since there is no case in history in which a material has totally run out, except in a given location.<sup>34</sup> Long before any possible exhaustion, and in the absence of technology, difficulties will arise in the form of persistently increasing costs because new deposits

<sup>34</sup> McDivitt stated: "There is no recorded history of mankind running out of the supply of one or the other mineral . . . there is no shortage of minerals in the world today and there is no indication of shortage in the foreseeable future. . . . Past shortages have been due to inability to keep up with sudden surges in demand rather than to any basic lack of natural resources—due, that is, to inadequacy in plant, not of raw materials." See McDivitt, *Minerals and Men* . . . (1965), p. 10. See also Landsberg's statement: "There is abundant oil in the shales and tar sands of the North American continent; abundant aluminum in the crust of the earth everywhere; abundant manganese and other metals in the nodules that cover much of the ocean floor; abundant timber in virtually untapped tropical forests. The crucial question usually is not how much there is of needed resource materials, but what it will cost to extract and put them to use." Landsberg, *Natural Resources for U.S. Growth* . . . (1964), p. 5. Also, "Today, some 500 million tons of material must be handled to produce the major domestic metals; some 10 billion tons might have to be moved if we wanted to recover our metal needs from average rock. Because such great masses of minerals are contained in the crust of the earth, scarcity and depletion are less physical concepts than economic ones." *Ibid.*, p. 199. Brown asserts that "one hundred tons of average igneous rock contain, in addition to other useful elements, 8 tons of aluminum, 5 tons of iron, 1,200 pounds of titanium, 180 pounds of manganese, 70 pounds of chromium, 40 pounds of nickel, 30 pounds of vanadium, 20 pounds of copper, 10 pounds of tungsten and 4 pounds of lead". Given adequate supplies of energy, these elements can be extracted from the rock and it appears likely that the rock itself contains the requisite amount of energy in the form of uranium and thorium. Brown concludes that the "basic raw materials for the industries of the future will be sea-water, air, ordinary rock, sedimentary deposits of limestone and phosphate rock, and sunlight". Brown, *The Challenge of Man's Future* (1954), pp. 217-218. See also his "Technological denudation" (1956). Barnett and Morse have noted: "Advancing ocean technology could conceivably lead to a 'steady state' equilibrium of a great circular flow process analogous to, but far more complex than, the carbon dioxide cycle. Equally important are the energy plateaux already created by atomic fission and eventually, perhaps, to result from nuclear fusion and solar energy devices. Once energy becomes available in unlimited quantities at constant cost, the processing of large quantities of low-grade resource material presumably can be undertaken at constant cost without further technological advance, and at declining cost with technological advance and capital accumulation." Barnett and Morse, *Scarcity and Growth* . . . (1963), p. 239. Brown, Bonner and Weir state that "... from the technological point of view, we see that fundamentally there is no lower limit to the grade of an ore which can be processed. This was illustrated dramatically by the isolation of the new element plutonium . . . the ultimate resources of energy which are available to man are enormous—and indeed are sufficient to power a highly industrialized world for literally millions of years. This means that, given adequate brainpower, there is little doubt that the trend which has led us to process ores of steadily decreasing grade can continue until we reach the point where we are processing the very rocks of which the earth's crust is made." They further remark that: "... man has available potential sources of energy which are sufficient to satisfy his needs for a very long time. However, these resources have yet to be transformed from potential supplies into actual ones. Before they can be used they must be developed. Whether or not man will be able to develop them in time is a very real question, the answer to which will be determined, in the long run, by many factors of a political, economic, and social nature," and finally, in conclusion, they state "... it appears that the critical limiting factor as far as the world's resources are concerned is not materials, energy, or food, but brainpower." Brown, Bonner and Weir, *The Next Hundred Years* . . . (1957), pp. 90-91, 112, 115. See also California Institute of Technology, *The Next Ninety Years* . . . (1967).

tend to become harder to exploit or because the quality of the deposits found is deteriorating.<sup>35</sup> If the costs of obtaining scarce natural resource products should rise significantly in relation to other costs, society would be devoting larger shares of manpower and capital for their production. Rising real cost would then become a drag on the continued improvement in the average level of living of populations.

14. Chapman has expressed the view that in the human ecosystem, man assigns utility to various elements of his environment and thus confers upon them the role of resources. Resources then are neither wholly of the physical world nor wholly of the world of man but are the result of the interaction between the two.<sup>36</sup> Others have stated that since man's economic activity consists in combining the agents of production (natural resources, labour and capital) to create utilities, natural resources can be defined as "an arrangement of matter to which man can apply his activities to increase his net welfare".<sup>37</sup> Zimmermann's dynamic functional definition of natural resources is based on the trinity of "nature, man and culture". Resources are dynamic not only in response to increased knowledge and expanding science and technology, but also in response to changing individual wants as well as social objectives.<sup>38</sup>

15. Perloff and others have introduced the new concept of "environmental resources" as distinct from the traditional commodity resources. Included are such "amenity resources" as climate, topography, coast and sea-shore, which may influence the location of economic activities or family residence, as well as open space areas, particularly on the outskirts of cities, that are attractive for recreation purposes.<sup>39</sup> In the United States, according to Perloff, the concept of natural resources is strongly influenced by the

<sup>35</sup> New technology can, however, prevent such a trend. For example, Herfindahl found that the deflated price of copper had remained fairly constant for long periods since 1870 in the United States, despite the fact that the average grade of copper ore decreased from 3 to 1 per cent. The important offsetting elements involved were the technological improvements, from mining down to finished products. Herfindahl, *Copper Costs and Prices* . . . (1959), pp. 202, 224; and his *Three Studies in Minerals Economics* (1961), p. 32 and fig. 9.

<sup>36</sup> Chapman further states: "The environmental elements that man calls upon to serve as resources, and the nature and size of the requirements he places upon them, depend on his numbers, his needs and desires, and his values and skills". See his "Interactions between man and his resources" (1969), p. 31.

<sup>37</sup> Schaefer and Revelle, "Marine resources" (1959), p. 74. More explicitly it has been stated by these authors that man "neither creates nor destroys matter . . .; he simply rearranges it for his own benefit. He normally accomplishes this only when the application of labor and capital to the naturally occurring arrangement of matter is 'profitable'; that is, more utilities are created than are consumed." *Ibid.*

<sup>38</sup> "Resources are highly dynamic functional concepts; they are not, they become, they evolve out of the triune interaction of nature, man and culture, in which nature sets outer limits, but man and culture are largely responsible for the portion of physical totality that is made available for human use." See Zimmermann, *World Resources and Industries* . . . (1951), pp. 814-815.

<sup>39</sup> Perloff, "A framework for dealing with the urban environment . . ." (1969), p. 5. See also Perloff and Wingo, "Natural resource endowment and regional economic growth" (1961), p. 197; and Fisher, "Impact of population on resources and environment" (1971), p. 392.

conservation movement in the early part of this century which placed great emphasis on the trinity of "conservation, development and use of natural resources".<sup>40</sup>

### B. Recent views on natural resources

16. A substantial number of scholars from a variety of scientific disciplines have expressed concern about the increasing scarcity of natural resources in the light of rapid population growth. Their concerns are essentially derived from the general premise that natural resources are scarce and that the scarcity increases with the passage of time leading to diminishing incremental returns, thereby adversely affecting the welfare of the population. This view, however, is not shared by a sizable number of scholars who are skeptical about accepting the thesis in the absence of sufficient evidence. A review of the existing literature on the subject reveals a multiplicity of propositions that are not always self-evident and factual, but are often based on speculation and hypotheses.

17. The past two centuries—the period characterized by the emergence of modern science, the industrial revolution and accelerating population growth—have witnessed a great interest in the relation of population to material resources.<sup>41</sup> This was rather systematically explored early in the nineteenth century by British classical economists, most of whom based their studies on the Malthusian theory of population and took the view that the limited availability of natural resources sets an upper limit to economic growth and welfare of population. Malthus' doctrine stated that population tends to outrun the means of subsistence—mainly land and farm products—subject to the constraint of positive (famine etc.) and preventive (birth control etc.) checks.<sup>42</sup> Ricardo,

<sup>40</sup> Perloff, "A framework for dealing with the urban environment . . ." (1969), pp. 7-8. See also Perloff *et al.*, *Regions, Resources and Economic Growth* (1960).

<sup>41</sup> Population questions also attracted interest in early times, though they were not closely linked to economic concerns or the availability of food. For the views of early Greek and Roman writers on population, see chapter III, section A. After about the sixteenth century, writers began to stress economic considerations in relation to population. See chapter III, section B. See also Mayer, "Toward a non-Malthusian population policy" (1969), pp. 5-6; Spengler, *French Predecessors of Malthus* . . . (1942); Wrigley, *Population and History* (1969), chaps. 2 and 3; and Langer, "Checks on population growth . . ." (1972).

<sup>42</sup> Malthus, *An Essay on the Principle of Population* . . . (1798; 1970 ed.). Malthus' *Essay* is far from a complete logical proposition such as that in a modern scientific model, of the relation of natural resources to population. However, the qualified Malthusian theory (applied to a population closed to trade, migration and technology from abroad) may historically be considered as tested and verified by the classical example of Ireland. The population of Ireland increased during the latter part of the eighteenth and the first half of the nineteenth centuries as food production increased, but thereafter a sharp decline, originating in the potato famine, set in. See the discussion in chapter II, section D. For a recent interpretation of the Malthusian doctrine, see Flew, "Introduction" (1970). Barnett and Morse have constructed an analytical model based on population and natural resources consistent with the intent of Malthus. Four variables have been included in the model: (1) time and population, (2) natural resources availability, (3) technology and institutions, and (4) the production process. Barnett and Morse, *Scarcity and Growth* . . . (1963), pp. 54-58. For the technical discussion and details of the model, see Morse and Barnett, "A theoretical analysis of natural resource scarcity . . ." (1961).

who considered mineral production as well as agriculture, modified Malthus' doctrine of scarcity by maintaining that the real threat was one of the progressive decline of resource quality because the richest farmland and beds of ore would be used first.<sup>43</sup> Mill accepted Malthus' principle of population, but he believed that social reforms and other improvements could lead to economic progress. He also broadened the scope of natural resource scarcity to include living space and the quality of life.<sup>44</sup>

18. About the turn of the century the Conservation Movement in the United States had a vigorous impact on public opinion.<sup>45</sup> The 1908 United States Governors' Conference and the communications of the Inland Waterways Commission provided literally thousands of estimates of the physical quantities and characteristics of natural resources.<sup>46</sup> These estimates gave finite amounts for coal, iron and other minerals as well as the dates when they would be exhausted.<sup>47</sup>

19. The recent body of literature on the relation of natural resources to population is voluminous. Some prominent contemporary conservationists believe that, within the foreseeable future, an increasing consumption of resources might produce scarcities, causing a lowering

<sup>43</sup> Ricardo, *The Principles of Political Economy and Taxation* (1817; 1911 ed.), pp. 34-35, 46-47.

<sup>44</sup> Mill, *Principles of Political Economy* . . . (1848; 1965 ed.), particularly pp. 157 ff. See also the discussion in chapter III, section D.

<sup>45</sup> The meaning of "conservation" varies from author to author and from time to time. Barnett and Krutilla have shown that its root lies in Malthusian thinking and the exhaustion of natural resources. Herfindahl, examining the writings of the Conservationists since Gifford Pinchot, the virtual founder of the Movement, found that conservation had been associated with many conflicts and inconsistencies. Among factors intensifying these conflicts, he noted the growth of population with its effects on increased demands for the use of natural resources. Herfindahl, *What is Conservation?* (1961), particularly p. 9. See also Krutilla, *Conservation Reconsidered* (1967); Mason, "The political economy of resource use" (1958), pp. 157-162; Scott, *Natural Resources* . . . (1955); Ciriacy-Wantrup, *Resource Conservation* . . . (1963) and his "Economics and policies of resource conservation" (1959); National Academy of Sciences—National Research Council, *Principles of Resource Conservation Policy* . . . (1961), pp. 1, 3-4.

<sup>46</sup> The communications of the Inland Waterways Commission to President Theodore Roosevelt, which led to the Conference, called attention to an unprecedented consumption of natural resources and exhaustion of these resources. President Roosevelt, in accepting the view, declared " . . . there is no other question now before the nation of equal gravity with the question of the conservation of our natural resources. . . . It is evident the abundant natural resources on which the welfare of this nation rests are becoming depleted and, in not a few cases, are already exhausted". See United States, Committee of Governors, *Proceedings of a Conference of Governors* . . . (1909), p. x. The idea of resource depletion was widely accepted and appears to have dominated the Conference deliberations.

<sup>47</sup> Pinchot, who shared with President Roosevelt the leadership of the Movement, stated: "The five indispensable essential materials in our civilization are wood, water, coal, iron, and agricultural products. . . . We have timber for less than thirty years at the present rate of cutting. The figures indicate that our demands upon the forest have increased twice as fast as our population. We have anthracite coal for but fifty years, and bituminous coal for less than two hundred. Our supplies of iron ore, mineral oil, and natural gas are being rapidly depleted, and many of the great fields are already exhausted. Mineral resources such as these when once gone are gone forever." Pinchot, *The Fight for Conservation* (1910), pp. 123-124.

of the level of living of the population.<sup>48</sup> Others, such as Vogt and Osborn, have warned that unless population were reduced, there would be great risk of a drastic lowering of the level of living.<sup>49</sup> Vogt's argument is based on the adjustment of "demand to supply", that is, a choice between a lower *per capita* income and living standard or fewer people.<sup>50</sup> Osborn also urges restrained population increase on the ground of "relatively fixed" natural resources.<sup>51</sup> One of the most pessimistic of recent writers is Ehrlich, who believes that famine will be rife in the 1970s and hundreds of millions of people will die of starvation.<sup>52</sup>

20. Some physical scientists have investigated the question of the interactions of population and natural resources. Their conclusions cover a spectrum from the pessimistic views of Vogt and Osborn to the optimistic views of Mather. Among the pessimistic views are those of C. G. Darwin and Alan Gregg.<sup>53</sup> Some authors have gone so far as to predict doomsday by either deductive or intuitive and visionary methods.<sup>54</sup> On the optimistic

side, among others, von Neumann speculated that within decades "... energy may be free ... with coal and oil used mainly as raw materials for organic chemical synthesis ...".<sup>55</sup> Others, finding the alarmist views in error because of their disregard of technological changes, have suggested that the long-term solution of energy problems, for food as well as power and fuel, would be found in solar energy.<sup>56</sup> Mather, who wrote towards the end of the Second World War, went further, stating that "Mother Earth can provide food enough" for all people.<sup>57</sup> Some scientists have also insisted that the human species had a vital stake in the extension of the cosmic frontier in order to gain access to new resources on other planets.<sup>58</sup>

21. Some scholars have considered that rapid population growth plays a less important role than other factors in creating pressure on resources and on the available land. According to Juniper, the principal pressure is said to be the result of the increased standards of individual affluence and leisure time.<sup>59</sup> Others have been concerned

<sup>48</sup> See Ordway, *Resources and the American Dream* ... (1953), particularly pp. 26, 35, 47. Similar views are held by other contemporary conservationists such as Leopold, *A Sand County Almanac* ... (1949), and Sears, "Ethics, aesthetics and ..." (1958).

<sup>49</sup> Vogt, *Road to Survival* ... (1948); Osborn, *Our Plundered Planet* (1948); his *The Limits of the Earth* (1953); and his "The world resources situation" (1950); Sax, *Standing Room Only* ... (1955); and Massingham and Hyams, *Prophecy of Famine* ... (1953).

<sup>50</sup> Vogt, *Road to Survival* ... (1948), p. 265.

<sup>51</sup> Osborn has stated: "We are under the power of a timeless principle, exerting its influence relentlessly on a global scale. This principle ... finds expression in a simple ratio wherein the numerator can be defined as 'resources of the earth' and the denominator as 'numbers of people' ... The denominator is subject ... to control by man. If we are blind to this law, or delude ourselves into minimizing its power, of one thing we can be assured—the human race will enter into days of increasing trouble, conflict and darkness." Osborn, *The Limits of the Earth* (1953), p. 207.

<sup>52</sup> Ehrlich, *The Population Bomb* (1968), prologue.

<sup>53</sup> Darwin believed that society has a tendency to breed without limit. He further stated that the intellectually poor stock tends to breed at higher rates, with the result that the weak will fill the earth. Darwin, *The Next Million Years* (1952), particularly pp. 152-153. Borgstrom asserted that the world is "... on the verge of the biggest famine in history ... Such a famine will have massive proportions and affect hundreds of millions, possibly even billions ... The most disquieting aspect of this particular food issue is the fact that with few exceptions the scientific and technical community has been signaling green light to mankind, when red signals are far more appropriate ... Whatever happens, whatever urgent measures we may take, food is going to be the overriding issue of this crucial century." Borgstrom, *Too Many* ... (1969), pp. 317-318. Gregg said that: "There is an alarming parallel between the growth of a cancer in the body of an organism and the growth of human populations in the earth's ecological economy." Gregg, "Is man a biological cancer?" (1955), p. 74. Similar pessimistic views expressed by various scientists were reported in the seven substantive volumes of the United Nations symposium on conservation. United Nations, *Proceedings of the United Nations Scientific Conference* ... (1950). The generally pessimistic outlook adopted by the United Nations Conference as regards resources has been interpreted by the editors of *Nature* as a means to "... further stir the consciences of the developed nations and mobilize greater international aid for the developing countries ...", "Should Malthus be disinterred ...?", *Nature* (1968), p. 214.

<sup>54</sup> Foerster and others, on the basis of a static mathematical model, deduced that on Friday, 13 November A.D. 2026, the population of the world would squeeze itself to death; von Foerster, Mora and Amiot, "Doomsday ..." (1960), p. 1291. Other scholars calculated exactly how large human population can ultimately grow

and how great the pressure on natural resources will then be. Watt, *Ecology and Resource Management* ... (1968), pp. 12-17; and Kleiber, *The Fire of Life* ... (1961), chap. 19. The Ehrlichs stated: "The explosive growth of the human population is the most significant terrestrial event of the past million millenia ... Armed with weapons as diverse as thermonuclear bombs and DDT, this mass of humanity now threatens to destroy most of the life on the planet. Mankind itself may stand on the brink of extinction; in its death throes it would take with it most of the other passengers of Spaceship Earth. No geological event in a billion years—not the emergence of mighty mountain ranges ... nor the occurrence of periodic glacial ages—has posed a threat to terrestrial life comparable to that of human population." They further asserted: "Spaceship Earth is now filled to capacity or beyond and is running out of food." Ehrlich and Ehrlich, *Population, Resources, Environment* ... (1970), pp. 1, 3; see also Ehrlich, *The Population Bomb* (1968); Taylor, *The Doomsday Book* ... (1970); Dubos, *Reason Awake* ... (1970), and his *So Human an Animal* (1968); Dorst, *Before Nature Dies* (1970); and the collection of Helfrich, ed., *The Environmental Crisis* ... (1970), particularly the introduction and the papers contributed by Cole and Borgstrom.

<sup>55</sup> Von Neumann, "Can we survive technology?" (1955), p. 37; see also Wick, "Prophet of nuclear power" (1972).

<sup>56</sup> Thomson, *The Foreseeable Future* (1955); Stamp, *Land for Tomorrow* ... (1952); Rosin and Eastman, *The Road to Abundance* (1953) especially part 2; Smith and Chapin, *The Sun, the Sea, and Tomorrow* ... (1954); United Nations, *New Sources of Energy and Economic Development* ... (1957); ———, *New Sources of Energy and Energy Development* ... (1962).

<sup>57</sup> Mather concludes, "Mother Earth can provide food enough and to spare so that ... every member of the world-wide human family may be adequately nourished. There is no prospect that the press of population will ever place an impossible burden upon the available sources of food or of the organic materials required in industry." Mather, *Enough and to Spare* ... (1944), pp. 69-70. Alvin Weinberg, director of Oak Ridge National Laboratory, has stated "... there is no resource problem. Some substitutions, adjustments, and compromises will be inevitable, and much expensive recycling of scarce substances must be done; but the key requirements appear to be available." Cited by Wick, "Prophet of nuclear power" (1972).

<sup>58</sup> See, for example, Lederberg, "Exobiology: approaches to life beyond the earth" (1966), particularly p. 134.

<sup>59</sup> Juniper states: "It is widely, but erroneously, assumed that were our population stabilized at, say, the 1900 figure no problems of vandalism, waste disposal, air and water pollution, housing pressures on land and all the other nastiness associated with industrial societies would arise. They would, in fact, all occur, but at a marginally lower rate. The principal pressures are industrial demands; ever increasing standards of individual affluence and

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with the extent of the disproportionate affluence prevailing in developed and developing countries around the world. They argue that the richer countries tend to consume more natural resources, disturb the ecology more and are capable of causing more pollution of air, land and water than are the poorer countries.<sup>60</sup>

22. Another approach to the man-resources relationship, with some antecedents in the conservation doctrine, but developed mainly by biologists, is the ecological approach. Ecologists study the interdependence of plants and animals as they exist in nature and the relations of each to their environment. The scope of human ecology, which is concerned in general with the interrelationships between human beings and their environment, is less clearly defined and has been interpreted differently by different scholars.<sup>61</sup>

23. A few economic studies of a theoretical nature have considered that the time distribution of resource use and investment under free enterprise conditions may not necessarily be "optimum" and for the "greatest general good".<sup>62</sup> Ise found that the time distribution of resource utilization in the United States was skewed and biased towards the present with a threat of poverty for future generations. Scott and Ciriacy-Wantrup are, however, less convinced of such extreme maldistribution of resources through time; they none the less are of the opinion that national prudence requires appropriate public policies for the protection of the future population.<sup>63</sup> Barnett and Morse, on the other hand, on the basis of analysis of historical data and the multiplier effect of technological changes, have argued that the reservation of resources for later use would contribute little to the welfare of future generations. The natural environment, they declare, is only part of what one generation passes on to another; knowledge, technology,

capital accumulation and economic institutions, which are the determinants of the real income *per capita*, are very likely to be more significant to future generations. Resource reservation, by limiting output and thereby research and development, education and investment, might even diminish the value of the social heritage.<sup>64</sup>

24. Some economists have regarded the growth of population as a factor responsible for the deterioration of the general relation of natural resources to economic welfare.<sup>65</sup> Pigou believed that an efficiently operating *laissez-faire* economy may fail to maximize the social benefit.<sup>66</sup> A number of "Malthusian trap models", characterized by fixed resources (particularly land) and significant rates of population growth have been conceived. These models illustrate that an increase in *per capita* income tends, generally, to further increase population.<sup>67</sup>

25. The interrelationship of natural resources and population growth is not generally considered as an essential part of demography. However, many demographers have expressed pessimism as to the adequacy and capability of natural resources to support current rates of growth of population and consumption *per capita*.<sup>68</sup> On the basis of a new concept of optimum

(Footnote 59 continued)

leisure time, increased energy requirements, the spread of democratic principles and above all, the invention of the car." Juniper, "Laissez-faire..." (1967), p. 1049.

<sup>60</sup> See, for example, Mayer "Toward a non-Malthusian population policy" (1969), pp. 12-13.

<sup>61</sup> McKenzie, *On Human Ecology* (1968), pp. 3-4; Duncan, "Human ecology and population studies" (1959), pp. 678-679.

<sup>62</sup> Hotelling, for example, concentrating on mineral resources, asks: "Is it more profitable to complete the extraction within a finite time, to extend it indefinitely in such a way that the amount remaining in the mine approaches zero as a limit, or to exploit so slowly that mining operations will not only continue at a diminishing rate forever but leave an amount in the ground which does not approach zero? Suppose the mine is publicly owned. How should exploitation take place for the greatest general good, and how does a course having such an objective compare with that of the profit-seeking entrepreneur?" Hotelling, "The economics of exhaustible resources" (1931), p. 139. Heady, on the other hand, is concerned with agricultural land and investment. He states that "... funds should be given allocative priority between soil associations in terms of their marginal productivity in the relevant future time period. Each increment of investment in monetary or technical assistance should be spent in a manner which minimizes the diminution of future production (owing to erosion or other processes which permanently lower productivity)." Heady, "Efficiency in public soil-conservation programs" (1951), p. 51. See also Rothenberg, *An Approach to the Welfare Analysis* ... (1967), particularly chap. 3.

<sup>63</sup> Ise, "The theory of value as applied to natural resources" (1925); Scott, *Natural Resources* ... (1955), chap. 2; Ciriacy-Wantrup, *Resource Conservation* ... (1963); and his "Economics and policies of resource conservation" (1959).

<sup>64</sup> Barnett and Morse, *Scarcity and Growth* ... (1963), pp. 248-249; see also Nolan, "The inexhaustible resource of technology" (1958). Moore states: "To hoard resources unthinkingly in the name of conservation is to misunderstand completely the nature and scope of technological change." Moore, "Unlocking new resources" (1959), p. 138; see also Barnett, "Population problems—myths and realities" (1971).

<sup>65</sup> See, for example, Spengler, "Aspects of the economics of population growth—part II" (1948); and his "Social and economic factors influencing environment" (1961). Boulding looks at the problem in a novel way: "... if the society towards which we are developing is not to be a nightmare of exhaustion, we must ... develop a new technology which is based on a circular flow of materials such that the only source of man's provisions will be his own waste products. In a spaceship there are neither mines nor sewers, and man has to find a place for himself provisioned by a circular flow of materials which happens to take a form unusually favourable to him in the place that he happens to occupy. There is no way, of course, thanks to the dismal second law of thermodynamics, that a circular system of this kind can be achieved without inputs of energy. From the human point of view, fortunately, the energy input from the sun can be regarded as virtually inexhaustible ..." Boulding, *Economics as a Science* (1970), p. 147.

<sup>66</sup> Pigou states that "... there is wide agreement that the State should protect the interests of the future in some degree against the effects of our irrational discounting and of our preference for ourselves over our descendants." Pigou, *The Economics of Welfare* (1932), p. 29. Mitchell has also expressed the same view: "The appalling wastes of natural resources that are going on seem due largely to the policy of handing over the nation's heritage to individuals to be exploited as they see fit. It appears that business planning takes, and must take, a relatively short period of time into account—a period that is but as a day in the life of the nation. What is rational on the basis of this short-run private view may be exceedingly unwise on the basis of long-run public interest." Mitchell, *The Backward Art of Spending Money* ... (1937), p. 89.

<sup>67</sup> See the discussion of the works of Nelson, Leibenstein and Hagen in chapter III, section H.

<sup>68</sup> Robert Cook has said that: "Next to the atom bomb, the most ominous force in the world today is uncontrolled fertility. Unbalanced and unchecked fertility is ravaging many lands like a hurricane or a tidal wave ... The scramble for bare subsistence by hordes of hungry people is tearing the fertile earth from the hillsides, destroying forests and plunging millions of human beings into utter misery." Cook, *Human Fertility* ... (1951), p. 5. On the question of how many persons can live in the United States, Price

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population, Cloud considered that the present world population of 3,500 million, as well as the United States population of more than 200 million, both exceed the optimum.<sup>69</sup>

26. Intensive systematic studies carried out in the United States in the early 1950s revealed that there was scarcely a metal or mineral fuel of which the quantity used in the United States since the outbreak of the First World War did not exceed the total used throughout the world in all the centuries preceding.<sup>70</sup> Although concern was expressed over growth of demand for natural resources, no specific recommendation was made to restrain the growth of resource use in the future.<sup>71</sup>

27. In order to keep up with a rapid rate of growth of population, some authors have expressed the view that resource utilization ought to undergo some radical changes in form, which could be translated into either a more effective organization or through a new and revolutionary technique.<sup>72</sup>

### C. Classification of natural resources

28. Natural resources have been classified in various ways according to the objectives of different authors' inquiries.<sup>73</sup> The following classification appears, for the present purpose, most convenient:

(Footnote 68 continued)

stated: "If people are willing to live in dormitory fashion and to get food from algae and other 'artificial' sources, then the population of the United States can continue to increase for many years; but if the people wish to live in single family houses, to eat steak, fresh vegetables, and apple pie . . . to drive their own cars rather than use commercial transportation . . . then the upper limit of population is approaching". Price, "Introduction" (1967), p. 3.

<sup>69</sup> He defined optimum population as one that is "large enough to provide the diversity, leisure, and substance whereby the creative genius of man can focus on the satisfactory management of his ecosystem, but not so large as to strain the capabilities of the earth to provide adequate diet, industrial raw material, pure air and water, and attractive living and recreational space for all men, everywhere, into the indefinite future". United States Congress, *Effects of Population Growth on Natural Resources* . . . (1969), p. 4.

<sup>70</sup> United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952), p. 5. As an outcome of these studies, it was proposed that the resource situation of the United States could be improved, *inter alia*, through technological advances which could lead to an expansion of domestic supplies, by shifting from scarce materials to more abundant ones and by obtaining more materials from abroad. *Ibid.*, p. 8.

<sup>71</sup> United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952).

<sup>72</sup> See Lent, *Food Enough for All* (1947); Rosin and Eastman, *The Road to Abundance* (1953), pp. 55, 65-66; Smith and Chapin, *The Sun, the Sea, and Tomorrow* . . . (1954); and Herber, *Our Synthetic Environment* (1962), p. 201.

<sup>73</sup> There are a number of classifications of natural resources such as: (1) *renewable* versus *non-renewable resources*: despite strong preference of some scholars for this classification, the distinction is difficult to make in the long run, since, as Kindleberger says, erosion can ruin croplands and prairies, and new reserves of "exhaustible" resources can be brought into use through greater capital investment. Kindleberger, "International trade and investment . . ." (1961), p. 154; (2) *stocks* versus *flow resources*: some resources are exhaustible (e.g. oils, metals) while others are permanent and inexhaustible and their services flow at a certain rate through time (e.g. waterpower and sunlight). For these distinctions and other classifications of resources, see, for example, Hammar, "Society and conservation" (1942), pp. 110-115; Ciriacy-Wantrup, *Resource Conservation* . . . (1963), pp. 42-43; and his "Economics and policies of resource conservation" (1959).

(a) "Atmosphere", comprising such elements as air, space, weather and climate;

(b) "Hydrosphere", dealing with water;

(c) "Lithosphere", including land and soil,<sup>74</sup> and fuel and non-fuel minerals from the land and from the sea;

(d) "New energy resources", comprising such non-conventional sources as solar, geothermic, tidal and atomic energy.

29. According to modern ecologists, the activities of the biosphere<sup>75</sup> are interactive with the non-living elements of the atmosphere, lithosphere and hydrosphere in the ecosystem.<sup>76</sup> Man is able to use and transform the components of the biosphere as the need arises, but this transformation cannot go beyond the limits where the dynamic equilibrium of the biosphere would be upset.<sup>77</sup>

### 1. ATMOSPHERE

30. The atmosphere is probably the most important element in man's physical environment, since without air there can be no life. The importance of air as a natural resource has only recently been appreciated. The atmosphere is a physical mixture of about a dozen different gases (see table XI.1),<sup>78</sup> which the force of gravity

<sup>74</sup> These topics are developed only briefly in the present chapter, since they are treated extensively in chapter XII. The discussion here is merely intended to integrate the coverage of that chapter in the wider context of the present.

<sup>75</sup> The biosphere of the earth has been defined as consisting of "all life-forms and of that portion of air, land, and water in which life exists. . . . The scientific definition of biosphere . . . : a zone of the earth intersecting with the lower atmosphere, hydrosphere, and upper lithosphere". Matthews, *Man's Impact on the Global Environment* . . . (1970), p. 114. For a chronology that interrelates the evolution of atmosphere, hydrosphere, lithosphere and biosphere from the origin of the solar system, as established from evidence in geological records in rocks and in fossils, see Cloud and Gabor, "The oxygen cycle" (1970), p. 111.

<sup>76</sup> The concept of system has come to dominate analytical thinking in social science. An ecological system or ecosystem has been described as "... an open-energy system in which solar energy is incorporated into organic compounds through the photosynthetic process in green plants. Energy circulates within the plant, from plant to animal, from animal to animal, and finally through decomposing organisms, such as fungi and bacteria. In this process, the original potential energy in plants is degraded from concentrated form to greater and greater dispersion . . . until all of it is lost to the living systems. An ecosystem is somewhat analogous to an open reservoir, with energy in place of water flowing through the system. Maintaining the ecosystem requires a constant input of energy, which moves through the system and is eventually lost to the system. Through feedback mechanisms, the system maintains a certain degree of stability in what is known as a steady state . . . Populations of human beings . . . together with their total environments, form the highest level of biological integration . . . Man's societies dominate all ecosystems on earth." Ripley and Buechner, "Ecosystem science as a point of synthesis" (1967), pp. 21-22; see also Taylor, "Ecology . . ." (1959); Slobodkin, *Growth and Regulation of Animal Populations* . . . (1961), chap. 16; Watt, ed., *Systems Analysis in Ecology* (1966); Handler, *Biology and the Future of Man* (1970), chap. 11; and Murdoch, "Ecological systems" (1971).

<sup>77</sup> United Nations Educational, Scientific and Cultural Organization, *Use and Conservation* . . . (1970), p. 13. In some large areas of the globe, these limits appear to have already been attained, resulting in the disappearance of various plants and animal species, fresh water basins, soil etc. *Ibid.*, pp. 13-29.

<sup>78</sup> On the contents of the atmosphere see Magill *et al.*, *Air Pollution Handbook* (1956), p. 3-2; Mirtov, *Gaseous Composition of the Atmosphere* . . . (1964), chap. 1, particularly p. 21; Junge, (Continued on next page)

prevents from escaping into space. The sun pours energy in the form of radiation of short-wave length into this mixture. While the outermost fringe of the atmosphere is believed to be about 1,000 km above sea level, the "weather" is mainly confined to the layer of space closest to the earth, known as the "troposphere". The "stratosphere", a region of thin cloudless air extending to about 80 km lies above this, and further removed is the "ionosphere", which makes long-distance radio transmission possible.<sup>79</sup>

TABLE XI.1. AVERAGE COMPOSITION OF THE ATMOSPHERE

Gas	Symbol	Composition by volume (part per million)
Nitrogen .....	N <sub>2</sub>	780,900
Oxygen .....	O <sub>2</sub>	209,500
Argon .....	A	9,300
Carbon dioxide .....	CO <sub>2</sub>	300
Neon .....	Ne	18
Helium .....	He	5.2
Methane .....	CH <sub>4</sub>	2.2
Krypton .....	Kr	1
Nitrous oxide .....	N <sub>2</sub> O	1
Hydrogen .....	H <sub>2</sub>	0.5
Xenon .....	Xe	0.08

SOURCE: Magill et al., eds., *Air Pollution Handbook* (1956), p. 3-2.

31. Air space is an aspect of man's environment which is important not only for his productive activities but also for his health and welfare, as well as for plant and animal life. Space is also an important factor affecting the use of resources and, as a component of the biosphere, it conditions the behaviour of organic matter. The space immediately adjacent to the earth sets limits to the number of humans and other species and the inadequacy of this space can be seriously prejudicial to the well-being of both man and other living organisms.<sup>80</sup> While available information concerning the optimal relations between population and atmosphere relates mainly to subhuman life,<sup>81</sup> there have been inferences as to variation in these relations affecting humans through the medium of their organic environment.<sup>82</sup>

32. Modern industry consumes vast quantities of the atmosphere's chief chemical ingredients: nitrogen, oxygen, argon, carbon dioxide, neon, etc.<sup>83</sup> So far as nitrogen is

concerned, the reserves may be considered as virtually inexhaustible since the air over each hectare of land contains approximately 78,000 metric tons of nitrogen.<sup>84</sup>

33. The atmosphere plays the primary role in the "hydrologic cycle".<sup>85</sup> Both water supply and water power are subject to the vagaries and irregular fluctuations of the weather and climate.<sup>86</sup> Neiburger has pointed out that if and when it becomes possible to control the atmospheric circulation and, in particular, the evaporation and precipitation processes, an increase in usable water resources may be expected.<sup>87</sup>

34. Technological innovations have significantly increased man's ability to cope with unfavourable weather as well as with diseases, pests and other conditions associated with adverse climate; but the results of these innovations have not proved to be consistently predictable so far.<sup>88</sup> A number of long-term experiments have recently been undertaken in several countries for purposes of weather modification. Most of the efforts have been in the direction of dispersing fogs, increasing local precipitation and suppressing hail.<sup>89</sup> The dissipation of fogs and low stratus clouds over limited areas has become

<sup>84</sup> Lamer, *The World Fertilizer Economy* (1957), p. 99. In this connexion Delwiche states: "Of all man's recent interventions in the cycles of nature the industrial fixation of nitrogen far exceeds all the others in magnitude. Since 1950 the amount of nitrogen annually fixed for the production of fertilizer has increased approximately fivefold, until now it equals the amount that was fixed by all terrestrial ecosystems before the advent of modern agriculture. In 1968 the world's annual output of industrially fixed nitrogen amounted to about 30 million tons of nitrogen; by the year 2000, the industrial fixation of nitrogen may well exceed 100 million tons." Delwiche, "The nitrogen cycle" (1970), p. 137. See also Junge, *Air Chemistry and Radioactivity* (1963), chap. 1.

<sup>85</sup> See the discussion of the "hydrologic cycle" later in this chapter. See also Arvill, *Man and Environment* ... (1969), chap. 6, particularly the graph, p. 93; Huberty, "Fresh-water resources" (1959); and Penman, "The water cycle" (1970).

<sup>86</sup> The question as to whether the climate is really constant or changes with time has often been asked, particularly when the weather has been extreme. Flohn observed that the plotting of any continuously observable parameter of the atmosphere in terms of time would reveal short-term irregular fluctuations. Flohn, *Climate and Weather* ... (1969), p. 196. The search for regularity in the long-term climatic variations, even with the help of computers, has met with little success. Shaw gives a number of series of fluctuations that are seldom stable in time, nor do they cover large areas. Shaw, *Manual of Meteorology*, vol. 2 (1936) chap. 4-6; United Nations Educational, Scientific and Cultural Organization, *Changes of Climate* ... (1963), various papers in parts 1 and 2.

<sup>87</sup> Neiburger, "The atmosphere" (1959), p. 111.

<sup>88</sup> May, *The Ecology of Human Disease* (1958); Seybold and Woltereck, eds., *Klima, Wetter, Mensch* (1952), pp. 190-225. As regards new technology, including the use of larger computers, see National Academy of Sciences—National Research Council, *Weather and Climate Modification* ... vol. 2 (1966), pp. 124-140.

<sup>89</sup> See, for example, National Academy of Sciences—National Research Council, *Weather and Climate Modification* ... (1966), (2 vols.); Sulakvelidze, Bibilashvili and Lapcheva, *Obrazovanie osadkov i vozdeistvie na gradovye protsessy* (1965); Sulakvelidze, *Livnevye osadki i grad* (1967); Cam and Neyman, eds., *Proceedings of the Fifth Berkeley Symposium* ... vol. 5 (1967), particularly papers contributed by Neyman and Scott; "Some outstanding problems relating to rain modification", and their "Appendix ...", Müller, "Weather modification experiments in Bavaria", Battan and Kassander, "Summary of results of a randomized cloud seeding project in Arizona", Decker and Schickedanz, "The evaluation of rainfall ...". See also Neyman, Scott and Smith, "Areal spread of the effect of cloud seeding at the Whitetop experiment" (1968).

(Footnote 78 continued)

*Air Chemistry and Radioactivity* (1963), chap. 1, sections 1.1 and 1.2, particularly table 1; Dobson, *Exploring the Atmosphere* (1968), pp. 10-16.

<sup>79</sup> For a discussion of the characteristics of the various parts of the atmosphere, see Dobson, *Exploring the Atmosphere* (1968), chap. 1.

<sup>80</sup> Sears, "The inexorable problem of space" (1958); Piddington, *The Limits of Mankind* ... (1956); Slobodkin, *Growth and Regulation of Animal Populations* ... (1961). On space as the ultimate resource, see McGann, "Technological progress and minerals" (1961), pp. 89-91.

<sup>81</sup> See, for example, such studies as Christian and Davis, "Endocrines, behavior, and population ..." (1964); Watt, "The effect of population density on fecundity in insects" (1960).

<sup>82</sup> See, for example, Frank, "Ecology and demography" (1959), pp. 672-673.

<sup>83</sup> Doane, *World Balance Sheet* (1957), p. 65.



operationally practicable as has been demonstrated in clearing airport fogs in such countries as the United States, France and the Soviet Union.<sup>90</sup> There has been increasing, though somewhat controversial, statistical evidence that precipitation from cloud and storm systems can be moderately increased or redistributed by the seeding technique.<sup>91</sup> With regard to hail suppression, there is a wide range of opinion as to whether hail can be effectively suppressed or its damage mitigated. Recent experiments in the United States and in the Soviet Union have indicated that hail's damage may be cut to 75 to 80 per cent by using rapid cloud-seeding techniques.<sup>92</sup>

35. Success in modifying hurricanes and tornadoes must await the development of adequate theories of the structure and dynamics of these atmospheric storms. The type of data needed to provide information as to how hurricanes originate is as yet almost completely lacking. Recently near-earth satellites have provided photographs at an early stage of their development, but they have not been able to supply information concerning the storm's full life cycle. It is considered, however, that the new technology of computers, simulation and satellites greatly improve possibilities for fairly adequate global forecasting.<sup>93</sup>

36. Some students have warned that man's intervention in the atmosphere may involve the danger of costly mishap. They believe that attempts to tame or to reduce wind speed of hurricanes may dangerously alter the course of these erratic storms, or cause them to dump most of their rain at sea, parching the mainland. Such weather modification may also be capable of generating

a plague of destructive insects, plant diseases and noxious weeds.<sup>94</sup>

37. The modification of the atmosphere over urban areas has attracted increasing attention in recent years as a result of the accelerated trend towards urbanization. A number of urban climatic studies have suggested a persistent decrease in average wind velocity and an increase in temperature as urbanization advances. The excess of temperature in the urban areas over the surrounding areas is largely due to man-made heat sources in the former. This leads to a slightly larger precipitation probability over a city than over its surroundings. A systematic increase in the rainfall of the order of 10 per cent has been noted in a number of growing cities in the last two decades. On the other hand, precipitation in the form of snow has tended to become less frequent in the city than in the rural areas.<sup>95</sup> It has been observed that in contrast to the effects of large-scale city building, the meteorological effects of altering rural landscapes, for example, by forestation, deforestation, or irrigation, appear to be small.<sup>96</sup> Statistical evidence on climatic consequences is, in general, meagre and controversial, especially in so far as effects beyond the immediate vicinity of the limited modified area are concerned.<sup>97</sup>

38. Another important aspect of the atmosphere concerns its nature as a medium of transportation. Air transport, which is an extension or replacement of older forms of transport (water-ways, railways and highways), has increased the dynamic role of transportation in regional development.<sup>98</sup> Patterns of air transportation are affected by patterns of population distribution and levels of development. In the highly developed countries, empirical data have shown a high correlation between air passenger traffic and urban concentration of the popula-

<sup>90</sup> Schaefer and Langmuir demonstrated the efficacy of cloud seeding with dry ice and silver iodide. Schaefer, "The production of ice crystals in a cloud of supercooled water droplets" (1946); Langmuir, "Cloud seeding by means of dry ice, silver iodide, and sodium chloride" (1951), p. 41; Beckwith, "Supercooled fog dispersal for airport operations" (1965); Lessing, "Doing something about the weather . . ." (1968); and Landsberg, "Man-made climatic changes" (1970), p. 1269.

<sup>91</sup> Schaefer, "Artificially induced precipitation and its potentialities" (1956); National Academy of Sciences—National Research Council, *Weather and Climate Modification* . . . , vol. 2 (1966), pp. 124-128. For a discussion of the reasons for the controversy, see Woodley, "Rainfall enhancement by dynamic cloud modification" (1970), particularly p. 127. See also Simpson and Woodley, "Seeding cumulus in Florida: new 1970 results" (1971); Brazier-Smith, Jennings and Latham, "Accelerated rates of rainfall" (1971).

<sup>92</sup> Lessing, "Doing something about the weather . . ." (1968), p. 171. The Soviet Union experiment, which was based on direct seeding by means of rockets, is said to have been comparatively successful. Battan, "A view of cloud physics and weather modification in the Soviet Union" (1965), p. 309; and National Academy of Sciences—National Research Council, *Weather and Climate Modification* . . . , vol. 2 (1966), pp. 34-40.

<sup>93</sup> See, for example, Dobson, *Exploring the Atmosphere* (1968), chap. 5; National Academy of Sciences—National Research Council, *Natural Resources* . . . (1962), pp. 20-21; Simpson and Malkus, "An experiment in hurricane modification . . ." (1963), p. 498; National Academy of Sciences—National Research Council, *Weather and Climate Modification* . . . , vol. 2 (1966), pp. 49-54 and 134-146. Gentry describes how the wind speed of the storm was modified as a result of silver-iodide seeding of cloud. See Gentry, "Hurricane Debbie modification experiments, August 1969" (1970). See also Flohn, *Climate and Weather* . . . (1969), chap. 4; Kibel, *An Introduction to the Hydrodynamical Methods* . . . (1963); Wigger, *Meteorological Satellites* (1966); and Wick, "Nimbus weather satellites . . ." (1971).

<sup>94</sup> For example, Cry has considered what the effects on moisture climate might be in eastern and southern United States if tropical cyclones could be eliminated. See his "Effects of tropical cyclone rainfall on the distribution of precipitation . . ." (1967), chaps. 1 and 4. Sugg, "Beneficial aspects of the tropical cyclone" (1968). During the last decade, in the United States, attempts have been made to reduce wind speeds of hurricanes and typhoons by seeding clouds around the eyes of hurricanes. A 10 per cent reduction in wind speeds seems to have been achieved. See Lessing, "Doing something about the weather . . ." (1968), p. 172; see also Cooper and Jolly, *Ecological Effects of Weather Modification* . . . (1969), chap. 5.

<sup>95</sup> Landsberg, "The climate of towns" (1956) and his "Man-made climatic changes" (1970). See also National Academy of Sciences—National Research Council, *Weather and Climate Modification* . . . vol. 2 (1966), pp. 93-95; Lowry, "The climate of cities" (1967). While snowfall has generally been found to be less frequent in the cities than in the rural areas, there have been occasional reports of snowfall occurring exclusively over heavily industrialized cities, with no precipitation in the surrounding areas. Landsberg, "The climate of towns" (1956), p. 595.

<sup>96</sup> National Academy of Sciences—National Research Council, *Weather and Climate Modification* . . . vol. 1 (1966), p. 11; Sears, "The processes of environmental change by man" (1956). Pointing out that changes in the micro-climate for which man is responsible are only local, Thornthwaite stated that "man is incapable of making any significant change in the climatic pattern of the earth . . . Through changes in the water balance . . . sometimes inadvertently, he exercises his greatest influence on climate". Thornthwaite, "Modification of rural microclimates" (1956), p. 582.

<sup>97</sup> Landsberg, "Man-made climatic changes" (1970), p. 1269.

<sup>98</sup> Isard, "Transport development and building cycles" (1942); Isard and Isard, "Economic implications of aircraft" (1945).



tion. For example, a resemblance has been observed between the pattern of air transportation of the closely spaced cities of the north-east of the United States and the north-west of Europe.<sup>99</sup>

## 2. HYDROSPHERE

39. According to data provided by Colas, oceans cover three quarters of the surface of the globe and have a volume of 1,350 million cubic kilometres. In addition, there are some 30 to 50 million cubic kilometres of fresh but solid water in the polar ice caps, 300,000 to 400,000 cubic kilometres of fresh water in the world's rivers and lakes and 200,000 to 300,000 cubic kilometres in underground basins. Thus, all but 3 or 4 per cent of the earth's water consists of salt water.<sup>100</sup> Water as a renewable resource circulates on the earth in a complex series of pathways known as the "hydrologic cycle". Water is evaporated by the sun, carried as vapour and clouds in the atmosphere, and condensed by temperature changes to fall as rain, hail or snow.<sup>101</sup>

40. Water is said to be the most basic food and fundamental to life. About ten tons of drinking water per ton of living tissue are required each year by human beings and domestic animals. The *per capita* water needs of man have sometimes been graphically illustrated by a "water pyramid", containing such components as the water content of man, water contained in food and liquid-water intake, hygiene uses (washing, cleaning, and sewage), water consumed in nature or in irrigation for agricultural production, and water used in industry.<sup>102</sup> Water requirements in agriculture and industry are also high. About 1,000 tons of water are required to grow a ton of sugar or corn under irrigation. Wheat, rice and cotton require about 1,500, 4,000 and 10,000 tons of water respectively per ton of crop. Only from one to two tons of water per ton of product is needed in the manufacture of brick, but 250 tons for paper and 600 tons for

nitrate fertilizers.<sup>103</sup> For hydroelectric power<sup>104</sup> and for the rapidly expanding range of chemical products, there is an almost unquenchable thirst for more water and in some places water is becoming the limiting factor to agricultural and industrial development.<sup>105</sup>

41. Demand for water varies according to the environment. Among the factors affecting such variations are: climate (particularly rainfall distribution), location and size of the community, water reserves distribution in relation to the population, the standard of living of the population and the price of water.<sup>106</sup> In addition to the continuous increase in water demand due to population growth and other factors,<sup>107</sup> inefficiency in the use of water, water pollution etc. may create problems of water supply.

42. Data on water supply are very rudimentary for the less developed areas of the world and unreliable or incomplete for many other countries as well. For example, information on the underground water which can be extracted at economic cost is not known and a number of the rivers have not yet been measured. Despite the shortcomings of existing data, an attempt has been made to estimate approximately the world's daily water supply at different periods of time and the amounts consumed by man and by nature. As indicated in table XI.2, the world's daily water deficit appears to have increased significantly from an estimated 27,000 million gallons in 1882 to 3,664,000 million gallons in 1952; the projected deficit by 2022 was calculated at 10,723,000 million gallons. The total supply of water is shown to decline from

<sup>99</sup> In general, three factors are of significance in determining the pattern of transportation: "(a) the unequal distribution of resources; (b) the unequal distribution of population; (c) the unequal development of knowledge among men of how to utilize material resources". Sealy, *The Geography of Air Transport* (1968), pp. 21 and 138-140; see also Buchanan, "Air transport ..." (1951); Masefield, "Some economic factors in air transport operation" (1951); Taaffe, "Air transportation and United States urban distribution" (1956).

<sup>100</sup> Colas, "Le problème de l'eau" (1964), pp. 32-33. For another set of estimates see Larras, *L'aménagement des cours d'eau* (1965), p. 5. See also Gurvich, *Roĭ prirodnykh bogatstv* ... (1961).

<sup>101</sup> Through the "hydrologic cycle" which may be called nature's own desalination process, pure water vapour is absorbed by the air from the oceans at an estimated rate of 875.3 cubic kilometres (km<sup>3</sup>) a day. About 775 km<sup>3</sup> return to the ocean through condensation and precipitation, there being a net windborne transfer of some 100 km<sup>3</sup> from the seas to the land. About 260 km<sup>3</sup> daily fall upon the land, 100 km<sup>3</sup> of which are blown in from the sea, 160 km<sup>3</sup> having been previously evaporated from the land. The cycle is balanced by about 100 km<sup>3</sup> of daily run-off from land to sea via the streams, rivers and flow of groundwater. Borgstrom, *Too Many* ... (1969), pp. 132-134; see also Huberty, "Fresh-water resources" (1959), particularly pp. 30-31; Arvill, *Man and Environment* ... (1969), pp. 106-109; Penman, "The water cycle" (1970).

<sup>102</sup> Borgstrom, *Too Many* ... (1969), p. 158.

<sup>103</sup> Revelle, "Water" (1963), p. 93. See also Guerrin, *Humanité et subsistances* (1957), p. 186; Poirée and Ollier, *Irrigation* ... (1962), pp. 19-20 and chap. 4; and Cram, *Water* ... (1968), p. 45.

<sup>104</sup> Estimates of the hydropower potential of the world show that, among the continents, Africa has the largest potential. On a unit-area basis, Switzerland has the highest potential. Huberty, "Fresh-water resources" (1959), p. 49. Large hydroelectric power resources are found in mountainous regions. Thus, in the Soviet Union the greatest development in hydroelectric power is likely to occur in the eastern part of the country, and in China in the mountainous south-west. Pavlenko, "Dalneishee razvitie energetiki SSSR ..." (1958).

<sup>105</sup> Hartley, "The engineer's contribution to the conservation of natural resources" (1957), p. 21; Colas, "Le problème de l'eau" (1964). See also United Nations, *Water for Industrial Use* (1958); Bradley, "Human water needs and water use in America" (1962); Barber, "Water resource development" (1961); United Nations, *Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources* ..., vol. 4 (1951); and Revelle, "Water-resources research in the Federal Government" (1963).

<sup>106</sup> United Nations, *Proceedings of the Interregional Seminar on the Economic Application* ... (1967), p. 32. Findings of a study of single-dwelling residential water meter records in a United States Midwest city revealed the existence of a close relationship between *per capita* water need and such socio-economic-demographic factors as assessed valuation of the dwelling, education, occupation and family income. Dunn and Larson, "Relationship of domestic water use to assessed valuation ..." (1963), fig. 1 and table 2.

<sup>107</sup> It would be erroneous to assume that water use in a country is strictly a function of population, since water requirements of other consumer categories (i.e., household and municipal use, industry, tourism, commerce, mining and agriculture) may increase more rapidly than total population, particularly in developing areas. United Nations, *Proceedings of the Interregional Seminar on the Economic Application* ... (1967), pp. 31-32.

TABLE XI.2. THE WORLD'S DAILY WATER SUPPLY AND DEMAND, 1882, 1952, 2022  
(Thousand millions of gallons)

	1882	1952	2022 <sup>a</sup>
Average daily precipitation ...	100,558	98,191	95,835
Consumed by nature .....	99,720	97,702	95,748
Consumed by population..	965	4,153	10,810
Total consumption .....	100,685	101,855	106,558
Deficit .....	-127	-3,664	-10,723
Population's consumption ....	965	4,153	10,810
From lakes and streams ..	795	3,422	8,907
From underground table ..	170	731	1,903

SOURCE: Doane, *World Balance Sheet* (1957), p. 96. Computed from data of the United States, President's Materials Policy Commission, *Resources for Freedom* (1952).

<sup>a</sup> Projected on the basis of rates of population increase and consumption of the 1950.

100,558,000 million gallons in 1882 to a projected figure of 95,835,000 in 2022.<sup>108</sup>

43. Recent estimates for the United States show a fairly rapid withdrawal depletion of water, which is likely to continue in the future, on the basis of future trends of population and urbanization.<sup>109</sup> Withdrawal in the east is estimated to increase from 13,700 million gallons per day in 1960 to 37,400 million gallons per day by the year 2000; in the more arid west, from 59,700 to 91,700 million gallons; and in the Pacific north-west, from 11,100 to 20,200 million gallons. Net losses of water resulting from withdrawal uses are expected to nearly double by the year 2000. In Sweden *per capita* demand for water is expected to increase by 112 per cent between 1960 and 2000. According to the latest estimates, in the Soviet Union the demand for water is expected to increase in the next twenty years to between two to two and one-half times the present.<sup>110</sup> The increase in demand for

fresh water in these countries is expected to come mainly from population growth, urbanization, stepped-up industrial activity, and the boom in outdoor recreation.

44. Data on the distribution of water within continents and countries are important for assessing the adequacy of supplies, since water cannot be as easily transported from one point to another at economically acceptable costs as can farm products, metals and fuels.<sup>111</sup> For example, water resources in the Soviet Union are not well distributed in relation to that country's population. While the average supply per head is 20,000 cubic metres per annum, for the southern republics the figure is only 0.3-1.5 thousand cubic metres and for the Black Sea Basin only 1.9 thousand cubic metres.<sup>112</sup>

45. Since the stock of water on earth is fixed, efforts are continuously being made to find various devices for expanding usable supplies and ensuring their effective utilization.<sup>113</sup> For example, surface and groundwater sources can be integrated for more economic use;<sup>114</sup> demineralization of brackish water and desalination of ocean water can be accomplished by several different methods;<sup>115</sup> additional storage reservoirs can be con-

<sup>108</sup> For detailed discussion and qualifications see Doane, *World Balance Sheet* (1957), pp. 95-96. The projected figures are not to be taken as predictions. On pitfalls of hydrological forecasting, both of surface water and groundwater, see United Nations Educational, Scientific and Cultural Organization, *International Conference on the Practical and Scientific Results* ... (1970), p. 18.

<sup>109</sup> Withdrawal depletion refers to fresh water taken from streams and lakes and not returned. Landsberg, *Natural Resources for U.S. Growth* ... (1964), p. 123. Every day the population in the United States uses about 300,000 million gallons of fresh water in houses, factories or on irrigated farmland. In addition to these withdrawal uses, other large quantities are used for a variety of "flow" purposes (for hydraulic plants, in land navigation, carrying away wastes etc.) or "on-site" purposes, such as maintaining swamps for wildlife or simply providing restful and beautiful scenery for the population. Landsberg, Fischman and Fisher, *Resources in America's Future* ... (1963), pp. 258-262. Since the end of the nineteenth century when water became commonly available in urban areas via faucet, *per capita* water consumption has constantly increased. In the United States, *per capita* water consumption increased from some ten gallons per person per day on the old farms to the present average of 160 gallons. Water consumption *per capita* per day is much higher than the average in such major cities as Chicago (250 gallons) and San Diego (560 gallons). The United States consumption of water is believed to be about three times that of Western Europe. Borgstrom, *Too Many* ... (1969), pp. 158-159.

<sup>110</sup> Landsberg, Fischman and Fisher, *Resources in America's Future* ... (1963), p. 28. United States, Eighty-sixth Congress, *Water Resources Activities in the United States* (1960). Quraishi,

"Domestic water use in Sweden" (1963), p. 454. The estimate for the Soviet Union is taken from "Water in wrong places", *Nature* (1971), p. 140.

<sup>111</sup> See the discussion of problems of regional disparities in water supply in the United States in United States President. Commission on Population Growth and the American Future, *Population and the American Future* (1972), p. 61.

<sup>112</sup> "Water in wrong places", *Nature* (1971).

<sup>113</sup> See, for example, Fox, "Water resources of the world" (1961); Lindenberg, "Effective use and conservation of groundwater" (1968); Krutilla and Eckstein, *Multiple Purpose River Development* ... (1958); Craine, *Water Management Innovations in England* (1969).

<sup>114</sup> Thomas, *The Conservation of Groundwater* ... (1951); United Nations, *Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources* ... vol. 4 (1951); Koenig, "Economics of groundwater utilization" (1963); Wolman, *Water Resources* ... (1962), pp. 15-30.

<sup>115</sup> Ellis, *Fresh Water from the Ocean* ... (1954); Howe, "Fresh water from saline sources" (1959). See also United Nations, *Proceedings of the Interregional Seminar on the Economic Application* ... (1967). A number of proposals for increasing water supplies, including desalination schemes, are contained in the Soviet Union's five-year plan. Voznesensky argued for the necessity of long-term

(Continued on next page)

structed;<sup>116</sup> evaporation and irrigation canal losses may be checked;<sup>117</sup> water-consuming trees and plants can be reduced; water prices can be raised to check increases in consumption;<sup>118</sup> rainfall may be induced by weather modification or other techniques.<sup>119</sup> It has also been mentioned that fertilizer can to some extent serve as a substitute for water.<sup>120</sup> While the efficient use of water can substantially reduce the quantity of water consumed both by industry and agriculture, higher efficiency often requires additional capital investment.<sup>121</sup>

46. Irrigation projects are often multipurpose in nature. For example, the Don-Volga project in the Soviet Union combines irrigation, flood control, hydropower generation and navigation. In the Kuibyshev, Stalingrad and Tsymlyansky projects, a large percentage of the capital invested is for power; that for transportation ranks second and irrigation third.<sup>122</sup> An expert group reporting to the United Nations Educational, Scientific and Cultural Organization noted that some large irrigation

(Footnote 115 continued)

planning, the complex use of water resources, and of considering the interaction of water problems over extensive zones. Cited in "Water in wrong places", *Nature* (1971), p. 140.

<sup>116</sup> Wilm, "Water" (1957); and Binnie, "The control, storage, and use of water" (1957).

<sup>117</sup> Olivier, *Irrigation and Climate* . . . (1961). It has been estimated that in Iran over 60 per cent of the annual intake of water flows into the sea or is evaporated without having done any "work". *Ibid.*, p. 4. On water evaporation, see also Poirée and Ollier, *Irrigation* . . . (1962), pp. 153-164; and Task Group Report, "Survey of methods for evaporation control" (1963). DeHaven suggested that an efficient method to protect water against evaporation is by the use of monomolecular surface films. DeHaven, "Water supply economics, technology, and policy" (1963), p. 546.

<sup>118</sup> It is generally recognized that the cost of water will ultimately lead to water's being priced and thus to its being treated as a vital natural resource. Presently, 1,000 gallons of water (purified of salt) costs a household 30 shillings in Kuwait, while only 2 shillings in Britain. In industry, the cost of 1,000 gallons of water is 12 shillings in Kuwait and as low as one shilling in many areas in Great Britain. Arvill, *Man and Environment* . . . (1969), p. 105. Illustrating the effect of price of water on demand, DeHaven noted that steel mills may require from 1,400 to 65,000 gallons of water to produce a ton of finished steel, and power plants may use from 1.32 to 172 gallons to produce a kilowatt-hour of electricity, depending on the price of water. DeHaven, "Water supply, economics, technology, and policy" (1963), pp. 540-541. Studies in the United States and Canada have found that householders became more economical in their use of water when meters were installed. In Ottawa a 100 per cent use of meters lowered daily *per capita* water consumption by 29 per cent. Studies by Langbein and Leopold and Stockwell cited in Dunn and Larson, "Relationship of domestic water use . . ." (1963), p. 442. It has been noted that increases in water price create difficulties, since prices are generally politically determined, rather than by market mechanisms. See the discussion in Hirshleifer and Milliman, "Urban water supply; a second look" (1967), p. 2 and Clark, *The Economics of Irrigation* . . . (1970), chap. 3 and 6.

<sup>119</sup> See the discussion in subsection 1 above.

<sup>120</sup> Clark, *The Economics of Irrigation* . . . (1970), pp. 18-20, and table 4.

<sup>121</sup> See, for example, Krutilla and Eckstein, *Multiple Purpose River Development* . . . (1958), chap. 2; Stephens *et al.*, "Development of a capital improvement program" (1963). For a discussion of the optimal level of investment in a river basin, see Boyd, "Collective facilities in water quality management" (1968).

<sup>122</sup> Huberty, "Fresh-water resources" (1959), pp. 48-49. Voznesensky and Beschinsky calculated the amounts of coal that could be saved by the substitution of hydroelectric power in the Urals. Voznesensky and Beschinsky, "Osvoenie gidroenergeticheskikh resursov sibirskikh . . ." (1957).

projects had already led to undesirable changes in the environment and warned that, until there was improved knowledge of the interaction of water and other environmental factors, the introduction of additional projects might pose a threat to the integrity of the hydrosphere and biosphere.<sup>123</sup>

47. Despite the high costs which limit the feasibility of transporting water over long distances, the development of large-scale long-distance canal and pipeline projects has proved to be a means of coping with increasing demands for water in such countries as Belgium, Israel and the Netherlands.

48. Certain arid regions of the world which do not have rivers flowing from outside areas of high precipitation must depend largely on groundwater for their source of water supply. This is practically the only source of water supply in Saudi Arabia, for example, and such dry countries as Tunisia and Morocco must also depend largely on this source. Development of groundwater resources has also proved essential in certain semi-arid regions where rainfall is erratic and streams may dry up for long periods.<sup>124</sup>

49. In water-short areas that are close to a body of brackish water or sea-water, the supply of fresh water can be increased by a number of methods, including desalination, when economically and technically feasible.<sup>125</sup> The growing requirements of water for economic development have stimulated the advance of desalination technology. Over the past decade the progress made in improving desalination processes has led to a substantial reduction in production costs. But even the most efficient of the existing methods of desalting water and pumping it to higher elevations are still too expensive to provide water for irrigation.<sup>126</sup> As regards human consumption purposes, however, some fifty water-short areas in various parts of the world have been identified recently in which technical and economic studies appear to warrant the possibilities for utilization of desalinized water. With

<sup>123</sup> United Nations Educational, Scientific and Cultural Organization, *International Conference on the Practical and Scientific Results* . . . (1970), p. 16. See also Handler, ed., *Biology and the Future of Man* (1970), chap. 11.

<sup>124</sup> United Nations, *Large-Scale Groundwater Development* (1960), pp. 2-3.

<sup>125</sup> See, for example, Koenig, "The economics of water sources" (1956), p. 321; Jenkins, "Fresh water from salt" (1957); United Nations, *Proceedings of the Interregional Seminar on the Economic Application* . . . (1967), particularly lecture Nos. 1, 12 and 18. For the "brackish" water with a salt content of up to 1 per cent, various techniques are available for desalination at a moderate cost. Sea-water, however (average salt content of 3.5 per cent), has to be distilled, and costs hitherto have been very high, far out of reach of ordinary agriculture. It has been suggested, however, that the combination of a nuclear generator and a distillation plant in an area where there was a good market for both power and water might substantially reduce costs. Clark, *The Economics of Irrigation* . . . (1970), pp. 132-133.

<sup>126</sup> See, for example, Abelson, "Desalination of water" (1964); United Nations, *Proceedings of the Interregional Seminar on the Economic Application* . . . (1967); Revelle, "Water" (1963); Howe, "Fresh water from saline sources" (1959); United States, Eighty-eighth Congress, *Use of Nuclear Power for the Production of Fresh Water from Salt Water* . . . (1964); Snyder, "Desalting water by freezing" (1962); United Nations, *Science and Technology for Development* . . . , vol. 2 (1963), chap. 5; Howe, "Mineral aspects of water quality improvement" (1967).

TABLE XI.3. LAND USE PER HEAD OF POPULATION FOR SELECTED COUNTRIES  
(Acres per capita)

Country	Total	Arable land	Pasture and woodland	Forest land	Other
Canada .....	164.25	5.74	4.15	57.60	96.76
China .....	5.27	0.50	1.05	0.45	3.27
France .....	3.15	1.20	0.71	0.63	0.61
India .....	2.16	0.82	0.00	0.27	1.07
Japan .....	1.04	0.17	0.02	0.69	0.16
United Kingdom.....	1.44	0.42	0.68	0.07	0.26
United States <sup>a</sup> .....	11.69	2.68	4.22	2.68	2.11
USSR .....	25.91	2.59	1.43	7.29	14.60

SOURCE: Compiled from Glendinning and Logan, "Land as a resource" (1959), p. 154.

<sup>a</sup> Excluding Alaska.

rapidly growing population, the need for such an endeavour becomes increasingly important.<sup>127</sup>

### 3. LITHOSPHERE

50. The term "lithosphere" refers primarily to the surface of the earth which contains such substances as land, minerals, solid fuels (coal) and liquid fuels (oil and gas).

#### (a) Land

51. Land covers about one quarter of the earth's surface, but much of it is uninhabitable owing to extremes of climate or terrain (see chapter VI, section A). There are wide variations in the availability of land per head of population in the different regions and countries of the world. Among the selected countries for which data are shown in table XI.3, it is seen that Canada has about 160 acres of land *per capita*, while Japan has only about one acre.

52. As regards its use and function, land is generally classified into three broad categories: (1) that used for industry, housing, transportation and recreation; (2) that used for food and forest products; and (3) that which at present is not used for any purpose but may be drawn into use in the future.<sup>128</sup>

53. Estimates published by Doane in the 1950s showed that a little over one half of the world's land was in use—10 per cent in croplands and gardens, 20 per cent in pasture and meadow, 8 per cent in accessible forest and 15 per cent built on.<sup>129</sup> More recent estimates cited in chapter XII, section C, confirm that the area under cultivation amounts to only a little more than 10 per cent

of the world's total land area. Data for 1969 presented in table XII.10 in that chapter show that of the world's principal regions, Oceania has the largest amount of cultivated land *per capita*, amounting to more than six acres while Europe and the Far East have less than one acre. A similar wide range in arable land *per capita* is shown among selected countries in table XI.3. Whereas Canada has about 5.7 acres of arable land *per capita*, and the United States and the USSR 2.7 and 2.6 acres, respectively, Japan has only about 0.2 acres, the United Kingdom 0.4 and China 0.5 acres.<sup>130</sup>

54. While most experts agree that the amount of land under cultivation can still be expanded considerably, their estimates of potentially arable land differ by a wide margin, as shown in chapter XII, section C.<sup>131</sup> The possibility of bringing some tropical soil into use depends on the solution of the problems of cultivation of soil of lateritic and tropical types,<sup>132</sup> just as transformation of arid and semi-arid lands depends on the possibility of discovering adequate water.<sup>133</sup>

55. Large areas of the earth's habitable and cultivable land are being lost for cultivation owing to urban expan-

<sup>130</sup> See also the estimates presented by Stamp, "Conservation of land" (1957), p. 69.

<sup>131</sup> In addition to the sources cited in that chapter, see also Pearson and Harper, *The World's Hunger* (1945), p. 50; Guerrin, *Humanité et subsistances* (1957), pp. 327-333, 406; Woytinsky and Woytinsky, *World Population and Production* ... (1953), p. 323. On different classifications of agricultural land, see Zvorykin, "Study and classification of agricultural lands" (1964).

<sup>132</sup> Gerasimov, "Recent laterites and lateritic soils" (1961); Kellogg, *Food, Soil, and People* (1950), pp. 20-22; Pawley, *Possibilities of Increasing World Food Production* (1963), pp. 31-65; Tosi and Voertman, "Some environmental factors in the economic development of the tropics" (1964). It has been noted that the potentialities for supporting a larger population are much greater in the wet tropics than in either the cold or dry lands. Trewartha, Robinson and Hammond, *Elements of Geography* (1967), p. 532. For a discussion of soil as to its structure, classification, evolution, erosion and other aspects, see Jenny, "Soil as a natural resource" (1959); Demolon, *Dynamique du sol* (1952), chaps. 1, 2 and 14; Bunting, *The Geography of Soil* (1967); Guerrin, *Humanité et subsistances* (1957), pp. 132-185; and Dorst, *Before Nature Dies* (1970), pp. 128-135 and 173-174.

<sup>133</sup> Hodge and Duisberg, eds., *Aridity and Man* ... (1963); White, *Science and the Future of Arid Lands* (1960), chaps. 1-5; Vendrov *et al.*, "The problem of transformation and utilization ..." (1964); Geller *et al.*, "The transformation of nature ..." (1964).

<sup>127</sup> United Nations, *Water Desalination in Developing Countries* (1964), chaps. 1-4 (see especially table 16).

<sup>128</sup> On classifications of land use see, for example, United Nations, *Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources* ..., vol. 1 (1950), pp. 71-92; Wagner, *The Human Use of the Earth* (1960); and Dorst, *Before Nature Dies* (1970), pp. 290-296.

<sup>129</sup> The estimates further showed that between 1882 and 1952, when world population increased by about 74 per cent, the acreage built on increased by 86 per cent, that in cropland about 25 per cent and that in pasture and meadow about 42 per cent. Doane, *World Balance Sheet* (1957), pp. 2, 108.

sion, mineral working, roads and erosion.<sup>134</sup> The most pressing competition for land use has resulted from accelerated urbanization.<sup>135</sup> This creates special difficulties where agricultural land is severely limited, as in Japan and the United Kingdom.<sup>136</sup> It was estimated that between 1951 and 1971 England and Wales would lose 750,000 acres of farmland to urban development, and if present trends continued the loss of farmland might be greater in the second half of the twentieth century than in the first.<sup>137</sup> In the United States it is anticipated that the acreage devoted to agriculture, commercial forestry and grazing will decline by about 69 million acres between 1950 and 2000, while that required for cities, public recreation, transportation and reservoirs will increase by about 88 million acres.<sup>138</sup> One survey estimated that the demand for land for recreation facilities would treble between 1960 and the end of the century.<sup>139</sup>

#### (b) Mineral resources

56. More than other natural resources, minerals have become associated with the industrial power and wealth of nations. Some minerals (fuels, for example) are not renewable; others used in manufacturing and construction may be reclaimed as secondary metals (scrap) and used indefinitely.<sup>140</sup> Although the amounts of non-fuel minerals are believed to be vast, many of the known deposits are of such a low grade as to be uneconomic under the present state of technology. The non-fuel minerals are contained in the solid crust of the earth, the sea and in the atmosphere.<sup>141</sup>

<sup>134</sup> Arvill, *Man and Environment* ... (1969), p. 25.

<sup>135</sup> Cities are said to extend into excellent agricultural lands. Towns built in fertile regions or along communication routes tend to spread into plains. The City Council of Moscow, for example, has made an effort to preserve an enormous forest belt around the suburbs in order to provide the flora and fauna to live in harmony with man. Dorst, *Before Nature Dies* (1970), pp. 126 and 324. See also Darling and Milton, eds., *Future Environments of North America* ... (1966), and Arvill, *Man and Environment* ... (1969), pp. 131-135.

<sup>136</sup> White, *Social and Economic Aspects of Natural Resources* ... (1962), p. 6.

<sup>137</sup> Arvill, *Man and Environment* ... (1969), pp. 57-58. See also Stamp, *The Land of Britain* ... (1950); Best and Coppock, *The Changing Use of Land in Britain* (1962); Best, "Recent changes and future prospects of land use in England and Wales" (1965).

<sup>138</sup> Clawson, Held and Stoddard, *Land for the Future* (1960), p. 442. See also Clawson, "Land resources" (1971), p. 125; Wooten and Anderson, *Major Uses of Land in the United States* ... (1957).

<sup>139</sup> Outdoor Recreation Resources Review Commission, *Outdoor Recreation for America* ... (1962), p. 32. See also Burton and Wibberley, *Outdoor Recreation in the British Countryside* ... (1965); Perloff, ed., *The Quality of the Urban Environment* ... (1969).

<sup>140</sup> Though the cost of reclaiming material is sometimes so great that recovery does not pay, with proper techniques and organization the supply of the primary mineral resources can be increased considerably. In the United States scrap is said to constitute about 50 per cent of the domestic output of iron, 60 per cent of lead, 30 per cent of copper and 12 per cent of zinc. Carlisle, "Nonfuel mineral resources" (1959), p. 320. See also United Nations Industrial Development Organization, *Utilization of Non-Ferrous Scrap Metal* ... (1970).

<sup>141</sup> For a discussion of minerals from these different sources, see, for example, Tilson, "The earth's crust" (1962); Dobson, *Exploring the Atmosphere* (1968), pp. 8-16; Riehl, *Introduction to the Atmosphere* (1965); Goldberg, "The oceans as a chemical system" (1963); Flawn, *Mineral Resources* ... (1966); Hibbard, "Mineral resources ..." (1968).

57. Since minerals are used mainly by industry rather than as consumer goods, the demand for them depends on the level of industrial activity and follows the business cycle.<sup>142</sup> A very substantial increase in the use of minerals has occurred during the present century. According to estimates of Fisher and Potter, the world increase in the production of non-fuel minerals was about 50 per cent per decade between 1937 and 1966, while world population grew at only about 16 per cent per decade. Except for tin, gold and silver, the output of every important metal and every important non-metallic mineral grew at a faster rate than did world population.<sup>143</sup> In the United States between 1900 and 1950 the population doubled, and real *per capita* income increased a little over 2 and  $\frac{1}{4}$  times; consumption of all raw materials increased about 2 and  $\frac{1}{2}$  times, agricultural products increased 2 and  $\frac{1}{4}$  times, fishery and wildlife products a little more than 2 and  $\frac{1}{4}$  times and forest products declined 1 per cent, but the amount of minerals consumed, including fuels, increased sixfold.<sup>144</sup>

58. The world's supply of mineral resources is unevenly distributed geographically, and most industrialized countries, which account for the great bulk of the world's consumption of minerals,<sup>145</sup> must rely on imports for part of their supplies.<sup>146</sup> The United Kingdom is dependent almost entirely on imports for most of the minerals required for its industry and agriculture.<sup>147</sup> Of the world's large political units, the USSR may approach closest to self-sufficiency in minerals.<sup>148</sup> The United States, once considered to be nearly self-sufficient, is completely dependent on foreign sources for tin, and for 90 per cent of all the manganese, cobalt and mercury it consumes. It was once a huge exporter of copper, lead and zinc, but it

<sup>142</sup> Carlisle, "Nonfuel mineral resources" (1959); and Pehrson, "Mineral supply" (1962).

<sup>143</sup> Fisher and Potter, "Natural resource adequacy ..." (1969), p. 119.

<sup>144</sup> The increase in consumption of individual minerals was as follows: iron ore, 4 times; lead, 4.5; manganese, 5; copper, 7; zinc, 10; chromium, 40; aluminium, 300; crude oil, 35; natural gas, 47; and coal, 2 times. Carlisle, "Nonfuel mineral resources" (1959), pp. 336-337; United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952), pp. 4-5. For a discussion of the expected increase in consumption of minerals in relation to population growth in the United States during 1965-1980, see Hibbard, "Mineral resources ..." (1968).

<sup>145</sup> According to 1960 data cited by Feiss, the value of non-fuel minerals consumed in the United States accounted for more than half of the total value of the world's production. Feiss, "Minerals" (1963), p. 129. Hubbert estimated that the industrialized areas of the world consume about 90 per cent of the world production of industrial energy and mineral resources although they have only about 30 per cent of the world's population. To bring *per capita* consumption in the developing areas to the standard of the industrialized regions would require that the former be raised by a factor of about 21. Hubbert, "Mineral resources and rates of consumption" (1967), pp. 318-319. The severe inequality between rates of mineral consumption in industrialized and developing areas has been attributed by Gurvich to the consequences of colonialism. See his *Roľ prirodnykh bogatstv* ... (1961), pp. 191-192; 196-197.

<sup>146</sup> Lovering has pointed out that all industrialized nations, with the possible exception of the Soviet Union, are net importers of most minerals and ores. See his "Mineral resources from the land" (1969), p. 120.

<sup>147</sup> Jones, "Mineral resources" (1957).

<sup>148</sup> Stamp, *Our Developing World* (1960), p. 146.

has become the largest importer of these three major mineral products.<sup>149</sup>

TABLE XI.4. PERCENTAGE OF WORLD PRODUCTION OF SELECTED MINERALS FROM LESS DEVELOPED COUNTRIES

Mineral	Percentage of world production
Bauxite .....	61
Chrome ore .....	40
Coal .....	5
Cobalt ore .....	75
Copper .....	40
Iron ore .....	12
Lead .....	30
Manganese .....	42
Nickel ore .....	36
Silver ore .....	48
Tin ore .....	95
Zinc ore .....	28

SOURCE: Stamp, *Our Developing World* (1960), p. 179.

59. The dependence of the industrialized countries on the developing countries is evident from the geographical distribution of leading minerals. Table XI.4 shows, for selected minerals, the percentage of world production originating in developing countries, according to figures compiled by Stamp.<sup>150</sup> Thus, 95 per cent of the world's production of tin ore, 75 per cent of cobalt ore, 61 per cent of bauxite and 40 per cent or more of copper, chrome ore, manganese, and silver ore come from these areas. While new discoveries are constantly changing the situation, in the late 1950s three countries—Jamaica, Guyana and Surinam—supplied over half of the world's output of bauxite. Tin is even more localized, about 60 per cent coming from South-East Asia. The great majority of the world's cobalt is produced by Morocco, Democratic Republic of the Congo and Zambia. Iron ore is more widely distributed.<sup>151</sup> As industrialized countries use up their own cheap supplies of minerals, they are likely to have to rely more and more on foreign sources and on recycled or scrap metal.<sup>152</sup>

60. The problem of the presumably limited supply of mineral resources in the light of growing population and increasing industrialization has attracted wide attention. Table XI.5 shows the world reserves of selected minerals in terms of years of supply, according to various assumptions. It shows, in particular, that if the world's minerals were to be consumed at the rate at which the United States is using them, the known reserves of all minerals except coal would be depleted within a lifetime.<sup>153</sup> In spite of the accelerated drain on the world's mineral

resources, it is generally doubted that the supply will soon be exhausted. Such developments as new ore discoveries, resort to lower grade ores, and continued technological advance resulting in improvements in mining and processing and substitutions of more abundant materials for less abundant ones seem likely to ensure that the needs of a growing and industrializing population will be met for some time in the future.<sup>154</sup> Recent geologic, geophysical and geochemical methods of discovery and more elaborate exploration tools have helped to uncover a great number of unexpectedly rich mineral deposits.<sup>155</sup> Technology is said to keep creating new resources. Just as it is now possible to exploit ores that would have been considered worthless fifty years ago, new advances may make it possible to extract metals from still inferior ores in the future.<sup>156</sup> The critical question is said to be not merely how the world's mineral reserves will stand up under the strain of accelerating consumption and population growth, but within what probabilities and conditions can new technology continue to uncover new supplies of minerals.<sup>157</sup> While the ultimate depletion of mineral reserves is theoretically inevitable, Fisher and Potter conclude that this stage will be reached only after the world has changed

<sup>154</sup> Fisher and Potter, "The effects of population growth on resource adequacy . . ." (1971), pp. 232-233.

<sup>155</sup> Feiss points out that it will take many years to survey the world in reasonable detail. Only about two thirds of the United States has been topographically mapped and only one fifth has been mapped geologically. Feiss, "Minerals" (1963), p. 135. Stamp observed that even countries which have long had geological and mineralogical surveys have been found to have unexpected resources. Stamp, *Our Developing World* (1960), p. 144. See also Slichter, "Some aspects, mainly geophysical, of mineral exploration" (1959); Sawaf, "Minerals and living standards . . ." (1967), pp. 342-343. Also relevant are the communications assembled under the title "Increasing mineral resources by discovery," in *Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources . . .*, vol. 2 (1951), pp. 59-103; Tilson, "The earth's crust" (1962), and Nolan, "The inexhaustible resource of technology" (1958).

<sup>156</sup> Copper and iron ore are two examples where submarginal and low-grade deposits have become gradually economical as a result of the application of new techniques. See, for example, United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 2 (1952), pp. 143-147. Table III, p. 144, shows the marked increase in the trend of copper-reserve estimates in the United States during 1931-1945 despite an annual average production of some 700,000 tons. Table VII, p. 147, indicates that while the production of iron ore increased from 36 million tons in 1908 to an annual average of more than 100 million tons during the decade of 1940-1950, the available reserves increased from 4,800 million long tons in 1908 to 6,400 million long tons in 1950. A recent survey by the United Nations on the total iron ore resources of the world (reserves plus potential ore) has revealed that they have increased from 174,190 million tons in 1954 to 782,500 million tons in 1967. United Nations, *Survey of World Iron Ore Resources . . .* (1970), p. 8.

<sup>157</sup> Nolan, reviewing the development of science and technology in the first half of this century, states that "... it does not seem too improbable that, through one or another of the methods of improved exploration techniques, exploitation of presently unavailable supplies, or programs of substitution and improved utilization, raw materials for our civilization can be obtained for a long period in the future . . ." Nolan, "The outlook for the future . . ." (1955), p. 7. Barnett and Morse, *Scarcity and Growth . . .* (1963). For a discussion of future technology and its implication for minerals, see Landsberg, Fischman and Fisher, *Resources in America's Future . . .* (1963), pp. 488-496. These authors have also discussed the possibility of the occurrence of rich deposits of minerals on the moon and neighbouring planets of the solar system.

<sup>149</sup> Jones, "Mineral resources" (1957), p. 47. See also United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952), chap. 2.

<sup>150</sup> Stamp, *Our Developing World* (1960), p. 179. See also a different set of estimates computed by Sawaf in his, "Minerals and living standards . . ." (1967), p. 344.

<sup>151</sup> Stamp, *Our Developing World* (1960), pp. 148-150.

<sup>152</sup> Lovering, "Mineral resources from the land" (1969), p. 120.

<sup>153</sup> Pehrson, "Estimates of selected world mineral supplies by cost range" (1951).



so much in technology and culture as to make any forecast by the present generation irrelevant.<sup>158</sup>

TABLE XI.5. YEARS OF SUPPLY OF WORLD RESERVES OF SELECTED METALS AND MINERALS BASED ON VARIOUS RATES OF *per capita* CONSUMPTION<sup>a</sup>

Metal or mineral	Assumptions regarding rates of consumption		
	Current rates remain unchanged	World consumes at current United States <i>per capita</i> rate	United States consumes at current United States rate and rest of world at current European rate (excluding the USSR)
Iron ore			
Actual .....	200	25	66
Potential .....	625	74	200
Manganese ore ..	250	50	140
Chromite .....	47	8	40
Tungsten .....	125	34	b
Copper .....	45	5	20
Lead .....	33	4	11
Zinc .....	39	6	18
Tin .....	38	6	17
Bauxite .....	200	31	165
Petroleum			
Proved and indicated .....	22	2.5	20
Ultimate .....	160	18	150
Coal .....	2,200	340	985

SOURCE: Pehrson, "Estimates of selected world mineral supplies by cost range" (1951), p. 4.

<sup>a</sup> Unadjusted for population trends.

<sup>b</sup> Basis for estimate not available.

61. The chemical industry, which produces vast varieties of solvents, medicines, fertilizers, dyes, bleaching agents, plastics and the like, is said to be as important to industrialized society as the metal industry.<sup>159</sup> The important role of this industry in affecting the supply of resources is seen in the widespread use in recent years of polymeric materials, or plastics, as substitutes for such products as natural rubber, wood, glass, natural fibers, copper, lead, zinc, aluminium and even iron.<sup>160</sup> This industry also plays a prominent role in food production, since modern agriculture relies on chemistry for soil nutrients and the control of insects. Chemical agents can

<sup>158</sup> Fisher and Potter, "The effects of population growth on resource adequacy ..." (1971), p. 233.

<sup>159</sup> Stevenson has noted that chemical products "have a role in satisfying the six basic needs of mankind—food, clothing, shelter, transportation and communication, medication, and tools, machinery and equipment with which to work". Stevenson, "Past gains and future promise" (1959), p. 115.

<sup>160</sup> Brown, *The Challenge of Man's Future* ... (1954), pp. 207-210. On contributions of the chemistry industry, see also Borgstrom, *Too Many* ... (1969), chap. 2. A basic shift in the pattern of metal use since the Second World War has seen greater competition for steel production from aluminium, magnesium, titanium, structural concrete and a variety of strong solid plastics. Feiss, "Minerals" (1963), p. 129; and Brown, "Human materials production as a process in the biosphere" (1970), p. 200. On possible replacements for steel products see also United Nations, Economic Commission for Europe, *Competition between Steel and Aluminium* (1954); *Steel and its Alternatives* (1956); *Aspects of Competition between Steel and other Materials* (1966). See also Zackay, "The strength of steel" (1963).

raise crop yields even on poor soil, and chemical technology is able to transform low-value agricultural products into new resources.<sup>161</sup>

62. The sea contains a large variety of minerals<sup>162</sup> in the form of dissolved substances at low concentration, but at present only magnesium, bromine and common salt are being extracted in significant quantities. As shown in table XI.6, in 1964 about 90 per cent of the magnesium and 45 per cent of the bromine produced in the United States came from sea-water. Extraction from the sea of such elements as sodium, sulphur, potassium, and iodine also seems feasible in the future, though it is improbable for such elements as silver, gold, platinum, tin, molybdenum, nickel, tungsten, mercury and many others.<sup>163</sup>

63. Table XI.6 shows that for the world as a whole mineral products obtained from the sea represented about 10 per cent of the total value of all mineral production. In addition to the minerals from sea-water already mentioned, substantial quantities of oil, gas and sulphur, from beneath the sea floor, and sand and gravel from the sea floor were also extracted.<sup>164</sup> Weeks has estimated that 700,000 million barrels of petroleum liquids can be produced by primary recovery methods from beneath the continental shelves of the world.<sup>165</sup> The floor of the deep sea contains low-grade deposits of cobalt, nickel, and copper associated with deposits of iron and manganese, but the technological problems of mining these materials, in view of the great depth and pressure, have not been solved.<sup>166</sup>

<sup>161</sup> Herber, *Our Synthetic Environment* (1962), p. 39. Moore has commented that the raw materials required by the chemical industry: coal, limestone, corn cobs, oat hulls, and other agricultural by-products are of low value, plentiful, and in some cases waste products. "Chemical technology thus forces us to revise our estimate of what constitutes the resource base of our economy." Moore, "Unlocking new resources" (1959), p. 137.

<sup>162</sup> Among many works on the mineral resources of the sea are the following: Borgese, "The republic of the deep seas ..." (1968); Stephens, "Ocean harvest" (1967); Mero, *The Mineral Resources of the Sea* (1964); Emery, "Geological methods for locating mineral deposits on the ocean floor" (1966); Wenk, "The physical resources of the ocean" (1969); United Nations, *Mineral Resources of the Sea* (1970).

<sup>163</sup> Cloud, "Mineral resources from the sea" (1969), pp. 137, 140-141 and table 7.2; see also Wenk, "The physical resources of the ocean" (1969), p. 171.

<sup>164</sup> Emery noted that it could safely be predicted that the production of petroleum and natural gas from the world's continental shelves would increase at a faster rate than that from wells drilled on land. With continued urbanization, and a preference for coastal regions, off-shore production of sand and gravel, which are used for construction purposes, are also likely to expand greatly. Emery, "The continental shelves" (1969), p. 121; see also Schaefer and Revelle, "Marine resources" (1959), pp. 87-90; and Wenk, "The physical resources of the ocean" (1969).

<sup>165</sup> Weeks, "World offshore petroleum resources" (1965), p. 1680; and his "Offshore oil ..." (1965), p. 133. See also Hubbert, "Energy resources" (1969), pp. 194-196.

<sup>166</sup> Schaefer and Revelle, "Marine resources" (1959), p. 89. On improvements in technology, see Bascom, "Technology and the ocean" (1969), p. 199; United States, *Marine Science Affairs* ... (1969); Wang, "Latest advances in off-shore petroleum technology" (1971). See also Tilson, "The ocean" (1966), particularly the table on page 27; National Academy of Sciences-National Research Council, Committee on Oceanography, *Economic Benefits from Oceanographic Research* (1964), p. 17; Mero, "Minerals on the ocean floor" (1960); and his *The Mineral Resources of the Sea* (1964), pp. 127-241; Vine, "Spreading of the ocean floor ..." (1966).



TABLE. XI.6. APPROXIMATE VALUES OF NATURAL RESOURCES FROM OFF-SHORE AND FROM THE LAND  
IN 1964  
(In millions of dollars)

Resource	From the sea		From the land	
	United States	Rest of world	United States	Rest of world
<i>From sea-water</i>				
Magnesium .....	50	?	5	?
Bromine .....	25	?	30	0
Salt (NaCl) .....	15	25	190	?
<i>From the sea floor</i>				
Diamonds .....	0	4	0	?
Gold .....	0	?	50	1,500
Tin .....	0	>20	Negligible	600
Iron .....	0	1	800	4,500
Manganese .....	0	0	3	420
Phosphorite .....	0	0	160	215
Sand and gravel .....	10±	>15	850	?
Oyster shells .....	30	?	?	?
<i>From beneath the sea floor</i>				
Oil and gas .....	800	2,900	10,500	17,000
Sulphur .....	20	0	150	140
TOTAL	950	2,965+	12,738	24,375

SOURCE: Cloud, "Mineral resources from the sea" (1969), p. 136.

64. It has been noted that the expected sharp rise in demand for resources associated with population growth and rising gross national product is likely to imply a greater role for the sea in meeting demand. Wenks has pointed out that by the end of the century one-half of the population of the United States may be settled in three coastal urban belts comprising the megalopolises of the Atlantic, the Pacific and the Great Lakes, thus causing an intensification of competing demands on the resources of the narrow coastal zones.<sup>167</sup> A long-run factor threatening the coastal areas is the rising sea level from melting ice caps or movements of the land which may result in the submersion of some resources now above sea level.<sup>168</sup>

### (c) Energy resources

65. It is universally recognized that the energy<sup>169</sup> that sustains all living systems is derived from solar radiation. The total amount of solar energy fixed on the earth places a limit on the total amount of life; the patterns of flow of this energy through the earth's ecosystems set additional limits on the kinds of life on earth.<sup>170</sup> The solar radiation, which is absorbed by the leaves of plants and stored as chemical energy, furnishes the essential energy source for the human population and entire animal

kingdom. The present supply of fossil fuels—coal, petroleum and natural gas—originated from the organic matter of former plants and animals which had become buried in sedimentary sand, muds and limes in a state of incomplete oxidation.<sup>171</sup>

66. The use of energy is a key to the supply of food, to physical comfort, and to the enhancement of the quality of life beyond the essentials necessary for survival. It can be said that, with time, man's use of the energy supply has reached the stage of a steadily growing availability of additional energy sources. In the course of these developments, and partly as a consequence, human population growth was accelerated, but the acceleration in the expansion of available energy supplies has been even greater. The greater utilization of energy depends on energy resources already tapped, technological skills, and the social organization by which technology and its utilization are supported and being promoted. In earlier times, the amount of energy used generally progressed at little more speed than the size of human population. But with the discovery of coal, about eight centuries ago, and the

<sup>167</sup> Wenk, "The physical resources of the ocean" (1969), pp. 172-173.

<sup>168</sup> Cloud, "Mineral resources from the sea" (1969), p. 152.

<sup>169</sup> On the role of energy in the universe, see, for example, Dyson, "Energy in the universe" (1971); Ubbelohde, *Man and Energy* ... (1963); and Dicke, *Gravitation and the Universe* (1970).

<sup>170</sup> See, for example, Sagan, "On the origin and planetary distribution of life" (1966); Woodwell, "The energy cycle of the biosphere" (1970).

<sup>171</sup> Hubbert, "Energy resources" (1969), p. 157. The flow of energy through the earth's surface environment comes principally from three main sources: (a) the intercepted solar radiation; (b) thermal energy, which is conveyed to the surface of the earth from the warmer interior by the conduction of heat; and (c) tidal energy, derived from the combined kinetic and potential energy of the earth-moon-sun system, manifested principally in the oceanic tides and tidal currents. Of the total energy influx into the earth's surface environment, solar radiation accounts for 99.98 per cent. Hubbert, "The energy resources of the earth" (1971), p. 62; see also Jeffreys, *The Earth* ... (1970); Went, "Photosynthesis" (1959); Putnam, *Energy in the Future* (1953), pp. 198-204; Oort, "The energy cycle of the earth" (1970); Murdoch, ed., *Environment* ... (1971); and Gough and Eastlund, "The prospects of fusion power" (1971).

TABLE XI.7. PATTERNS OF WORLD CONSUMPTION OF ENERGY, 1950 AND 1969

Type of energy	1950		1969		Average annual rate of increase, 1950-1969 (percentage)
	Million metric tons of coal equivalent	Percentage distribution	Million metric tons of coal equivalent	Percentage distribution	
Total .....	2,519	100.0	6,416	100.0	4.6
Solid fuels .....	1,569	62.2	2,357	36.7	2.0
Liquid fuels .....	636	25.3	2,608	40.6	7.0
Natural gas .....	273	10.9	1,303	20.3	7.8
Hydro and nuclear energy .....	41	1.6	148	2.4	6.4

SOURCE: 1950 data from United Nations, *World Energy Supplies, 1956-1959* (1961), table 1; 1969 data from ———, *1966-1969* (1971), table 1.

discovery of petroleum just over one century ago, the rate of energy use began to outpace population growth to an increasing extent.<sup>172</sup>

67. Prior to the seventeenth century man's productivity depended mainly on his own labour and that of domestic animals. After 1700 power and machinery came increasingly into use and began to affect productivity significantly. The impact of these developments is illustrated by the case of agriculture in the United States, where productivity more than doubled between 1920 and 1960, at a time when machines and tractors were rapidly replacing animals on farms.<sup>173</sup>

68. There has been a significant change in the pattern of demand for energy in the last century and particularly in recent decades. Table XI.7 shows a marked trend away from coal and other solid fuels towards the use of liquid fuels and natural gas between 1950 and 1969. In 1950, 62 per cent of the world's energy requirements were provided by solid fuels, and 25 per cent by liquid fuels; by 1969, however, the share of solid fuels dropped to 37 per cent while that of liquid fuels rose to 41 per cent. The most significant change was that of natural gas whose share almost doubled from 1950 to 1969 (from 10.9 to 20.3 per cent). During 1950-1969, consumption of natural gas grew at an annual rate of 7.8 per cent, liquid fuels at 7.0 per cent and solid fuels at only 2.0 per cent.<sup>174</sup>

<sup>172</sup> Hubbert, "Energy resources" (1969), pp. 157-160. Commenting on the importance of energy reserves, Brown states: "If our energy resources dwindle, our industrial technology will dwindle, and life expectancy and population will slowly dwindle with it". Brown, *The Challenge of Man's Future* ... (1954), p. 167.

<sup>173</sup> Other factors such as the introduction of new hybrid grains, the use of fertilizer and pesticides, and irrigation also contributed to rising productivity. Starr, "Energy and power" (1971), pp. 38-41. In 1918, one fourth of United States harvested crop acreage was used to produce food for the nation's more than 25 million horses and mules. Many more animals and men to work them would be required to produce current agricultural output if methods had remained unchanged. An animal-powered agriculture on an essentially fixed land base could not have supported the American economy of the 1960s. Pinches, "Revolution in agriculture" (1961), pp. 4-5.

<sup>174</sup> United Nations, *World Energy Supplies, 1956-1959* (1961) and ———, *1966-1969* (1971), table 1. See also Schurr, "Energy" (1963), especially the graph on page 114; Starr, "Energy and power" (1971), especially the graph on page 39. Landsberg's historical study for the United States found a great swing from muscle-power to fuels and hydroelectricity. In 1850, only one third of the energy used in the American economy was of inanimate

69. Landsberg has pointed out that there has been a strong interaction between the form in which energy is demanded and the supply of different fuels. Oil output rose, for example, when its use for firing boilers and driving machines was discovered. It expanded even more when demand developed for a liquid fuel to power internal combustion engines.<sup>175</sup>

70. A country's energy consumption has been shown to be closely related to its national production.<sup>176</sup> In an analysis of data for 47 countries, Schurr found a strong positive correlation between *per capita* consumption of energy and the *per capita* gross national product.<sup>177</sup> There are, of course, limits to the extent to which increas-

origin, one half came from draft animals and about one eighth from human beings. By 1950, however, human and animal energy combined accounted for only about 1.5 per cent of all energy consumed. Fuelwood was dominant until around the turn of the century when coal took over only to be later surpassed by both oil and gas. In view of these great changes, Landsberg noted that there was small reason to believe that the present pattern would endure. Landsberg, "History and prospects" (1968), pp. 28-29.

<sup>175</sup> Landsberg, "History and prospects" (1968), p. 29; see also United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 3 (1952), chap. 1.

<sup>176</sup> It has been said that energy consumption is conceptually similar to national product in that each is identified with the work performed, which in one case is expressed in units of energy and in the other in units of currency. In so far as international comparisons are concerned, units of energy have an advantage over units of currency, since the former have precise and unchanging mathematical relativity to each other. Zagoroff, "National income and general productivity in terms of energy" (1955), p. 101.

<sup>177</sup> Schurr, "Energy" (1963). See also United Nations, *Changing Patterns in the World Energy Situation* ... (1971), p. 5. Empirical investigations of the relationship between energy consumption and national production were first undertaken in the late 1940s by such authors as Dewhurst and Hartley. Dewhurst, "Relation of energy output to production ..." (1948); Hartley, "Limiting factors in world development ..." (1949), pp. 50-51. The relationship was further studied by Barnett, who advanced the notion of effective use of energy. Barnett, *Energy Uses and Supplies* ... (1950). Robinson and Daniel, as well as Mason, found high correlations between *per capita* consumption of energy and *per capita* product in the 1950s. Robinson and Daniel, "The world's need for a new source of energy" (1956), particularly figures 2 and 3; and Mason, "Energy requirements and economic growth" (1956). See also Prévôt, "Les variations concomitantes de l'énergie consommée et du produit national" (1951); Schurr *et al.*, *Energy in the American Economy, 1850-1975* ... (1960), pp. 13-17; Cottrell, *Energy and Society* ... (1955); Kindleberger, *Economic Development* (1965), p. 70, particularly graph 4.4; and Starr, "Energy and power" (1971).

ing use of energy can raise production and output *per capita*.<sup>178</sup>

TABLE XI.8. ENERGY CONSUMPTION FOR MAJOR AREAS OF THE WORLD, 1950 AND 1968  
(Weights in coal equivalent)

Major areas	1950	1968	Average annual rate of increase 1950-1968 (percentage)
World			
Total (million tons) ..	2,518.8	6,016.1	5.0
Per capita (kg) ....	1,054	1,727	2.8
Developed private enterprise economies <sup>a</sup>			
Total (million tons) ..	1,866.8	3,774.5	4.0
Per capita (kg) ....	3,334	5,436	2.8
Centrally planned economies <sup>b</sup>			
Total (million tons)	512.5	1,744.7	7.1
Per capita (kg) ..	598	1,550	5.4
European area			
Total (million tons)	474.4	1,394.0	6.2
Per capita (kg) ..	1,659	3,850	4.8
Asian area			
Total (million tons)	38.1 <sup>c</sup>	350.4	13.1
Per capita (kg) ..	66	458	11.4
Developing countries <sup>d</sup>			
Total (million tons) ..	139.5	496.9	7.5
Per capita (kg) ....	128	299	4.8

SOURCE: compiled from United Nations, *Changing Patterns in the World Energy Situation* ... (1971), table 2.

<sup>a</sup> Includes North America, Western Europe, Japan, South Africa and Oceania.

<sup>b</sup> Includes Eastern European countries, the USSR, China, Mongolia, North Korea and North Viet-Nam.

<sup>c</sup> Estimate for China and North Korea only. It should be noted that 1950 was an abnormal year for China and a more appropriate base year might be the first year of the first Five-Year Plan, namely, 1953-1957.

<sup>d</sup> Developing countries comprise countries in the Americas, excluding North America; countries in Africa, excluding South Africa; and countries in Asia, excluding Japan and the centrally planned economies of Asia, listed in foot-note <sup>b</sup> above.

71. Table XI.8 indicates that the world consumption of energy, which amounted to more than 6,000 million tons of coal equivalent in 1968, increased by 5.0 per cent per annum between 1950 and 1968. Urbanization and industrialization have been the major underlying factors for this growth. However, the rate of growth of world energy consumption diminished slightly, from 5.3 per cent in the decade of the 1950s to 4.5 per cent in the decade of the 1960s, partly due to a shift from less efficient to more efficient fuels, that is, from solid fuels to liquid and gaseous fuels.<sup>179</sup> The pattern of energy consumption varied among different groups of countries. In the developed market economies, total energy consumption

<sup>178</sup> Putnam, *Energy in the Future* (1953), pp. 449-453; DuBoff, "A note on the substitution of inanimate for animal power" (1964). On the decline of output per installed horsepower as horsepower increases relative to population, see Renshaw, "The substitution of inanimate energy for animal power" (1963).

<sup>179</sup> United Nations, *Changing Patterns in the World Energy Situation* ... (1971), pp. 3-4.

TABLE XI.9. *Per capita* ENERGY CONSUMPTION FOR SELECTED COUNTRIES, 1969

Country	Kilogrammes of coal equivalent
Developed private enterprise economies	
Australia .....	5,214
Canada .....	8,819
France .....	3,517
Germany, Federal Republic of .....	4,850
Japan .....	2,828
Sweden .....	5,768
United Kingdom .....	5,139
United States .....	10,773
Centrally planned economies	
Czechoslovakia .....	6,120
Hungary .....	2,895
USSR .....	4,200
Developing countries	
Algeria .....	470
Brazil .....	475
Ceylon .....	133
Colombia .....	578
Ethiopia .....	29
India .....	187
Iran .....	565
Mexico .....	1,114
Philippines .....	266
Tunisia .....	248
Venezuela .....	2,096

SOURCE: United Nations, *World Energy Supplies* ... (1971), table 2.

doubled between 1950 and 1968, as the average rate of growth was 4.0 per cent per annum. In the centrally planned economies of the European continent the growth rate of energy consumption was relatively high, averaging 6.2 per cent during 1950-1968. In the developing countries there was also a high rate of growth in energy consumption—7.5 per cent per annum. The table also shows that, despite the more rapid rate of population growth in the developing countries, their average annual *per capita* growth rate of energy consumption—4.8 per cent—equalled that of the centrally planned economies of Europe and surpassed that of the developed market economies—2.8 per cent. While *per capita* energy consumption was rising comparatively fast in the developing countries, the level remained very low in comparison with the more developed parts of the world. In 1968 *per capita* energy consumption was estimated at only 299 kilogrammes of coal equivalent in the developing countries, compared to 3,850 kilogrammes for the European centrally planned economies and 5,436 kilogrammes for the developed market economies.<sup>180</sup> The low average energy consumption figures for the developing countries conceal further disparities between the urban centres and the more

<sup>180</sup> The data on energy consumption are somewhat understated since they do not include non-commercial energy sources (e.g. wood, animal power), information on which is not readily available. This omission creates a bias in comparisons of developing and more developed countries, since non-commercial forms of energy account for a much larger proportion of energy supply in the former than in the latter. See United Nations, *Changing Patterns in the World Energy Situation* ... (1971), p. 3.

TABLE XI.10. ACTUAL ENERGY CONSUMPTION IN 1960 AND PROJECTED ENERGY CONSUMPTION IN 2000 BASED ON VARYING ASSUMPTIONS: MAJOR REGIONS OF THE WORLD  
(Thousand million of metric tons of coal equivalent)

Region	Energy consumption in the year 2000 assuming that:				
	Actual energy consumption in 1960	Trend in consumption from 1950 to 1960 continues	World consumption is at 1960 per capita level of the United States	World consumption is at 1960 per capita level of Western Europe	North America, Europe, USSR and Oceania consume at 1960 per capita level of the United States; rest of world at 1960 level of Europe
World .....	4.2	22.4	55.3	17.7	25.1
Northern America .....	1.55	2.68	2.61	0.84	2.61
Latin America .....	0.14	3.18	5.22	1.67	1.67
Western Europe .....	0.79	2.98	3.45	1.10	3.45
Eastern Europe and the USSR .....	0.90	4.6 <sup>a</sup>	4.49	1.44	4.49
Centrally planned economies of Asia .....	0.40	5.0 <sup>a</sup>	14.4	4.6	4.6
Other Asia .....	0.24	2.9	20.0	6.4	6.4
Africa .....	0.08	1.0	5.31	1.70	1.70
Oceania .....	0.05	0.10	0.24	0.08	0.24

SOURCE: Fisher and Potter, *World Prospects for Natural Resources* ... (1964), p. 47.

<sup>a</sup> 1950-1960 trend roughly estimated.

backward rural areas where a large population lives often without an electricity supply and at a subsistence level.<sup>181</sup> A further indication of the wide variations that exist throughout the world in *per capita* energy consumption, and hence in levels of living, is given in table XI.9, which shows estimates of *per capita* energy consumption in selected countries of the world in 1969.

72. Energy consumption also shows marked differences in structure from one country to another. In the Soviet Union, about three quarters of total energy consumption was derived from coal around 1960, while the comparable figure for the United States was about one third. On the other hand, petroleum accounted for about 10 per cent of energy consumption in the Soviet Union, but 20 per cent in the United States. The corresponding figures for natural gas consumption were 6 per cent and 46 per cent respectively in the two countries.<sup>182</sup>

73. Projections of future world energy consumption have been made by various authors.<sup>183</sup> According to Milton Searl's projections, cited by Schurr, energy consumption in the year 2000 would be about five times that of 1960 while, during the same period, world population would only have doubled. These projections show that at the end of the century North America, Western Europe and Oceania may account for about 45 per cent of the world's total energy consumption, compared with about 60 per cent in 1960. The less developed regions are likely to increase their share of world energy consumption

from about 20 per cent in 1960 to about 35 per cent in the year 2000. One factor in the rise in energy consumption in these regions is their rapid rate of population growth, as a result of which they are expected to increase their share of world population. The main factor in the increased proportion of world energy consumption in these areas, however, is the assumption of advances in their industrialization and economic development. The remainder of the world's energy consumption—about one fifth of the total both in 1960 and 2000—is accounted for by the Soviet Union and Eastern Europe.<sup>184</sup>

74. Fisher and Potter have projected energy consumption to the year 2000 on the basis of four sets of assumptions as shown in table XI.10. The results of three of these projections (that is, all except the one based on the 1960 United States level of energy consumption which is probably unattainable) appear fairly consistent with the results presented by Schurr, since they indicate that the world energy consumption in the year 2000 will be within a range of 4 to 6 times that of 1960.

75. Brown and his associates estimated that nuclear energy may account for about one-third of total energy

<sup>181</sup> United Nations, *New Sources of Energy and Energy Development* ... (1962), p. 5.

<sup>182</sup> Campbell, *The Economics of Soviet Oil and Gas* (1968), p. 180.

<sup>183</sup> See, for example, Landsberg, Fischman and Fisher, *Resources in America's Future* ... (1963); Fisher and Potter, *World Prospects for Natural Resources* ... (1964); Schurr, "Energy" (1963).

<sup>184</sup> Schurr, "Energy" (1963), p. 112. Past experience of the United States in energy consumption supports these assumptions. During 1850-1910, a period of rapid industrial growth in the United States, the average annual rate of growth of *per capita* energy consumption was about 5 per cent, whereas in subsequent decades the rate fell substantially. Schurr *et al.*, *Energy in the American Economy, 1850-1975* ... (1960), p. 521. Putnam argues that, as a result of acquiring modern technology and benefiting from technical assistance programmes, the future rates of growth in *per capita* energy demand in the developing countries may even exceed the fastest rate yet recorded. Putnam, *Energy in the Future* (1953), p. 114. Scarlott places emphasis on the population's "growing taste for the things energy can do". Scarlott, "Fossil fuels—reserves, use, and prospects" (1959), p. 413.

consumption by the end of the century, and by the middle of the next century would supply most of the world's energy needs. They foresaw a slow continuous increase in the consumption of coal and a levelling off of the consumption of petroleum in the last quarter of the present century, followed by a decline.<sup>185</sup>

76. Estimates of potential energy resources are subject to many uncertainties. None the less, Hubbert has estimated the ultimate potential reserves of the various classes of the fossil fuels in terms of their energy contents. According to him, "The total ultimate energy for all the fossil fuels is approximately  $27.4 \times 10^{15}$  kilowatt-hours of heat. Of this 71.6 per cent is represented by coal, 17.3 per cent by petroleum and natural gas, and 11.1 per cent by tar sands and oil shale. The fraction consumed already is 4.1 per cent for coal, 10 per cent for petroleum and natural gas, and zero for tar sands and oil shales".<sup>186</sup>

77. Examinations of energy consumption, in retrospect, indicate that there has been a steady improvement in the efficiency with which energy is converted to heat, light and work. According to Summers, in the United States between 1900 and 1970 the efficiency with which fuels were consumed increased roughly by a factor of four. In recent years, however, gains in fuel economy have become more difficult to achieve, and increases in fuel consumption have risen faster than the gross national product. Since nuclear power plants convert only about 30 per cent of the energy in the fuel into electricity, whereas the comparable figure for the best fossil-fuel plants is about 40 per cent, it is clear that the expected increase in the use of nuclear fuels in the next decades may lead to a lower efficiency.<sup>187</sup>

#### 4. NEW SOURCES OF ENERGY

78. Because of the increasing consumption of fossil fuels, if man and his institutions are to survive in the long run, other sources of energy will have to be explored for possible replacement. One of these new sources is solar energy.

79. According to Daniels, the total solar energy reaching the earth is much greater than the total energy requirements of the world's population and technologically could be used to replace present energy sources, such as fuels and electricity.<sup>188</sup> The world's consumption of

fuels amounts to the equivalent of 25,000 kilocalories daily *per capita*, while food consumption is the equivalent of only 2,500 kilocalories. Thus ten times as much energy is required for man's tools and machines as for his nourishment. In the United States, where the ratio of fuel energy to food energy is much higher—50 to 1—150,000 kilocalories of heat per person per day is used to heat houses, to operate automobiles, trains and tractors, to carry out manufacturing operations and mechanical work.<sup>189</sup>

80. Two channels of the flux of solar energy are now known as large-scale sources of energy for human utilization. The first is the mechanism of photosynthesis for the entire biological system;<sup>190</sup> the second is the heat-engine channel, which produces principally the atmospheric and oceanic circulations and the hydrologic cycle, leading to wind power and water power.<sup>191</sup> Daniels listed a number of non-biological uses of solar energy including water and building heating, cooling and refrigeration, water distillation, solar furnaces, solar cookery and numerous thermoelectric, photoelectric and other means of electrical conversion or storage of solar energy.<sup>192</sup> Most of these uses are, however, still in the experimental stage. While it is possible to trap much of the solar energy and to convert it into heat inside a building fitted with suitable windows that let the sunshine in but do not let heat escape, house heating with solar energy is not yet generally economically feasible.<sup>193</sup> Solar water heating is the widest current application yet established on a commercial basis. In Japan, annual sales are as high as 100,000 units, ranging in price from about \$6 up to much higher prices for more durable and complex units.<sup>194</sup>

than the world's present installed electric power capacity. Hubbert, "Energy resources" (1969), p. 206. It is 5,000 times the energy input from all other sources combined. Hubbert, "The energy resources of the earth" (1971), p. 62.

<sup>189</sup> Daniels, "Introduction" (1955), p. 3; see also his *Direct Use of the Sun's Energy* (1964), chaps. 3-9.

<sup>190</sup> See the discussion in the preceding subsection. See also, for example, Rabinowitch and Govindjee, *Photosynthesis* (1969); Olson, "The evolution of photosynthesis" (1970); and Hutchinson, "The Biosphere" (1970), p. 47, and chart on pp. 50-51.

<sup>191</sup> See, for example, Stewart, "The atmosphere and the ocean" (1969); Lorenz, *The Nature and Theory of the General Circulation . . .* (1967); Palmén and Newton, *Atmospheric Circulation Systems . . .* (1969); and Perman, "The water cycle" (1970).

<sup>192</sup> Daniels, *Direct Use of the Sun's Energy* (1964), chaps. 5-18, each dealing with one topic in detail. See also various communications in Daniels and Duffie, eds., *Solar Energy Research* (1955); and Jukes, "Nuclear energy and other recent developments . . ." (1967), p. 327.

<sup>193</sup> Daniels and Duffie, eds., *Solar Energy Research* (1955), section 3, particularly p. 31.

<sup>194</sup> Tanishita, "Recent development of solar water heaters in Japan" (1964). See also Oshida, "Use of solar energy for heating purposes . . ." (1964). The widespread interest in solar energy utilization is reflected in papers on solar energy submitted to the United Nations Conference on New Sources of Energy, which was held at Rome in 1961. Among topics of discussion were: water heating, space heating, heat storage, solar drying, solar cooking, solar refrigeration for food preservation, solar air conditioning, solar distillation producing fresh water, solar furnaces, etc. See United Nations, *New Sources of Energy and Energy Development . . .* (1962), particularly p. 33. See also United Nations, *New Sources of Energy and Economic Development . . .* (1957), particularly chap. 4.

<sup>185</sup> The authors assume that: "Barring a world catastrophe, and assuming that industrialization will spread throughout the world, that population will continue to grow, and that we shall have adequate brainpower to solve our prodigious technical problems as they arise, total energy consumption will continue to rise rapidly, following the law of compound interest." Brown, Bonner and Weir, *The Next Hundred Years . . .* (1957), pp. 108-110. See also Brown, "The next ninety years" (1967).

<sup>186</sup> Hubbert, *Energy Resources . . .* (1962), p. 88. A considerable number of estimates are available for potential reserves of petroleum, coal and other fossil fuels. See Ayres and Scarlott, *Energy Sources—The Wealth of the World* (1952), chaps. 3-5; and Scarlott, "Fossil fuels—reserves, use and prospects" (1959). See also Hubbert, "Energy Resources" (1969), tables 8.2 and 8.6 and fig. 8.24, and his "The energy resources of the earth" (1971).

<sup>187</sup> Summers, "The conversion of energy" (1971), p. 149.

<sup>188</sup> Daniels, *Direct Use of the Sun's Energy* (1964), p. 351. Hubbert has pointed out that the thermal power intercepted by the earth's diametral plane ( $17.7 \times 10^{15}$  watts) is about 100,000 times larger

81. The possibilities for applying solar energy appear to be particularly promising in the developing regions. In the first place, many of these areas have insufficient supplies of conventional energy sources, and secondly, they are for the most part situated in a favourable geographical location, since solar energy is most readily accessible between latitudes 40° north and 40° south. In the more developed countries the question often arises of the economic feasibility of solar energy and its competition with the present energy sources based on fuels; it is foreseen that solar energy in these regions is likely to be mainly applied for such purposes as solar furnaces for research, solar power in space vehicles and water heating.<sup>195</sup>

82. The low intensity of radiant energy in sunlight calls for more efficient devices for its harnessing.<sup>196</sup> Recent models for a solar energy system have attracted considerable attention. Meinels has designed a system to capture the sun's energy by means of specially coated collecting surfaces, which would be heated by the resulting "greenhouse" effect to a temperature as high as 540° C;<sup>197</sup> Glaser, on the basis of current developments in space exploration and photo electric conversion, proposed placing a lightweight panel of solar cells in an orbit 22,300 miles above the equator, where they would be exposed to sunlight 24 hours a day. Solar cells would convert the radiant solar energy into electric power which would be converted into microwave radiation and beamed to the earth.<sup>198</sup>

83. Wind energy is considered to be unlikely to increase the energy supply substantially. A disadvantage is that wind power is variable over time and can therefore not guarantee a steady electric output. Wind power had been widely used in the past for such operations as pumping water in agricultural areas, but the expansion of rural electrification systems in developed countries led to its abandonment. However, there are still many cases in developing countries where simple wind-driven pumps and grain-mills may be both feasible and economic.<sup>199</sup>

84. The development of water power is generally expected to continue despite possible high costs involved, which result from the fact that in most developed countries the best and most economic sites have already been utilized. Moreover, since hydropower is a non-polluting

means of producing energy, its future use is likely to increase considerably. In developing countries there are still some potentially cheap hydropower sites remaining. Table XI.11 shows that the potential water power of the world is estimated at 2,857,000 megawatts. The continents of Africa and South America, both deficient in coal, appear to have the highest potential water-power capacities—780,000 megawatts for Africa and 577,000 megawatts for South America.

TABLE XI.11. WORLD'S WATER-POWER CAPACITY<sup>a</sup>

Region	Potential (10 <sup>6</sup> megawatts)	Percentage distribution
Total .....	2,857	100
North America .....	313	11
South America .....	577	20
Western Europe .....	158	6
Africa .....	780	27
Middle East .....	21	1
South-East Asia .....	455	16
Far East .....	42	1
Australasia .....	45	2
USSR, China and other centrally planned economies .....	466	16

SOURCE: Hubbert, "Energy resources" (1969), p. 209.

<sup>a</sup> Estimated around 1960.

85. By 1966, the installed water-power capacity of the world amounted to about 230,000 megawatts, which is only about 8 per cent of its potential capacity. Since in 1966 the total installed electric-power capacity of the world amounted to about 840,000 megawatts, the total potential hydropower capacity of the world was thus more than three times as large as the total installed electric-power capacity.<sup>200</sup>

86. Tidal power is said to be similar to hydroelectric power in all essential respects except that it is obtained from the flow of water in filling and emptying coastal basins caused by the rise and fall of ocean tides. Although small tidal mills were used for the grinding of grain as early as the twelfth century, tidal-electric installations have been brought into operation only recently. The first major tidal-electric plant was installed at La Rance, France, in 1966. Of the actual and potential major tidal power sites in the world, nine are in North America (Bay of Fundy), eight in France, four in the Soviet Union, one in Argentina, and one in the United Kingdom. The total maximum rate of energy dissipation for all these localities amounts to about 64,000 megawatts, of which perhaps 20 per cent, or 13,000 megawatts, might represent actual power recoverable, according to Hubbert.

<sup>195</sup> United Nations, *New Sources of Energy and Energy Development* ... (1962), p. 8.

<sup>196</sup> *Ibid.* Ubbelohde points out that in order to obtain very high temperature from sunlight, some form of focusing lens or reflector has to be constructed to concentrate the energy collected over a large area into a very small region of space. Ubbelohde, *Man and Energy* ... (1963), p. 67.

<sup>197</sup> Hammond, "Solar energy ..." (1971).

<sup>198</sup> Glaser's model is described in Summers, "The conversion of energy" (1971), pp. 158-159.

<sup>199</sup> See various communications submitted to the 1961 United Nations Conference on New Sources of Energy in United Nations, *New Sources of Energy and Energy Development* ... (1962), pp. 28-32; and Brooks, "Solar, wind, and water-power resources" (1959), particularly pp. 444-445. One scheme which is believed to offer promise is "... to use the variable power output of a wind generator to decompose water into hydrogen and oxygen. These would be stored under pressure and recombined in a fuel cell to generate electricity on a steady basis." Summers, "The conversion of energy" (1971), p. 157.

<sup>200</sup> United States, Federal Power Commission, *World Power Data* ... (1969), table 7. Hubbert cautioned against concluding from such figures that full development of the world's potential water-power capacity would make it possible for the world to continue, without the present supply of fossil fuels, at an industrial level comparable to the present on water power alone. He noted two conditions, which offset such an expectation. First, the sacrifice of natural scenery which the full development of water power would entail and, second, the fact that reservoirs formed by dammed streams are continuously receiving deposits of sediments which may cause them to become completely filled after a century or two. Hubbert, "Energy resources" (1969), p. 209.

Compared to the estimated potential water power of the world (2,857,000 megawatts as shown in table XI.11) potential tidal power amounts to less than 1 per cent. Tidal power has certain advantages, however, in that it can be developed in very large units in certain favourable localities; it creates no noxious wastes, does not consume exhaustible energy resources and does not seriously disturb the ecologic and scenic environment.<sup>201</sup>

87. One of the energy inputs into the earth's environment consists of the heat conducted from the earth's interior as a result of the increase of temperature with depth; another consists of the heat convected to the surface by volcanoes and hot springs. Recent explorations have revealed that reservoirs of steam and hot water are widespread in the earth's crust. It is also possible that geothermal fields may be found under the seas.<sup>202</sup> Geothermal electricity production began early in the twentieth century when a turbine with the capacity of a few hundred watts was installed at Larderello in Italy. By 1960 the total output of the Larderello plants exceeded 300,000 kilowatts and geothermal power plants had also been established in a few other countries. Altogether their combined capacity (including Larderello) was about 390,000 kilowatts.<sup>203</sup> By 1970 power production from Larderello and surrounding fields was 384,000 kilowatts, and the total from plants in Japan, Mexico, New Zealand, Soviet Union and the United States added 300,000 more kilowatts, bringing the total to 684,000. Additional capacity or new plants planned in El Salvador, Guadeloupe, Iceland, Japan, Mexico, New Zealand, Taiwan, Turkey, the United States and the USSR were expected to bring total output to over one thousand megawatts.<sup>204</sup> It is believed that in the Soviet Union, some 50-60 per cent of the territory contains thermal waters that are comparable in energy to all the coal, peat and fuel resources of the country combined.<sup>205</sup> In northern California, the geysers field has a potential capacity estimated at 3 million kilowatts, and surveys in the Imperial Valley of southern California suggest a potential of 20 million kilowatts.<sup>206</sup>

88. In addition to electric power, the geothermal fields have provided man with a number of useful products. Geothermal steam or hot water has been applied in the desalination of sea-water, for heating houses, greenhouses, swimming pools as well as for refrigeration, air conditioning and a wide range of industrial uses in mining, manufacturing and agriculture. Moreover, the hot water itself can serve to provide potable water. The technology and economics of a multipurpose development of geothermal resources have been envisioned and planned in a number of schemes in recent years.<sup>207</sup>

<sup>201</sup> Hubbert, "Energy resources" (1969), pp. 209-215.

<sup>202</sup> Barnea, "Geothermal power" (1972), p. 70.

<sup>203</sup> United Nations, *New Sources of Energy and Energy Development* . . . (1962), p. 21.

<sup>204</sup> United Nations, *United Nations Symposium on the Development and Utilization of Geothermal Resources* . . . (1971), p. 6.

<sup>205</sup> *Ibid.*, p. 7.

<sup>206</sup> Barnea, "Geothermal power" (1972), p. 70.

<sup>207</sup> Barnea, "Multipurpose exploration and development of geothermal resources" (1971). In Iceland, about 80,000 persons of a total population of 200,000 live in houses heated by geothermal water and, within the next decade, 60 to 70 per cent of the popu-

89. Nuclear power is also emerging as an important new source of energy<sup>208</sup> despite the fact that it has encountered some technical and economic impediments. For one thing, electricity generated from this source has difficulty competing with alternative sources based upon liquid fuels, owing to the falling prices of the latter.<sup>209</sup> Nevertheless, a number of nuclear plants and programmes are under way in several developed countries<sup>210</sup> and technological advances are constantly helping to improve the design of nuclear plants so as to make them economically more competitive in the large-scale generation of power.

90. Assessing the relation of new sources of energy to man, Dyson considers that in the very long run there is need for energy that is absolutely pollution-free: sunlight. In the fairly long run there is need for energy that is inexhaustible and moderately clean: deuterium. In the short run there is need for energy that is readily usable and abundant: uranium. And at present there is need for energy that is cheap and convenient: coal and oil.<sup>211</sup>

#### D. Factors affecting supply of natural resources

91. The natural resources available to a country at a given time depend upon the country's ability to draw upon both domestic and foreign sources, the latter through international trade. The domestic supply of a

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lation are expected to be served. United Nations, *United Nations Symposium on the Development and Utilization of Geothermal Resources* . . . (1971), pp. 7-8.

<sup>208</sup> A number of authors have discussed the controlled release of energy from the two contrasting nuclear processes of fission and fusion. Fission involves the splitting of nuclei of heavy elements such as uranium. Fusion involves the combining of light nuclei such as those of deuterium. Among the relatively non-technical literature on the subject, see Libby, "Toward peaceful uses of the atom" (1959); Ubbelohde, *Man and Energy* . . . (1963), chap. 5; Hubbert, "Industrial energy resources" (1970), pp. 201-205; Jukes, "Nuclear energy and other recent development . . ." (1967); Hubbert, "Energy resources" (1969), pp. 219-233; Seaborg and Bloom, "Fast breeder reactors" (1970); Gough and Eastlund, "The prospects of fusion power" (1971); Tuck, "Outlook for controlled fusion power" (1971). Rose predicts that the fusion power will become available in appreciable quantity by the year 2000. Rose, "Controlled nuclear fusion . . ." (1971), p. 806.

<sup>209</sup> The application of nuclear energy to the large-scale transportation field, however, may prove to be economically feasible. A major project under study is a sea-level canal through the Panamanian Isthmus at an estimated cost of \$747 million. It was estimated in 1947 that the cost of such construction by conventional method would be \$5,132 million. Brooks and Krutilla, *Peaceful Use of Nuclear Explosives* . . . (1969), pp. 38-40.

<sup>210</sup> In the United States twenty-two nuclear plants are in operation, fifty-five are under construction and forty are on order. In 1971 about 1.4 per cent of total electrical energy in the United States came from nuclear fission. This figure was expected to reach 25 per cent by 1980 and about 50 per cent by the end of the century. Summers, "The conversion of energy" (1971), p. 157.

<sup>211</sup> Dyson, "Energy in the universe" (1971), p. 59. Hubbert, despite his belief in unlimited resources of energy, draws attention to the limits of growth. "It is as true of power plants or automobiles as it is of biological populations that the earth cannot sustain any physical growth for more than a few tens of successive doublings. Because of this impossibility the exponential rates of industrial and population growth that have prevailed during the past century and a half must soon ease." Hubbert, "The energy resources of the earth" (1971), p. 70.



given natural resource depends, in turn, upon its physical occurrence and the skill and technology with which it is worked and utilized. Thus, the supply of natural resources depends essentially upon three factors: physical occurrence of the resources (i.e., reserves), the level of technology and international trade.<sup>212</sup>

## 1. RESERVES

92. The concept of "reserves" is highly complex and gives rise to controversy, even among experts. Reserves are generally defined as deposits that can be mined, processed and marketed profitably under current economic and technological conditions. "Potential" ore denotes deposits that will become profitable at some future date, with progress in technology or higher prices, or a combination of the two.<sup>213</sup> Reserves can thus be defined as the assured volumes or tonnages that can be produced without financial loss under the existing technology and cost-price relationship. They are considered working inventory, as they represent only part of the total discovered. Thus, reserve estimates apply only at the time and under the prevailing conditions. As new discoveries occur, as costs or market prices fluctuate, or as technology is improved, so also the volume of reserves changes.

93. For these reasons, the amount of reserves can change very rapidly, as has been illustrated in a study by Schurr, which found that proven world reserves of crude oil more than tripled between 1950 and 1962. Schurr also found that four regions consisting of the Middle East, the United States, the Soviet Union, and the Caribbean area have about 90 per cent of the world's proven reserves. In the case of coal, China, Europe, the Soviet Union and the United States account for more than 90 per cent of the world's estimated recoverable resources. Most of Africa (except North Africa), most of South America and India do not have sizable amounts of either coal resources or proved oil reserves.<sup>214</sup> Thus, the distribution of these essential resources is markedly different from the distribution of world population.

## 2. STAGE OF TECHNOLOGY

94. Advancing technology,<sup>215</sup> while leading to a greater use of resources,<sup>216</sup> also adds to the supply.

<sup>212</sup> Slichter listed some of the means of increasing the supply of the world's metal resources: more efficient exploration techniques for discovering hidden deposits; improved technology in the mining and recovery of metals; higher prices; reduction of waste; substitution of other materials; more complete recovery of scrap metal; and perhaps reducing trade barriers in the interest of establishing a more efficient economy in the world as a whole. Slichter, "Some aspects, mainly geophysical, of mineral exploration" (1959), p. 374; and Hibbard, "Mineral resources: challenge or threat?" (1968).

<sup>213</sup> For definitions and classifications of reserves see, for example, Netschert and Landsberg, *The Future Supply of the Major Metals* . . . (1961), pp. 1-4; Thom, "The discovery, development and constructive use of world resources" (1964), particularly p. 498; Schurr *et al.*, *Energy in the American Economy, 1850-1975* . . . (1960), pp. 296-300; Lovejoy and Homan, *Methods of Estimating Reserves* . . . (1965), pp. 1-5.

<sup>214</sup> Schurr, "Energy" (1963), p. 120.

<sup>215</sup> Among many works discussing the effects of technological changes upon natural resources and man, see Mesthene, *Techno-*

The latter effect has been achieved by reducing the costs of exploitation, thus making possible the use of lower grade deposits or deposits which were not previously accessible because of cost considerations. It has also developed new processes which utilize materials formerly unusable, or which substitute for materials already in use.<sup>217</sup> Of much greater importance are the actual or prospective additions of formerly useless, or little used components of the natural environment to the list of useful natural resources. Granite, formerly used only for building, has become a potential fuel as a result of its uranium content, and air has become a natural resource of the chemical industry. Such materials as sea-water, clays, rocks and sands have also become resources to some degree.<sup>218</sup> In the past, improved technology has often succeeded in compensating for the depletion of higher grade ores. For example, as was pointed out in section A, the average grade of copper ore in the United States decreased during the first half of this century from 3 per cent to 1 per cent, yet the real price of copper in dollars of constant purchasing power at the end of the period was not very different from what it had been at the beginning.<sup>219</sup> Also, according to Demaree, recent developments in the use of electric furnaces and the conversion of ore to iron make it possible to cut the capital costs of steel making nearly in half.<sup>220</sup>

95. Advancing technology is said to often have a multiplier effect in expanding the volume of resources. United States reserves of uranium, for example, are currently estimated at some 250,000 short tons, which at the present

*logical Change* . . . (1970); and his "How technology will shape the future" (1968); Jarrett, ed., *Science and Resources* . . . (1959), particularly chaps. 3-5; Jantsch, *Technological Forecasting in Perspective* (1967), part 3; Hamilton, "Predicting technology's future" (1968); Bronwell, ed., *Science and Technology in the World of the Future* (1970), chaps. 1-8; Goldsmith, ed., *Technological Innovation and the Economy* (1970); Hoagland, "Technology, adaptation, and evolution" (1969); National Academy of Sciences, *The Impact of Science and Technology on Regional Economic Development* . . . (1969), chaps. 3, 5, 6; Gibbons and Johnson, "Relationship between science and technology" (1970).

<sup>216</sup> Chapman, "Interactions between man and his resources" (1969), p. 38. McDivitt puts it this way: "The technological aspect, then, moves us ever forward, on the one hand to greater use, on the other to greater supply, and considerations of cost and price in the long run tend to establish a reasonable balance between the two." McDivitt, *Minerals and Men* (1965), p. 143. See also the discussion in section E below.

<sup>217</sup> Landsberg, *Natural Resources for U.S. Growth* . . . (1964), p. 199. Landsberg saw considerable possibilities for increasing food and energy supplies through new technology, but was less optimistic that technological advances in other areas can significantly relieve population pressure. Landsberg, "Population growth and the potential of technology" (1968), p. 158. On the contributions of technology, see also Barnett and Morse, *Scarcity and Growth* . . . (1963), particularly pp. 7-13; McGann, "Technological progress and minerals" (1961); Nolan, "The inexhaustible resource of technology" (1958); Cooper, "Technology: its influence on the character of world trade and investment" (1967), pp. 15-21; Carlisle, "Nonfuel mineral resources" (1959), particularly pp. 353-355; and Schurr, "Energy" (1963).

<sup>218</sup> Barnett and Morse, *Scarcity and Growth* . . . (1963), pp. 7-10.

<sup>219</sup> Herfindahl, *Copper Costs and Prices* . . . (1959), pp. 202, 224. See also United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952), pp. 18-19, particularly charts 1 and 6; McGann, "Technological progress and minerals" (1961), pp. 74-80.

<sup>220</sup> Demaree, "Steel . . ." (1971), p. 76.

level of technology may have an energy equivalent slightly above the total United States energy consumption in 1960. With a more advanced technology, the present uranium reserves might be equivalent to between ten and 100 or more times the 1960 energy consumption.<sup>221</sup>

96. Technological improvement in fission and the enlargement of sources of fission materials could meet energy needs for several millennia, while the development of feasible and economical ways of using fusion materials would virtually remove limits imposed by shortages of energy.<sup>222</sup> Given adequate supplies of energy resulting from the advance in technology, exploitation of heavy-volume minerals which abound in the surface of the earth (e.g., iron, aluminium) would become economically feasible,<sup>223</sup> and the cost of desalination and transportation of sea-water would be significantly reduced.<sup>224</sup>

97. The rate and direction of technological innovations is said to be partly accidental—the result of individual and unco-ordinated inventive efforts—but it is increasingly becoming dependent upon the extent and the nature of research and development carried out by the public sector or private sector.<sup>225</sup> The role of government is particularly important because of the effects of externalities and uncertainty involved in research and development expenditures.<sup>226</sup>

<sup>221</sup> Landsberg, *Natural Resources for U.S. Growth* ... (1964), p. 192; see also Hibbard, "Mineral resources: challenge or threat?" (1968), p. 145.

<sup>222</sup> According to McGann, while world reserves of fossil fuels might be exhausted in two centuries if world gross national product grows between 2 and 3 per cent annually, developments in fission material may extend the availability of mineral fuels another 1,000 years. McGann, "Technological progress and minerals" (1961), p. 74. On developments and prospects for nuclear energy see, for example, Seaborg and Bloom, "Fast breeder reactors" (1970); Artsimovich, "Controlled nuclear fusion ..." (1970); Hubbert, "Energy resources" (1969), pp. 218-233; Gough and Eastlund, "The prospects of fusion power" (1971); and Hammond, "Breeder reactors ..." (1971).

<sup>223</sup> McGann, "Technological progress and minerals" (1961); Landsberg, "Population growth and the potential of technology" (1968). On fossil fuel reserves, continuous sources of power and nuclear energy, see Hubbert, *Energy Resources* ... (1962), pp. 32-123.

<sup>224</sup> See communications on various aspects of desalination, submitted to the United Nations *Proceedings of the Interregional Seminar on the Economic Application* ... (1967).

<sup>225</sup> For a discussion of the definition, measurement, and other characteristics of research and development, see, for example, Organisation for Economic Co-operation and Development, *The Overall Level and Structure* ... (1967); United States, National Science Foundation, *National Patterns of R&D Resources* ... (1969), pp. 1-2.

<sup>226</sup> Mansfield argues that the market, if left to its own devices, would allocate too few resources to research and development. The risks and uncertainties involved to the individual investor in research and development are greater than the risks to society, since the results of the investment may be useful to someone other than the investor. For such reasons as these, a large proportion of expenditures on research and development stem from government agencies, private foundations and universities. The relevant question is whether this support that supplements that provided by the market mechanism is sufficient, too large or too small, and whether it is properly allocated. Mansfield, "Contribution of R&D to economic growth ..." (1972), p. 480. See also Arrow, "Economic welfare and the allocation of resources of invention" (1962); Nelson, "The simple economics of basic scientific research" (1959), pp. 297-306; and for a generalization see Debreu, *Theory of*

TABLE XI.12. RATIO OF RESEARCH AND DEVELOPMENT EXPENDITURE TO GROSS NATIONAL PRODUCT FOR SELECTED COUNTRIES, RECENT YEARS

Country	Year	Research and development expenditure as percentage of gross national product
USSR .....	1967	3.1
United States .....	1968	2.9
United Kingdom .....	1967	2.7
Germany, Federal Republic of .....	1967	2.7
France .....	1966	2.4
Canada .....	1966	1.4
Japan .....	1966	1.3
Norway .....	1967	1.2
Italy .....	1968	0.9

SOURCE: United States, National Science Foundation, *National Patterns of R&D Resources* ... (1969), p. 4.

98. Table XI.12 shows the ratio of research and development expenditure to gross national product in nine industrialized countries.<sup>227</sup> It is seen that the ratio ranges from 3.1 for the USSR to 0.9 for Italy.<sup>228</sup> Data for the United States show an increasing trend in research and development expenditure in relation to gross national product during recent decades; whereas this ratio was only 0.2 per cent in 1921,<sup>229</sup> it had risen to 2.9 per cent in 1968 (table XI.12). In most advanced industrialized countries, governments' expenditures on research and development are focussed on defence and space technology,<sup>230</sup> and there has been an awareness of underinvestment in some particular types of research and development in the civilian sectors.<sup>231</sup>

99. In assessing the effects of technological advances on the supply of resources, attention must also be given

*Value* ... (1959), chap. 7; Organisation for Economic Co-operation and Development, *The Overall Level and Structure* ... (1967), pp. 25-39; and Mansfield, *The Economics of Technological Change* (1968), chap. 6.

<sup>227</sup> Owing to the differences in definitions among countries, the ratio R&D/GNP may not be strictly comparable. United States, National Science Foundation, *National Patterns of R&D Resources* ... (1969), p. 4.

<sup>228</sup> For information on research and development expenditures in OECD countries, see Organisation for Economic Co-operation and Development, *Gaps in Technology* ... (1970), pp. 113-134.

<sup>229</sup> Nelson, Peck and Kalachek, *Technology, Economic Growth and Public Policy* (1967), p. 46.

<sup>230</sup> In the early 1960s in the United States, for example, over 55 per cent of the nations's research and development expenditures were for these purposes. Mansfield, "Contribution of R&D to economic growth ..." (1972), p. 480. In most developed countries, there have been considerable benefits to civilian technology—the "spillover", "spin-off", or "fall-out"—from military and space research and development such as the electronic computer, jet engine, atomic energy etc. *Ibid.*

<sup>231</sup> For example, in the United States, a presidential commission reported in 1966 that too little was being spent by the Government on research and development in the fields of urban transportation, pollution control and housing. Mansfield, "Contribution of R&D to economic growth ..." (1972), p. 481; United States, National Commission on Technology, Automation, and Economic Progress, *Technology and the American Economy*, vol. 1 (1966), p. 112; Nelson, Peck and Kalachek, *Technology, Economic Growth and Public Policy* (1967), p. 177; Mansfield, *The Economics of Technological Change* (1968), pp. 228-232.

to the possible adverse side effects of modern technology on the environment. The discovery of means for extracting energy from nature has led to increasing atmospheric pollution, and modern industrial development has been accompanied by significant increases in the pollution of both air and water which have caused a deterioration of man's resources and have had harmful consequences for human beings and other species. While coal burning has been responsible for large amounts of pollutants, a more recent energy source—the internal combustion engine—has been found capable of polluting the atmosphere with carbon monoxide much faster than fire.<sup>232</sup> Modern physics and chemistry have produced numerous pollutants,<sup>233</sup> including radioactive elements, detergents and pesticides, as well as industrial wastes.<sup>234</sup>

100. Efforts to reduce environmental pollution through stricter controls on industry have met with considerable success in particular areas, such as in the southern part of England (United Kingdom) since the implementation of the Clean Air Act of 1956.<sup>235</sup> Some scientists like Medawar have emphasized that the despoliation sometimes produced by technology is not an irremediable process, but rather a problem for which technology has found and will continue to find solutions.<sup>236</sup>

### 3. INTERNATIONAL TRADE

101. Since no country is nowadays self-sufficient in all resources, nations have come to rely on international trade to meet the growing demand for resources of their expanding industries. It has been seen in section C of this chapter that a large proportion of the world's mineral production is supplied by the developing countries (table XI.4), although an estimated 90 per cent of mineral consumption takes place in the industrialized countries. Thus, much of the production of minerals in the less developed countries is for export.<sup>237</sup> The United States, which formerly approached self-sufficiency in mineral resources, has become a fairly large net importer of such items as copper, lead, zinc, iron ore and lumber, as well as manganese, nickel, chromium and diamonds.<sup>238</sup>

102. So far as sources of energy are concerned, the industrialized regions supply most of their own needs for

solid fuels, gas and electricity,<sup>239</sup> but they are greatly dependent on trade with the developing regions for their supplies of oil. Table XI.13 shows that in 1969 net imports of crude petroleum accounted for over 90 per cent of supplies in Western Europe and Oceania, 66 per cent in Eastern Europe excluding the USSR, and about 12 per cent in North America. Only the Soviet Union, among the major industrialized regions, was a net exporter of oil.

TABLE XI.13. NET IMPORTS AND TOTAL SUPPLY OF CRUDE PETROLEUM, INDUSTRIALIZED REGIONS, 1969

Region	Supply (million metric tons)	Net imports (million metric tons)	Net imports as a percentage of supply
North America .....	610.18	70.76	11.6
Western Europe .....	547.67	527.62	96.3
Eastern Europe .....	52.57	34.68	66.0
USSR .....	265.85	-62.45	— <sup>a</sup>
Oceania .....	25.10	23.09	92.0

SOURCE: United Nations, *World Energy Supplies* ... (1971), table 8.

<sup>a</sup> Net exports amounting to 23.5 per cent of supplies.

103. Countries can import the materials they lack only to the extent of their ability to obtain foreign exchange, generally through their export proceeds. Developed countries usually rely mainly upon the sale of services and manufactured exports while developing countries rely often upon exports of agricultural products, raw materials and small manufactured goods.<sup>240</sup> Exploitation of domestic natural resources thus plays an even more strategic role in the economic development of the less developed countries than in the support of industrialized economies. It is the possibilities of exploiting natural resources for the export sector that has attracted capital, skilled manpower and advanced technology from the industrialized to the developing countries.<sup>241</sup>

104. The question has been raised as to whether specialization in the export of domestic resource products would achieve the adequate foreign exchange needed for imports and would thus enable the developing countries to increase their supply of other needed resources. In general, when a less developed country exports resource products, it may reap a large amount of foreign exchange from trade. At the same time, however, it not only loses the resources which are exported, but it is exposed to large shifts in the terms of trade, instability of real income, and possibly

<sup>232</sup> On the relative importance of different sources of carbon monoxide as an air pollutant, see, for example, Jaffe, "The global balance of carbon monoxide" (1970).

<sup>233</sup> Herber, *Our Synthetic Environment* (1962), p. 40; Epstein, "Control of chemical pollutants" (1970); United Kingdom, Royal Commission on Environmental Pollution, *Second Report* ... (1972), pp. 4-5.

<sup>234</sup> See, for example, Prat and Giraud, *La pollution des eaux par les détergents* (1964); Carson, *The Silent Spring* (1962); Graham, *Since Silent Spring* (1970).

<sup>235</sup> United Kingdom, Royal Commission on Environmental Pollution, *First Report* (1971), pp. 11-12.

<sup>236</sup> Medawar, "On 'the effecting of all things possible'" (1969), p. 8.

<sup>237</sup> Sawaf, "Minerals and living standards ..." (1967), pp. 343-344.

<sup>238</sup> Fisher and Potter, "Natural resource adequacy ..." (1969), p. 113. The authors note that imports of iron ore made up over 29 per cent of domestic consumption during 1965-1967. See also United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 2 (1952); Jones, "Mineral resources" (1957), particularly p. 47.

<sup>239</sup> United Nations, *World Energy Supplies* ... (1971), tables 3, 12 and 13.

<sup>240</sup> For trade patterns among industrialized and developing countries, see, for example, United Nations Conference on Trade and Development, *Review of International Trade and Development*, 1970 ... (1970), chaps. 1 and 2; United Nations, *World Economic Survey*, 1968 (1970), part 2, chap. 2; ———, Economic Commission for Asia and the Far East, "Trends and patterns of trade of the developing countries in the ECAFE region, 1950-1961" (1964); Maizels, *Industrial Growth and World Trade* ... (1963), particularly pp. 66-67.

<sup>241</sup> Baldwin, "Export technology and development from a subsistence level" (1963), particularly pp. 80-84. See also Neumark, *Foreign Trade and Economic Development in Africa* ... (1964).

even action by importing countries to exploit their monopsonic situation.<sup>242</sup>

### E. Factors influencing demand for natural resources

105. The demand for natural resources is generally an indirect or derived demand which varies according to the extent that resources are used in the production of final products.<sup>243</sup> The major categories of natural resources, as described previously, differ substantially in their contribution to the economic activities of a country. In most countries, products of land greatly exceed in value those of all other raw materials and this is true even in economically advanced countries. In the United States, for example, in 1954 edible and inedible agricultural products made up about 84 per cent and minerals about 16 per cent of the total value of all natural resource products. In 1899, the corresponding percentages were 93 and 7.<sup>244</sup> In some economically less developed countries, minerals are even less important relatively than they were in the United States at the turn of the century, and agricultural products relatively more important. However, certain outstanding exceptions, such as the Libyan Arab Republic and Kuwait, deserve mention; in these countries the value of petroleum resources far exceeds that of agricultural products.

106. The long-term demand for natural resources depends on a number of factors, the principal of which are: population growth, average level of income, state of science and technology, price-cost structure and institutional patterns.

<sup>242</sup> Kindleberger, "International trade and investment . . ." (1961), particularly p. 186; Swerling, "Some interrelationships between agricultural trade and economic development" (1961), pp. 379-386. A controversy developed early in the 1950s over the contribution of international trade to the development of agriculture countries. Prebisch and Myrdal, among others, argued that the accrual of the gains from trade is biased in favour of the advanced industrialized countries and that, contrary to what would be expected from classical trade doctrine, free trade has in reality accentuated international inequalities. In contrast, Viner, Clark, Lewis, Haberler and others supported the traditional position that foreign trade can contribute substantially to the development of primary exporting countries, and that the gains from international specialization merge with the gains from growth. Hicks and Nurkse appear to have adopted a more neutral position. See United Nations, Economic Commission for Latin America, *The Economic Development of Latin America and its Principal Problems* (1950); Prebisch, "The economic development of Latin America and its principal problems" (1962), pp. 4-6; United Nations, *World Economic Survey, 1958* (1959), chap. 6; Viner, *International Trade and Economic Development* (1952); Clark, *The Economics of 1960* (1942), and his "Halfway to 1960" (1952); Lewis, *Economic Survey, 1919-1939* (1949), and his "World production, prices and trade . . ." (1952); Haberler, "Terms of trade and economic development" (1961); Hicks, *Essays in World Economics* (1959), pp. 180-188; and Nurkse, "International trade theory and development policy" (1961), pp. 234-245. See also MacBean, *Export Instability and Economic Development* (1966), parts 1 and 4, and his "Foreign trade aspects of development planning" (1969); and Meier, *The International Economics of Developments . . .* (1968), chap. 3.

<sup>243</sup> For a statement in terms of "elasticities", see Kindleberger, "International trade and investment . . ." (1961), pp. 154-156.

<sup>244</sup> University of Maryland, Bureau of Business and Economic Research, "Some relationships between U.S. consumption and natural resources, 1899, 1947, 1954" (1958), p. 6.

## 1. GROWTH OF POPULATION

107. The demand for natural resources depends *inter alia* on the size and distribution of population. A growing population means a greater demand for resources of all kinds, for food, water, air, mineral resources, construction materials, and space for a variety of purposes.<sup>245</sup> On the other hand, the distribution of the population as between urban and rural areas, and agricultural and non-agricultural economic activities, influences the nature of demand for resources, since a highly urban, non-agricultural population requires, *inter alia*, less land but more industrial raw materials and supplies of energy *per capita* than an agricultural population. World population growth has recently shown a rapid acceleration and there has been an increasing concentration of population in urban areas, particularly in large metropolitan centres. Each addition to the population means an additional increment of basic resource necessities, such as food, water, shelter and space. But, in addition, man is said to be in the midst of a "revolution of rising expectations", the nature of his increasing demands depending on his tastes and preferences and his ability to satisfy them.<sup>246</sup> The result has been a universal commitment to the concept of economic growth and to an increase in *per capita* production and consumption.<sup>247</sup>

108. As discussed previously, a considerable number of authors have expressed the belief that the increasing use of natural resources as a result of population growth has a tendency to lower the future standard of living, even in areas generously endowed by nature.<sup>248</sup> Some of these fears derive from the Malthusian notion that land and other resources are scarce and tend to be pressed upon by population growth; others are based on the Ricardian concept that resources are used in order of declining quality, with the result that diminishing returns accompany population growth. Various writers have pointed out that experience in the advanced countries indicates fallacies in these arguments. In these countries, birth rates have fallen, the capital stock has increased faster than population numbers, and natural resources, far from being fixed in volume, have increased as a result of technological advances. Looking ahead to the time when all nations will have made advances in economic development, Barnett saw no reason for believing that diminishing returns would set in as a result of population growth, or that there would be a shortage of natural resources for production of extractive goods.<sup>249</sup>

109. The past experience of the developed countries, as reflected in their statistical data, shows that it has been possible to expand resource materials at a faster natural

<sup>245</sup> Keyfitz, "United States and world populations" (1969), p. 58.

<sup>246</sup> Chapman, "Interactions between man and his resources" (1969), particularly p. 32.

<sup>247</sup> On man's commitment to economic growth as an "irreversible and irrepressible need" see Jaguaribe, "World order, rationality, and socio-economic development" (1966), p. 612. Boulding, however, argues for the necessity in the future of a type of economy based not on maximization of production and consumption, but on improving the quality of environment and life. Boulding, "The economics of the coming spaceship earth" (1966).

<sup>248</sup> See section B.

<sup>249</sup> Barnett, "Population problems—myths and realities" (1971).

rate than population has grown. In the United States, for example, during 1870-1957, while the population increased fourfold, mining of bituminous coal increased eighteenfold, extraction of iron ore increased twenty-sixfold, extraction of copper ores seventy-sevenfold and output of crude petroleum increased four hundred ninetyfold.<sup>250</sup> Data on *per capita* consumption of resource products show a steadily upward trend, increases being most rapid during the early part of the period. The average *per capita* rate of growth of mineral consumption, for example, was about 4.5 per cent per year during the last part of the nineteenth century, whereas it fell to between 1.5 and 2 per cent thereafter.<sup>251</sup>

110. Projections of future demand for natural resources are clouded with uncertainties concerning the trends of population growth, future gains in technology, and other conditions such as the flow of world trade.<sup>252</sup> Looking ahead to the end of the century and assuming a 50 per cent increase in population for the United States and about a threefold increase in gross national product, Fisher calculated rough estimates of resource demand. His projections show the following increases over 1970 levels: total energy requirements, one and a half to two times; electric power, six times or so; iron ore, more than double; aluminium, five times or more; copper, double or more; timber, more than double; fresh water, withdrawn and not returned, one and a half times; wheat, one-quarter to one-third; cotton, one and a half times, or more.<sup>253</sup> According to estimates of the Commission on Population Growth and the American Future, the demand for minerals in the year 2000 in the United States would be 9 per cent less if families averaged two children rather than three.<sup>254</sup>

111. For the world as a whole, projections by Fisher and Potter suggest that energy consumption in the year 2000 may be four to six times the 1965 level, iron ore consumption perhaps four times, and copper three times. Since during the same period, world population was projected to increase at only slightly more than 100 per cent,<sup>255</sup> it is clear that factors other than population accounted for the major part of the expected increased demand for the resource products mentioned.

<sup>250</sup> Potter and Christy, *Trends in Natural Resource Commodities* ... (1962), p. 1.

<sup>251</sup> Fisher and Potter, "Natural resource adequacy ..." (1969), pp. 110-111; Potter and Christy, *Trends in Natural Resource Commodities* ... (1962), pp. 8-9.

<sup>252</sup> Landsberg, *Natural Resources for U.S. Growth* ... (1964), pp. 6-7.

<sup>253</sup> Fisher, "Impact of population on resources and the environment" (1971), p. 393. See also projections in Landsberg, *Natural Resources for U.S. Growth* ... (1964), chap. 3, and Landsberg, Fischman, and Fisher, *Resources in America's Future* ... (1963), particularly pp. 16-41.

<sup>254</sup> United States President. Commission on Population Growth and the American Future, *Population and the American Future* ... (1972), p. 58.

<sup>255</sup> Fisher and Potter, "Natural resource adequacy ..." (1969), pp. 126-127 and table 2. See also their *World Prospects for Natural Resources* ... (1964), chap. 4.

112. The rate of economic growth, as reflected in *per capita* income, is among the major determinants of the demand for resources. With reference to the United States, it has been observed that regardless of future population growth, expected increases in output are likely to result in tremendous increases in demand for resources.<sup>256</sup>

113. It is known that demand for some resource products increases faster proportionately than the average income of the population while that for others increases relatively slower.<sup>257</sup> Where income is low, it has generally been found that there is a tendency to spend a large part of any increment in income on primary products. In the long run, however, as average income rises, increasing proportions of further gains in income are spent on services and other products. The historical experience of industrialized countries of Western Europe and North America shows that, with a rise in real incomes there is a relatively rapid rise in demand for capital goods, chemicals and durable consumer goods, and a relatively slow expansion in the demand for food, beverages, tobacco, textiles and clothing.<sup>258</sup> International comparisons indicate that income elasticities of demand for food are considerably higher in developing countries than in the more industrialized countries.<sup>259</sup> Owing both to fast population growth and high income elasticities of demand, food consumption demand in developing countries is likely to increase rapidly in the coming decades.<sup>260</sup>

114. While both population and economic growth are universally acknowledged to be influential factors in determining the demand for natural resources, there are some differences of opinion as to their relative importance. According to the findings of the Commission on Population Growth and the American Future, in the year 2000,

<sup>256</sup> United States President. Commission on Population Growth and the American Future, *Population and the American Future* ... (1972), p. 57.

<sup>257</sup> This is conveniently expressed in terms of income-elasticity of demand, which can be computed for various resources and goods in a country. The income elasticity of demand shows the responsiveness of a consumer's purchases of a particular product to a change in his income. See, for example, Kindleberger, "International trade and investment ..." (1961), particularly pp. 154-155.

<sup>258</sup> Maizels, *Industrial Growth and World Trade* ... (1963), p. 41.

<sup>259</sup> Income elasticities in the range of 0.5 to 0.8 have been found in some more developed countries. See, for example, Maizels, *Industrial Growth and World Trade* ... (1963), p. 42; Houthakker, "An international comparison of household expenditure patterns ..." (1957); and Dewhurst *et al.*, *Europe's Needs and Resources* ... (1961), p. 969. Clark and Haswell considered that the income elasticity ratio for food, which was sometimes thought to approach 1.0 in very poor countries, was actually below this level. They noted claims of a ratio of 0.9 for India, but believed this figure subject to an upward bias. Clark and Haswell, *The Economics of Subsistence Agriculture* (1970), pp. 172, 177. See also the much lower values estimated for both developing and developed countries in Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), p. 15.

<sup>260</sup> Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), p. 15. See also chapter XII, sections B and D.

if gross national product *per capita* were 1 per cent less than projected, the consumption of most minerals would be 0.7 to 1.0 per cent less; however, if population were 1 per cent less than projected, minerals consumption would be 0.5 to 0.7 per cent less. The effect of slower population growth, while substantial, is smaller than might be expected, owing to the fact that a lower rate of population growth implies a different age structure with a more favourable ratio of labour force to total population, and hence higher output *per capita*.<sup>261</sup> Spengler, however, has argued in more general terms that the demand for total resource services stemming from population growth progresses at about the same rate as population, whereas the elasticity of demand associated with growth of *per capita* income tends to fall.<sup>262</sup>

### 3. STAGE OF TECHNOLOGY

115. While technological achievement is usually given credit for widening the supply of resources (see section D above), it may also lead to a greater demand for resources. Chapman has pointed out that the enormous requirements of some technologies in themselves contribute greatly to the depletion of resources and the production of waste.<sup>263</sup>

116. Some technological developments have the effect of increasing the demand for particular resources, while others decrease such demand. For example, the advent of the automobile and the consequent development of highway systems, suburban living arrangements and shopping centres have tended to increase the demand for land; on the other hand, many technological advances in agriculture have decreased the demand for land.<sup>264</sup> Thus, if corn yields had not increased after the 1940s, it would have taken nearly 100 million acres to produce the crop that was actually grown on 57 million acres in 1962 in the United States.<sup>265</sup>

117. The advances that have been made in the efficiency of resource use suggest how resource demand may be influenced in the future by further technological innovations. For example, the amount of fuel required for the production of one kilowatt-hour of electricity declined from 6.85 pounds of coal or coal equivalent in 1900 to only 0.95 pounds in 1955.<sup>266</sup> The effect that changes in technology can have on demand for fuels is illustrated in the following calculations prepared by Landsberg for the year 2000:<sup>267</sup>

<sup>261</sup> United States President. Commission on Population Growth and the American Future, *Population and the American Future* ... (1972), p. 58.

<sup>262</sup> Spengler, "Summary, synthesis and interpretation" (1961), p. 301.

<sup>263</sup> Chapman, "Interactions between man and his resources" (1969), p. 38.

<sup>264</sup> White, *Social and Economic Aspects of Natural Resources* (1962), p. 9.

<sup>265</sup> Landsberg, *Natural Resources for U.S. Growth* ... (1964), p. 25.

<sup>266</sup> White, *Social and Economic Aspects of Natural Resources* (1962), p. 10.

<sup>267</sup> Landsberg, *Natural Resources for U.S. Growth* ... (1964), p. 28.

Projected fuel requirements  
in the United States  
in the year 2000 assuming

	Continued gains in efficiency in the production of electricity	No gains beyond 1960 in efficiency in the production of electricity
Natural gas (thousand million cubic feet)	3,480	4,800
Coal (million short tons)....	455	640
Oil (million barrels) .....	135	185

Thus, without continued gains in the efficiency of producing electricity, demand for natural gas, coal and oil might be around 40 per cent greater by the end of the century than could be expected with continued gains in efficiency. In view of the great influence that technological change may exert upon the demand for resources, Landsberg noted that inability to make allowances statistically for possible radical innovations in methods of production constitutes the most serious weakness of resource requirement appraisals.<sup>268</sup>

### 4. PRICE-COST STRUCTURE

118. Price-cost changes in raw materials are reflected throughout the economic structure, from producer at each stage of the production process and ultimately to the consumer. Hibbard has said that "raw materials are powerful economic multipliers". However, the price mechanism has not always proved to be adequate to spur the necessary investments.<sup>269</sup> Changes in price structure affect the demand for specific resources within such major resource categories as food, fuel and other raw materials, although they have little effect on the volume of aggregate demand for each major category. If the relative price of one product rises, other conditions remaining equal, consumers are likely to substitute another product to some extent in their purchases, with the result that the demand for natural resources used in producing this product tends to fall. Similarly, a rise in the cost of a natural resource is likely to cause it to be partially replaced in the production process by another natural resource or by labour or man-made capital. In the United States, for example, as lead became a relatively higher priced commodity, plastics began to supplant lead.<sup>270</sup> A large decline in the price of aluminium—a close substitute for copper—was undoubtedly an important factor in checking the growth rate of the demand for copper after the Second World War.<sup>271</sup>

119. Competition among resources resulting from substantial, persistent changes in the price structure are most important in the case of resources such as fuels and metals, which can relatively easily be substituted for one

<sup>268</sup> Landsberg, *Natural Resources for U.S. Growth* ... (1964), pp. 27-28.

<sup>269</sup> For example, substantial capital and a number of years are required to complete a new mineral-producing facility. Hibbard, "Mineral resources: challenge or threat?" (1968), p. 144.

<sup>270</sup> United States, President's Materials Policy Commission, *Resources for Freedom*, vol. 1 (1952), p. 10.

<sup>271</sup> Herfindahl, *Copper Costs and Prices* ... (1959), pp. 226-227.



another.<sup>272</sup> As technology changes, so do costs and competitive relationships. Competition among fuels, in particular, is said to be a complex of economic, technology and political forces.<sup>273</sup>

## 5. INSTITUTIONAL PATTERNS

120. Some writers have dealt with the attitudes of different peoples toward their natural environment, and the implications of such attitudes for the exploitation of natural resources. Spoehr has noted that in many non-western, pre-industrial societies, man is regarded as part of a natural environment over which he has little control. In contrast, western concepts tend to regard nature as something apart from man that should be developed as fully as possible through the application of technology to meet man's needs and wants.<sup>274</sup>

121. Within the over-all pattern of resource consumption in a given society, there is a diversity of tastes and preferences among individual consumers, once the levels of income and price structure have been specified. In industrially developed countries, it is generally possible to meet one's resource needs among a number of alternatives, but often the consumer simply "prefers" one over the other, with the result of influencing the demand for that particular resource.<sup>275</sup> Allowances thus have to be made for the international diffusion of tastes and preferences, which can produce changes in the composition of a country's demand for natural resources as well as in the level of world demand for a particular resource.

122. Changes associated with industrialization have in some countries resulted in the production of a multiplicity of consumer goods and led to a situation where such items as telephones, motor vehicles, airplanes, and newsprint, which formerly had been luxuries, have become necessities. Such consumption patterns, of course, greatly affect the demand for resource products.<sup>276</sup>

<sup>272</sup> There is said to be increasing competition for steel from aluminium, plastics and pre-stressed concrete. If and when cheap electric power becomes available, the cost of aluminium may drop relative to that of steel, giving the former a competitive advantage. United Nations, Economic Commission for Europe, *Long-Term Trends and Problems of the European Steel Industry* (1959), p. 138. On interfuel competition, see United States, National Fuels and Energy Study Group, *Report on an Assessment of Available Information on Energy ...* (1962), pp. 274-294.

<sup>273</sup> United States, National Fuels and Energy Study Group, *Report on an Assessment of Available Information on Energy ...* (1962), p. 274.

<sup>274</sup> Spoehr, "Cultural differences in the interpretation of natural resources" (1956), particularly pp. 98-101.

<sup>275</sup> In the United States, for example, "despite the fact that natural gas and heating oil are more expensive than coal in some areas, they are preferred by householders to such an extent that they have taken over a large segment of the space-heating market. Gas is taking away markets from oil for the same reason—simple preference." See United States, National Fuels and Energy Study Group, *Report on an Assessment of Available Information on Energy ...* (1962), p. 284.

<sup>276</sup> Thus in the United States some 1,300 pounds of new steel are produced each year per person. Brown, "Population, food and energy transition" (1969), pp. 181-182.

## F. Relation of natural resources and population to development

123. The size and characteristics of a country's population in relation to its resources are believed to exert a substantial influence on the country's prospects for development. Resources, in general, set certain limits to what may be accomplished in combination with manpower, capital and the state of technology. While the magnitude of resources is hardly ever known precisely at any given point in time, the unequal distribution of resources with respect to area and population is well known. Because of the inequality of world resource distribution, the prospects for economic and social development are likely to be brighter in areas that are relatively well-endowed with resources than in others which are not.

124. Some authors attach greater importance than others, however, to the possession of natural resources as a prerequisite for development. Kuznets, for example, regards physical resources as relatively unimportant, stating that the factors that induce formation of reproducible capital needed for economic growth are not likely to be inhibited by a lack of natural resources.<sup>277</sup> Lewis, however, states that since capital is not a perfect substitute for natural resources, such as land, water and minerals, a shortage of natural resources can be an obstacle to economic development.<sup>278</sup> Most writers would no doubt agree that possession of a variety of natural resources is advantageous, though not decisive for economic development.<sup>279</sup>

125. Hartshorne has suggested a twofold classification of factors which are necessary for economic development: (a) material factors, which consist of raw materials, transport facilities, other capital goods (machine and plant equipment) and power sources; and (b) human factors, including entrepreneurship, money capital, labour and markets. He noted that a lack of material factors does not in itself preclude economic growth, since all of these factors are available elsewhere and can be imported, provided the country can produce sufficient surpluses

<sup>277</sup> Kuznets, "Toward a theory of economic growth" (1955), p. 36. He also observed that scarcity of natural resources in underdeveloped countries is primarily a function of their underdevelopment, and the latter is not a function of scarce natural resources. Kuznets, "Population and economic growth" (1967), p. 174.

<sup>278</sup> Lewis, "Employment policy in an underdeveloped area" (1958), p. 46.

<sup>279</sup> See, for example, Mountjoy, *Industrialization and Underdeveloped Countries* (1966), p. 25. The author noted that certain countries well-endowed with resources, such as Brazil, are not very highly developed, while other countries such as Denmark and Switzerland, with limited resources, are highly advanced. Abramovitz observed, however, that among countries having similar institutions, culture and technology, the presence of resources seems to have an influence on income levels. Thus, such countries as Australia, Canada, New Zealand and the United States, which are richer in resources, have generally higher *per capita* incomes than most of the countries of Northern and Western Europe. Abramovitz, "Comment" (1961), p. 14. Attention has sometimes been called to the geographical disadvantages for development of certain countries, resulting from their climate, soils or topography. With respect to the factor of climate in particular see Myrdal, *Asian Drama ...*, vol. 1 (1968), pp. 678-681; Lee, *Climate and Economic Development in the Tropics* (1957).



of other products needed elsewhere.<sup>280</sup> Thus, it is the accessibility of resources rather than their presence in a country that counts most for economic development.<sup>281</sup> The non-material, or human factors, which every country has a potential for developing within its own population, are considered to be more essential for economic growth. To develop this potential through education and training is one of the major challenges that developing countries face.<sup>282</sup>

126. It has been observed that during the early stages of industrial growth of the presently developed countries, their rate of economic growth was often affected by changes in the available supply of resources. Wrigley has pointed out that the removal of constraints against raw materials supply was closely connected with the rapid growth of England's economy toward the end of the eighteenth century. It became possible to substitute inorganic raw materials such as coal—the supply of which could be more rapidly expanded—for organic materials, such as wood.<sup>283</sup> In the United States the availability of rich agricultural and mineral resources facilitated

<sup>280</sup> Hartshorne, "Geography and economic growth" (1960), p. 18; see also his "The role of the state in economic growth . . ." (1959), pp. 296-321.

<sup>281</sup> Herfindahl, *Natural Resource Information for Economic Development* (1969), p. 4. Myrdal, however, warned that developing countries will encounter difficulties in relying on imports of raw materials at the beginning of their development. Myrdal, *Asian Drama . . .*, vol. 1 (1968), p. 677.

<sup>282</sup> Hartshorne, "Geography and economic growth" (1960), p. 19. Among many articles dealing with education and manpower training requirements in developing countries see, for example, Harbison, "Human resources development planning in modernising economies" (1962); Bowman and Anderson, "The role of education in development" (1962); United Nations Economic Commission for Africa and UNESCO *Conference of African States on the Development of Education in Africa . . .* (1961); Schultz, "Education and economic growth" (1961).

<sup>283</sup> Wrigley, "The supply of raw materials . . ." (1962), particularly pp. 1-6.

internal development and attracted capital and labour from abroad.<sup>284</sup>

127. The outlook for development in the newly emerging countries depends on a variety of factors, among them the limits that scarce resources may impose on productivity gains, the rate of technological advancement and the rate of population growth. Spengler noted several favourable recent trends which have given rise to some optimism: (a) investment in scientific discovery, applied technology and education has been found to account for the major increase in output in advanced countries; (b) input of land and natural resources per unit of output has greatly decreased in advanced countries; and (c) technological change and substitution have greatly augmented stocks of fuels, minerals and related resources. In Spengler's opinion, however, the favourable experience of advanced countries may be given too much weight in assessing prospects for developing countries and insufficient attention given to the difficulties encountered by developing countries and the depressing effects of population growth.<sup>285</sup> Kuznets observed that the relative scarcity of natural resources in some underdeveloped countries might be so acute that the pressures of further population growth could not be borne even by advanced technology.<sup>286</sup> According to White, the developing countries may reach the end of the century with continued high birth rates and a low level of *per capita* consumption that may keep them on the verge of subsistence. But, on the other hand, through progress in family limitation and the beginning of technological take-off, they may be able to achieve self-sustained economies.<sup>287</sup>

<sup>284</sup> See, for example, Youngson, "The opening up of new territories" (1965), particularly pp. 144-181.

<sup>285</sup> Spengler, "The economist and the population question" (1966), p. 9.

<sup>286</sup> Kuznets, "Population and economic growth" (1967), p. 173.

<sup>287</sup> White, *Social and Economic Aspects of Natural Resources . . .* (1962), p. 33.

## Chapter XII

### POPULATION AND FOOD

1. Food, clothing and shelter are among man's basic needs, but even more than the others, food is essential for day-to-day survival. While the scarcity of clothing and shelter is likely to cause misery, the scarcity of food often has more severe consequences, manifesting itself in undernutrition and malnutrition and, in cases of acute shortages, in sickness, starvation and premature death. The satisfaction of the minimum requirements for food and nutrition are thus at the root of the survival and well-being of the individual and the society. The struggle to secure enough food to assure his daily subsistence, and often his failure to do so, have dominated man's destiny for a long time. The food problem, arising from the effect of the food requirements of a rapidly growing population, therefore, has been and continues to be a source of widespread preoccupation.

2. It is generally recognized that the actual and potential sources of food supply, even though as yet not fully known, are not unlimited and that ultimately population will be checked by the limits of food supplies. At the same time it is generally agreed that the actual population of the world and its different parts is in varying degree still below these limits. Although this essentially long-term concept of the carrying capacity of the earth has also influenced thinking on the population and food problem in a shorter time perspective, it is not a major issue at the present time. The immediate problem in the relation between population and food is whether the actual production of food, as opposed to the potential, can satisfy the requirements and effective demand for it created by a rapidly growing population. Especially in the developing countries, where population growth has accelerated to unprecedented levels and nutrition and food consumption are often deficient, food requirements and demand have grown at very high rates. Although the growth of population in these countries adds to their labour force, there is no assurance that these rapidly increasing requirements and demand will be met by higher production or supply. Such a growth in production would only be possible with considerable investments in land, material equipment and labour, technological progress and institutional changes, conditions which are often difficult to meet in these countries. A rapidly increasing labour force under the prevailing circumstances may lead to growing underemployment, an increasing pressure on other resources, stagnating productivity and a less than proportionate increase in agricultural and food production. The food problem created by rapid population growth is, therefore, part of the general problem of over-all and agricultural underdevelopment, the solution to which must be sought both

in accelerating development and slowing down the growth of population.

3. The purpose of this chapter is to present a general review of the state of knowledge concerning the relations between population and food. The first section contains a brief sketch of the historical evolution, present situation and possibilities of finding solutions to the population and food problem. The next two sections are concerned with the effects of demographic factors on the requirements and actual demand for food and on the supply of food, respectively. The first of these includes a discussion of trends in food production and supplies in relation to population, the prevailing levels of nutrition and the role of demographic factors in determining the effective demand for food. The second focuses on the relations between population and the productivity of land and agricultural labour as the two basic factors related to the absolute and relative levels of agricultural and food production. It concludes with some comments about the possibilities of increasing food production and supplies. The final section of the chapter deals briefly with the outlook for future food production and demand and their reconciliation, with special reference to the impact of demographic factors on total food requirements and demand.

#### A. The population and food dilemma

4. It is generally recognized that population and food are closely interrelated, even to the extent that at times the population problem has been identified as a food problem. In effect, during the greater part of man's history the number of people has been regulated by the availability of food and for most of these times the balance between population and food has been a precarious one. The development of agriculture and increasing food supplies in more recent centuries were among the main factors which made possible the accelerated growth of population characteristic of the modern period. Even so, food shortages which acted as a check to the increase of population were eliminated only in the relatively small group of more developed countries. In most other parts of the world, little if any progress was made in increasing supply relative to the demand for food and in improving levels of nutrition. Rapid population growth in recent decades and the prospects of its continuation in the future in most of these countries, coupled with their desire for improved and satisfactory levels of nutrition as part of their aspirations for development, has brought the population-food problem again to the centre of attention.

induced by population growth will become an effective demand only if total production and income expands at least at the same rate as population. If total production does not expand at all or expands more slowly than population, causing *per capita* income to fall, total demand for food may increase less than population and levels of nutrition may decline.<sup>98</sup> For this reason, and because of the more complex effects of income on the demand for food and its structure, the income factor, it is sometimes argued, is the most important of the two.<sup>99</sup> Nevertheless, projections of the demand for food based on certain assumptions of growth of income and population and elasticities of the demand for food indicate that for the world as a whole, as well as in developed and developing regions, population growth was found to be a more important factor than *per capita* income in the expected future increase of demand for food.<sup>100</sup>

41. In addition to population growth, changes in population composition and structure are thought to influence the demand for food. Since the needs of persons of different sex and age differ, the sex and age distribution of the population will tend to affect food requirements and total demand as well as the demand for individual foods.<sup>101</sup> It has been noted, for instance, that the high proportion of young children in developing countries may lower calorie requirements somewhat, but that this effect is probably outweighed by the greater need for proteins of children and young adults.<sup>102</sup> However, in practice this effect may be small. According to Sukhatme and Schulte, estimated changes in the sex and age structure, considering existing population trends, might cause changes of less than 10 per cent in calorie requirements and even less than that in proteins.<sup>103</sup> Related to the effect of the age distribution is the influence of the size of the household on the demand for food. Differences in this respect, as discussed in another chapter,<sup>104</sup> depend to a considerable extent on the existence of economies of scale and indications are that *per capita* expenditure on food decreases as the size of the family increases.

42. Among the demographic factors affecting the demand for food, the rural-to-urban migration and the urban-rural distribution of the population are generally thought to be important. Being associated with a shift from agricultural to non-agricultural activities, changes in the level of income and increased emphasis on non-food products and services, urbanization is considered as

likely to have an impact on the demand for food. This effect may be especially strong in the developing countries, where urbanization is rapid, and implies a shift from the subsistence to the market economy and, where large increases occur in the non-farm population, in the volume of food marketed and in relative food prices.<sup>105</sup> Even so, the influence of urbanization itself on patterns of food consumption and demand—apart from the influence of income differentials between urban and rural populations—is not clear. Various studies, for instance, suggested that, on the whole, urban diets were qualitatively somewhat better than rural ones, while others did not show a marked difference in food consumption between urban and rural groups with comparable incomes.<sup>106</sup>

### C. Population and agriculture

43. Whereas section B above reviewed aspects of the population and food problem related to population in its role as consumer, the purpose of the present section is to examine some of the principal implications of demographic factors for agricultural production and development. The effects of demographic factors on agricultural production and development are diverse and an exhaustive survey of the complex of direct and indirect influences is beyond the scope of this study, particularly since such relations are to a great extent conditioned by the stage and process of over-all development. Therefore, the following discussion is confined to major aspects of this problem. The first part of this section is concerned with the relations between population, on the one hand, and the amount of agricultural land and its productivity, on the other. As the primary determinants of the volume of agricultural production, these factors are of special relevance for those countries faced with actual or potential shortages, where increasing the total amount of food produced is of the first priority. However, the long-term solution of the food problem and, for that matter, the whole problem of under-development can only be attained through raising the productivity of agriculture and agricultural labour, which not only ensures an adequate food supply, but raises the levels of living of the agricultural population and the degree of employment of its labour force and makes possible the transfer of workers necessary for the development of the non-agricultural sectors of the economy. The second part of this section considers some general aspects of the relations between population and the productivity of agricultural labour as one of the basic indicators of the level of agricultural development.

44. Empirical comparisons and verifications of such relationships are seriously hampered by the scarcity and shortcomings of data as well as difficulties in their interpretation. The measurement of agricultural land and labour, the productivity of each, and the interpretation

<sup>98</sup> Mellor, *Economics of Agricultural Development* (1970), p. 44; United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations . . .* (1965), p. 96.

<sup>99</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development . . .*, vol. 1 (1970), p. 13; United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations . . .* (1965), p. 97.

<sup>100</sup> See section D below.

<sup>101</sup> United Nations, *Population and Food Supply* (1962), pp. 25-26; Food and Agriculture Organization of the United Nations, *Agricultural Commodities Projections . . .*, vol. 2 (1967), p. xxvii; Organization for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 14-15.

<sup>102</sup> United Nations, *Population and Food Supply* (1962), pp. 25-26.

<sup>103</sup> Sukhatme and Schulte, "Forecasts of nutritional requirements . . ." (1967).

<sup>104</sup> See chapter XIII, section A.

<sup>105</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodities Projections . . .*, vol. 2 (1967), p. xxvi; United Nations, *Population and Food Supply* (1962), pp. 20-21; Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development . . .*, vol. 1 (1970), pp. 519-520; Sukhatme and Schulte, "Forecasts of nutritional requirements . . ." (1967).

<sup>106</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1957* (1957), p. 103.

and significance of such concepts as density, under-employment, to name but a few aspects, are subject to severe qualifications. Consequently, the present state of knowledge is much less than complete and there are many gaps as regards the relationships between population and the growth and development of agriculture. Even so, the analysis of the available data may be useful for the purpose of broad comparisons and as a factor in formulating policies and programmes.

# 1. AGRICULTURAL LAND AND ITS PRODUCTIVITY

45. Agricultural production can be increased either by enlarging the area under cultivation or by raising the yields of the existing agricultural land.<sup>107</sup> Historically, little is known concerning the relative importance of increases in agricultural land as opposed to higher productivity of the land already in use in determining agricultural production. As has been noted before,<sup>108</sup> it is generally assumed that during the greater part of history the growth of agricultural output was to a very large extent the result of the spread and expansion of agriculture, while—at least until the Industrial Revolution—the productivity of land is thought to have changed relatively little. In more general terms it is usually held that as population increases, more land will be brought under cultivation in order to feed the larger population. Recent trends do not necessarily confirm such a hypothesis, especially where the more developed regions are concerned. The available data suggest that in these regions the growth in production was exclusively the

<sup>107</sup> Agricultural land can be increased by adding to the area harvested or through multiple cropping.

<sup>108</sup> See section A of this chapter. Also Brown, *Man, Land and Food* ... (1965), p. 100; McCormack, *The Population Problem* (1970), p. 54.

result of a rise in yields, as the area under cultivation remained stable and, in fact, even declined somewhat. The situation is different in the less developed regions, where the expansion in agricultural land has been a significant factor in the growth of output. But even in this group of countries, the contribution of higher yields to the growth in production has risen very fast in recent decades and become the predominant factor.

46. Percentage changes in production, cultivated area and average yields per hectare of twelve major crops<sup>109</sup> are presented in table XII.9 for different periods since the Second World War. According to these estimates, world production of these crops has, to an increasing extent, been dominated by rising yields. While the rate of growth of the latter remained relatively stable over the period considered, although registering an increase in the more recent period, the relative growth of the area under cultivation declined and, as a result, the contribution of the change in yields to the growth of production rose from an estimated 61 per cent between 1948-1952 and 1957-1959 to 88 per cent between 1964-1966 and 1969-1971. These world-wide trends reflected different developments in the more developed and less developed regions. In the former, the area under cultivation did not change much—particularly after the late 1950s—the only exception being Oceania. In the other developed regions the cultivated area actually contracted during recent periods, so that gains in yields accounted for more than the increase in total production. In contrast, in the developing countries the expansion of area under cultivation was much more important and the area planted with these crops increased significantly during the post-war period. But even in these regions the rate of expansion of

<sup>109</sup> The selected crops were: wheat; rye; barley; oats; maize; rice; potatoes; ground-nuts; soybeans; tobacco; cotton; and jute.

TABLE XII.9. TRENDS IN PRODUCTION, CULTIVATED AREA, AND COMBINED AVERAGE YIELD PER HECTARE FOR TWELVE MAJOR CROPS, FOR MAJOR AREAS AND REGIONS OF THE WORLD, <sup>a</sup> 1948-1952 TO 1969-1971

Major area and region	Percentage change in production <sup>b</sup>			Percentage change in area under cultivation			Percentage change in yield <sup>b</sup> per hectare			Change in yield as percentage of change in production <sup>c</sup>		
	1948-1952	1957-1959	1966-1968	1948-1952	1957-1959	1966-1968	1948-1952	1957-1959	1966-1968	1948-1952	1957-1959	1966-1968
	to 1957-1959	to 1964-1966	to 1969-1971	to 1957-1959	to 1964-1966	to 1969-1971	to 1957-1959	to 1964-1966	to 1969-1971	to 1957-1959	to 1964-1966	to 1969-1971
World <sup>a</sup> .....	25	18	14	10	4	2	14	14	13	61	77	88
More developed regions ....	21	16	13	2	-1	-3	19	18	15	90	105	108
Western Europe .....	23	13	14	4	-3	-1	19	17	14	84	125	105
Eastern Europe and USSR .....	38	15	15	13	1	-6	22	15	21	65	97	140
North America .....	7	17	12	-13	-6	—	22	24	12	290	132	100
Oceania .....	10	79	8	10	51	10	1	18	-2	6	35	-25
Developing regions <sup>a</sup> .....	32	22	18	21	11	6	9	10	11	34	50	62
Latin America .....	37	37	8	26	22	6	8	12	3	29	40	33
Far East <sup>a</sup> .....	28	18	21	18	9	7	9	8	13	36	49	64
Near East .....	47	20	14	36	9	-1	9	10	15	25	55	104
Africa .....	32	17	21	18	5	11	11	12	9	42	73	46

SOURCE: Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1968* (1968), table III.1, p. 75.

<sup>a</sup> Excluding China.

<sup>b</sup> Price weighted.

<sup>c</sup> Percentages over 100 indicate that production has increased despite a reduction in area.

the area under cultivation slowed down significantly, except for Africa, over the whole period considered. Since at the same time yields increased, the contribution of the higher productivity of land to the growth in production rose sharply. Whereas between 1948-1952 and 1957-1959 only some 34 per cent of the increase in the production of the selected group of crops in the latter regions could be attributed to rising yields, between 1964-1966 and 1969-1971 this factor accounted for 62 per cent of the growth in output. Similar data for earlier periods relating to the same twelve products, or total grain production, also suggested, in general, that the growth of production in the developed regions was entirely due to increases in yields, whereas in the developing regions the area under cultivation was the main factor in the increase of production, but that its importance was declining as time progressed.<sup>110</sup> Although the trend towards a growing importance of increasing yields in developing countries may be interpreted as an indication of an existing or imminent scarcity of land in these regions, or parts of them, in absolute terms agricultural land is not scarce in the sense that there would be no longer large areas which could be brought into productive use.

47. The estimated area actually under cultivation represents somewhat over 10 per cent of the world's total area,<sup>111</sup> but most writers agree that this area could still be considerably expanded.<sup>112</sup> According to an early estimate by Fawcett, often cited since then, some 30 per cent of the total land area, or 4,000 million hectares, would be suitable for cultivation.<sup>113</sup> A similar estimate was obtained by Stamp, who reached this figure by eliminating from the total land area, the areas under permanent snow or ice; mountain and plateau regions unsuitable for cultivation and arid regions—each estimated to account for one fifth of the total—and then deducting another 10 per cent to allow for poverty of

soils, excessive rainfall and so forth.<sup>114</sup> Baade also estimated that the area under cultivation could be increased to 4,000 million hectares.<sup>115</sup> Clark assessed the potential agricultural area of the world in terms of standard land—that is the type of land found in the humid temperate zones, capable of producing one crop a year or providing substantial grazing opportunities. Taking as the sole criterion climatic conditions, he estimated the potential in equivalents of standard farm land to be near to 7,700 million hectares.<sup>116</sup> Various estimates of the arable land of the world under different assumptions were made by Malin. With existing methods and no capital investments, the arable land could be increased, he asserted, to about 2,700 million hectares. With capital investments for land development, this figure would increase to nearly 5,500 hectares and new methods of cultivation, in combination with substantial investments, would bring the total to as high as 9,300 million hectares.<sup>117</sup> Another estimate was prepared by the United States President's Science Advisory Committee which, on the basis of different soil groups, climates and amounts of precipitation, calculated that the potentially arable land of the world was 7,860 million acres—or about 3,200 million hectares—representing somewhat over 24 per cent of the total land area.<sup>118</sup> While these different estimates concur to the extent that they all indicate the possibilities of increasing the land under cultivation, the wide range of the estimated potentials suggests that such world-wide estimates involve a large margin of uncertainty.

48. According to the available estimates, there is slightly less than 0.4 hectares per person of the world's land under cultivation,<sup>119</sup> while the amount of agricultural land, which includes, besides land under cultivation, also permanent meadows and pastures, is estimated to be around 1.2 hectares per person. These figures compare with about 3.7 hectares of total land per person<sup>120</sup> (see table XII.10). It should be noted, however, that such estimates have various limitations. They involve

<sup>110</sup> United Nations, *Population and Food Supply* (1962), p. 30, table 9; Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 100, table III-1. See also Sen, "The impact of population growth . . ." (1967); United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations . . .* (1965), pp. 19-21; Schaub, "Agriculture's performance . . ." (1970); United States President's Science Advisory Committee, *The World Food Problem . . .*, vol. 1 (1967), p. 19; Revelle, "Population and food supplies . . ." (1960).

<sup>111</sup> See table XII.11. Also Stamp, *Our Developing World* (1960), p. 42; United Nations, *Population and Food Supply* (1962), p. 34; Brown, *Man, Land and Food . . .* (1963), pp. 17-18. The proportion is somewhat below 10 per cent for the developing regions as a whole and near to 12 per cent in the developed. See also Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development . . .*, vol. 1 (1970), p. 42.

<sup>112</sup> Some writers, however, have argued that already more land than that which is suitable for cultivation is used for that purpose. Pearson and Harper, *The World's Hunger* (1945), p. 18, estimated that only over 1,000 million hectares, or 7 per cent of the total land area, is adapted to food production. See also Vogt, *Road to Survival* (1952), pp. 27-28. Whitaker, "World land resources . . ." (1952) asserted that there were only two acres of cultivated land for each person in the world, and that the extension of this area would present serious handicaps, but that at least two and one-half acres per person would be needed to ensure a satisfactory level of living. Another study considered an estimate of 12 per cent of the land area as suitable for cultivation a realistic one. See Political and Economic Planning, *World Population and Resources* (1959), p. 31.

<sup>113</sup> Fawcett, "The extent of the cultivable land" (1930).

<sup>114</sup> Stamp, *Our Developing World* (1960), pp. 38-40; see also his *Land for Tomorrow . . .* (1952), p. 52.

<sup>115</sup> Baade, *Der Wettlauf zum Jahre 2000 . . .* (1967), pp. 29-31, 52.

<sup>116</sup> Clark, *Population Growth and Land Use* (1967), pp. 142-149. See also his "Future sources of food supply" (1962). Cépède, Houtart and Grond, *Nourrir les hommes* (1963), p. 321, cite a figure of 7000 million hectares.

<sup>117</sup> Malin, "Food resources of the earth" (1967).

<sup>118</sup> United States President's Science Advisory Committee, *The World Food Problem*, vol. 2 (1967), pp. 407-469.

<sup>119</sup> Land under cultivation is defined here as to consist of "arable land" and "land under permanent crops". The former includes: land under temporary crops; temporary meadows for mowing or pasture; land under market and kitchen gardens; and land temporarily fallow or lying idle. The latter includes land cultivated with crops which occupy the land for a long period and need not be replanted after each harvest; land under shrubs, fruit trees, nut trees and vines; but it excludes land under trees grown for wood or timber. See Food and Agriculture Organization of the United Nations, *Production Yearbook, 1970*, vol. 24 (1971), p. 700.

<sup>120</sup> For similar data, see United States President's Science Advisory Committee, *The World Food Problem . . .*, vol. 2 (1967), p. 434, table 7-9; McCormack, *The Population Problem* (1970), p. 52, table 3-3; Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), p. 70, table IV.1.

where land is still plentiful—an occurrence considered unlikely under present conditions—the solution to the problem of increasing agricultural production must be found within national boundaries. Finally, as a result of the rapid growth of population, land is likely to become increasingly short in many developing countries and it is unlikely that the extension of crop land alone would be sufficient to cope with the increased demand, which may be expected as a result of demographic trends.<sup>129</sup>

50. Given these various constraints on the expansion of the area under cultivation, as well as the fact that ultimately the quantity of land suitable for agriculture is limited, the importance of raising the productivity of land for increasing agricultural and food production has been nearly universally recognized.<sup>130</sup> Moreover, the available data on recent trends in the productivity of land<sup>131</sup> indicate that the possibilities for raising the output per hectare are substantial in most countries and, in many, exceed the possibilities of raising total production through an increase of agricultural land.

51. Data on yields of individual crops and livestock, as well as estimates of the over-all productivity of land, confirm the existence of large differences between countries. Estimates for some major crops in 1957, compiled by Malin, showed that yields in countries with the highest productivity may be as much as ten times or more those in countries with the lowest yields:<sup>132</sup>

Yields per hectare (hundred kilogrammes)

	Average	High	Low
Wheat ..	10.7	42.7 (Denmark)	3.2 (Burma)
Rye .....	11.1	29.2 (Netherlands)	3.1 (Australia)
Barley ...	12.9	40.6 (Netherlands)	2.3 (Tunisia)
Oats ....	12.4	33.3 (Denmark)	4.1 (Portugal)
Rice ....	18.4	57.4 (Spain)	6.3 (Puerto Rico)

52. More recent estimates suggest that these differences have not decreased significantly since then. Average yields of wheat for the years 1968 to 1970 varied from little over 200 kilogrammes per hectare in Libya,<sup>133</sup> to more

than 4,400 in the Netherlands. The corresponding ranges for the other crops mentioned were: rye, from 390 kilogrammes per hectare in South Africa to 3,800 in Switzerland; barley, from 280 kilogrammes per hectare in Libya to 3,900 in Ireland; oats, from 480 kilogrammes per hectare in South Africa to over 3,900 in the Netherlands; and rice, from 560 kilogrammes per hectare in Mali to 7,000 in Australia.<sup>134</sup> The range in over-all productivity of land may be expected to be greater than that of individual crops, since total productivity also reflects such factors as differences in managerial skills and methods of cultivation, including land rotation, mixed farming, and so forth.<sup>135</sup> Estimates of the productivity per acre in terms of nutrition calories,<sup>136</sup> prepared by Stamp for thirteen countries in the late 1950s, indicated that the standard nutrition units per cultivated acre varied from 0.2 in Australia to 6.5 in Japan, implying that while in Japan each acre could support 6 to 7 persons, in the case of Australia 5 acres would be needed to produce enough calories for one person.<sup>137</sup> In general terms, it has been estimated that the over-all productivity of land in countries with the highest yields may be some 40 times that of countries with the lowest productivity.<sup>138</sup> Indices of over-all productivity for fifty-two countries for a recent period, presented in table XII.11, suggest an even wider range of variation. Productivity per hectare in the three countries with the highest yields is between 8 and 11 times that of Yugoslavia, which being at mid-point was assigned the index 100. Yields per hectare in the latter country are, however, about ten times as high as those in the three countries with the lowest productivity.<sup>139</sup>

53. Output per hectare is usually higher in the more developed as compared with the less developed countries, though this is not true in all cases.<sup>140</sup> The data in table XII.12 show that even though some of the highest yields are found in developing countries, the majority of the twenty-six countries with highest productivity are more developed countries and among the remaining twenty-six countries with low productivity the greater number are developing countries. Other estimates tend to confirm the lower average productivity of land in the developing regions. Estimated grain yields per acre harvested in 1960-1961 were 699 kilogrammes for the developed as compared with 506 kilogrammes for the developing countries.<sup>141</sup> Despite recent increases in

<sup>129</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1968* (1968), p. 101; Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 70-71, 107.

<sup>130</sup> Russell, *World Population and World Food Supplies* (1954), p. 64; United Nations, *Population and Food Supply* (1962), p. 38; Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 95; ———, *The State of Food and Agriculture, 1968* (1968), p. 75; Harrar and Wortman, "Expanding food production in hungry nations . . ." (1969); Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), p. 107; United Nations, *Human Fertility and National Development . . .* (1971), p. 19; Christensen, "Problems and policies in the 1970's" (1970); Spengler, "Agricultural development is not enough" (1968).

<sup>131</sup> The productivity of land can be measured either in terms of money values or in terms of physical yields or calories. Output per hectare thus can be increased either through higher yields of existing crops or a shift towards crops with a higher value. See Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), pp. 97-98; also Schaub, "Agriculture's performance . . ." (1970).

<sup>132</sup> Malin, "Food resources of the earth" (1967). See also McCormack, *The Population Problem* (1970), p. 56, table 3-5.

<sup>133</sup> Estimated production for 1970 was only 130 kilogrammes per hectare, well below the averages for earlier years, although the latter remained in all cases below 300 kilogrammes per hectare.

<sup>134</sup> Food and Agriculture Organization of the United Nations, *Production Yearbook, 1970*, vol. 24 (1971), tables 14-17, 21.

<sup>135</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 110.

<sup>136</sup> Nutrition calories were expressed in "standard nutrition units" of 1,000,000 calories produced and 900,000 calories available or consumed, sufficient to provide the calorie needs of one average person for a year.

<sup>137</sup> Stamp, *Our Developing World* (1960), pp. 108-113, table XX.

<sup>138</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 110.

<sup>139</sup> For similar estimates of the productivity of land in terms of wheat units (equivalent to one ton of wheat) see Hayami and Ruttan, *Agricultural Development . . .* (1971), table 4-1, p. 70.

<sup>140</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 110; Schaub, "Agriculture's performance . . ." (1970).

<sup>141</sup> Brown, *Man, Land and Food . . .* (1963), table 21, pp. 56 ff. See also Paarlberg, "Food for more people . . ." (1969).

TABLE XII.11. INDEX NUMBERS OF PRODUCTIVITY PER HECTARE IN FIFTY-TWO COUNTRIES, 1969-1971  
(Yugoslavia = 100)

Country	Index of productivity per hectare	Country	Index of productivity per hectare
China (Taiwan) .....	786	Greece .....	99
United Arab Republic .....	590	Philippines .....	91
Netherlands .....	568	United States .....	80
Belgium .....	554	India .....	78
Japan .....	478	Spain .....	73
Republic of Korea .....	325	Canada .....	64
Federal Republic of Germany ..	321	Iran .....	60
Denmark .....	308	Colombia .....	59
West Malaysia .....	273	Turkey .....	53
Israel .....	210	Burma .....	51
France .....	208	Morocco .....	39
Indonesia .....	206	Brazil .....	37
Norway .....	195	Chile .....	35
Italy .....	194	Syria .....	35
Sweden .....	184	Iraq .....	32
Switzerland .....	173	Honduras .....	30
United Kingdom .....	159	Uruguay .....	25
Pakistan .....	159	Venezuela .....	24
Austria .....	156	Tunisia .....	23
Finland .....	150	Peru .....	22
Ceylon .....	145	Mexico .....	21
Thailand .....	133	Argentina .....	19
New Zealand .....	122	South Africa .....	13
Ireland .....	115	Australia .....	10
Portugal .....	100	Algeria .....	9
Yugoslavia .....	100	Ethiopia .....	9

SOURCE: Files of the Food and Agriculture Organization of the United Nations.

yields in the developing countries, they fell relatively further behind the more developed countries, since productivity increased even more rapidly in the latter. It has been estimated that grain yields in 1967 were 1.2 tons per hectare in the developing regions and 2 tons in the developed ones. Compared with the estimates for 1954—0.97 tons in the developing and 1.40 tons in the developed regions—the difference increased in both absolute and relative terms.<sup>142</sup>

54. The interrelations between population, agricultural land, its productivity and the levels and growth of agricultural and food production are complex and have been the source of considerable controversy. As has been discussed in more detail in another chapter,<sup>143</sup> the classical school of economists, under the influence of Malthus' work, held that population would tend to increase with the means of subsistence, causing an increasing pressure on the fixed supply of land, diminishing returns and, eventually, a stagnation of production and the stabilization of population at the subsistence level of living. The experience of the presently developed countries during the last one and a half centuries or so, however, did not bear out these views. As a result of the increasing control over fertility, population growth failed to respond to the increase of the means of subsistence in the manner anticipated by the classical school. In addition, these

writers had underestimated the potential contribution of greater knowledge and technological progress, which made it possible for agricultural production to outpace population growth by a considerable margin. As the threat of subsistence crises in the more developed countries disappeared, the importance assigned to the traditional limits to agricultural production, namely, the fixed supply of land and its diminishing returns, and to the impact of population trends on the capacity to feed a growing population has decreased considerably.<sup>144</sup> Nevertheless, this does not mean that no relation exists between population, on the one hand, and the availability of agricultural land and its productivity, on the other. Especially in the developing countries, where modern technology has not yet penetrated agriculture and where rapid population growth raises the already high agricultural density, the relation between population and agricultural land, as well as the productivity of the land, are fundamental issues.

55. It is usually assumed, as postulated in the classical theory, that a general relation exists between the size and growth of population and the land used for agricultural purposes. Thus, as has been noted before,<sup>145</sup> it is held

<sup>144</sup> For the lessened emphasis placed on land, see, for instance, Schultz, "The declining economic importance ..." (1951); also Kuznets, "Population and economic growth" (1967); Spengler, "The economist and the population question" (1966).

<sup>145</sup> See section A of this chapter.

<sup>142</sup> Schaub, "Agriculture's performance ..." (1970).

<sup>143</sup> See chapter III, sections C and D.



TABLE XII.12. DISTRIBUTION OF 132 COUNTRIES ACCORDING TO PERCENTAGE OF TOTAL LAND AREA UNDER CULTIVATION AND POPULATION DENSITY

	Population per square kilometre	Number of countries	Percentage of total land area under cultivation				
			0-4	5-9	10-19	20-29	30 and over
Total .....		132	33	19	29	24	27
0-9 .....		34	24	7	1	1	1
10-24 .....		29	6	9	12	1	1
25-49 .....		18	3	—	6	3	6
50-99 .....		17	—	2	3	5	7
100 and over .....		34	—	1	7	14	12

SOURCE: data on land use: Food and Agriculture Organization of the United Nations, *Production Yearbook, 1970*, vol. 24 (1971), table 1; data on density: United Nations, *Demographic Yearbook, 1970* (1971), table 2.

that historically the growth of population has been associated with an increase of the land under cultivation. Likewise, the existence of high population densities is frequently seen to be an indication of limited possibilities to increase further the land under cultivation.<sup>146</sup> Even so, there is only limited evidence of a systematic relation between the density of population and the proportion of total land used for agriculture or under cultivation in different regions and countries. The land used for agriculture as a proportion of the total land area in different regions (see table XII.10) does not appear to be in any way related to the number of total hectares per person as an indicator of population density. However, data referring to the proportion of land under cultivation may be thought to provide some evidence of a relation between density and cultivated area. High percentages of cultivated land are found in such densely populated regions as Europe and the Far East and a low percentage is found in such a sparsely settled region as Oceania. However, China, with a low proportion of cultivated area, does not conform to the pattern of the other high density areas and the association appears also to be weak when the other regions are considered.

56. Data on the percentage of total land under cultivation and on over-all population density for a large number of countries appear to confirm the existence of a general but not necessarily invariable relationship between the two (table XII.12). The proportion of total land under cultivation is generally low in countries where population density is low and high where population density is high. Nevertheless, there are a number of exceptions to this association and, especially when density classes between the two extremes are considered, the association between density and land use, although it appears to exist, is not very clear and systematic. Part of the explanation of a lack of a consistent relation in this regard may be attributed to the crude nature of such a measure as over-all population density. More fundamental, however, are numerous factors which determine land use. Prominent among these are the potential agricultural land and its quality. In addition, such factors as the levels of over-all and agricultural development, the type of agricultural products and systems of land tenure, to name but a few, influence the amount of effective agricultural land.

57. Population growth, it may be argued, will not only tend to have the effect of increasing the land used for agriculture, but may also give rise to a more intensive cultivation by increasing the labour expended on land already in use.<sup>147</sup> It might be expected, therefore, that, as a rule, higher population density would be associated with a higher number of persons per unit of agricultural land. The data for different regions on number of persons per unit of agricultural or cultivated land seem to bear out that land use is not independent from population density. Comparatively high population densities, as shown by the low land area per person, in the Far East, Europe and China are associated with low averages of agricultural and cultivated land per person (table XII.10). Lower average densities in the Near East and Latin America are accompanied by higher averages of agricultural and cultivated land per person. However, variations between regions also convey the impression that, especially in the case of agricultural land, the association is not a systematic one. Data on population density and the number of hectares of cultivated land per person for a large number of countries also show that high population density tends to be accompanied by a more intensive use of land and that the opposite is true in most cases where density is low (see table XII.13). However, although there exists a fairly clear distinction between countries at very different levels of density as far as the number of persons per hectare of cultivated land is concerned, the variation within each of the classes of density is considerable.

58. Population size and growth are thought to affect not only the availability of land and the amount of labour expended on it, but also its productivity, since population density is a factor influencing the intensity with which the land is used. It may be expected, therefore, that countries with high population densities, which they can support only by intensive methods of cultivation, will tend to have a higher productivity of land than less densely settled countries. A comparison of data on hectares of cultivated land per person, as an index of density, and yields for some of the major crops for the different regions of the world, however, does not suggest the

<sup>147</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 112; Taeuber, "Demographic aspects of agricultural development . . . (1966).

<sup>146</sup> See the discussion earlier in this section.

TABLE XII.13. DISTRIBUTION OF 132 COUNTRIES ACCORDING TO HECTARES OF CULTIVATED LAND PER PERSON AND POPULATION DENSITY

Population per square kilometre	Number of countries	Hectares of cultivated land per person					
		0- 0.19	0.20- 0.39	0.40- 0.59	0.60- 0.99	1.00- 1.99	2.00 and over
Total .....	132	31	29	29	23	12	8
0-9 .....	33	2	7	7	6	4	7
10-24 .....	30	1	5	10	10	3	1
25-49 .....	18	1	3	4	5	5	—
50-99 .....	16	4	6	4	2	—	—
100 and over .....	35	23	8	4	—	—	—

SOURCE: data on land use: Food and Agriculture Organization of the United Nations, *Production Yearbook*, 1970, vol. 24 (1971), table 1; data on density: United Nations, *Demographic Yearbook*, 1970 (1971), table 2.

TABLE XII.14. HECTARES OF CULTIVATED LAND PER PERSON AND YIELDS OF SOME MAJOR CROPS FOR MAJOR AREAS AND REGIONS OF THE WORLD <sup>a</sup>

Major area and region	Hectares of agricultural land per person	Yields per hectare (hundred kilogrammes)			
		Wheat	Rye	Barley	Oats
World <sup>a</sup> .....	0.39	14.8	15.4	16.5	16.5
More developed regions					
Europe (excluding USSR) .....	0.35	24.6	19.5	27.1	23.4
USSR .....	0.97	14.4	13.6	13.0	12.9
North America .....	0.98	20.3	15.3	27.6	18.1
Oceania .....	2.49	11.7	5.1	11.3	9.1
Developing regions <sup>a</sup>					
Far East <sup>a</sup> .....	0.24	12.0	14.0	13.5	10.4
Near East .....	0.46	10.2	10.8	9.0	12.1
Africa .....	0.65	7.6	4.3	8.4	5.1
Latin America .....	0.45	13.6	7.2	10.1	11.8

SOURCE: Food and Agriculture Organization of the United Nations, *Production Yearbook*, 1970, vol. 24 (1971), tables 1, 4, 14-17.

<sup>a</sup> Excluding China.

existence of a clear association between density and the productivity of land (table XII.14). Part of the explanation for the lack of such an association may be that, as has been noted before, the productivity of land, on the whole, is considerably higher in the more developed than in the less developed regions. If the data for each of these two broad groups are considered separately, there are some indications that density and the productivity of land are not independent of each other. Both within the group of developed regions and within that of the developing regions, yields are highest in the most densely populated ones and lowest in those less densely settled.

59. Data on number of persons per hectare of farm land for fifty-two countries classified into four groups in descending order of levels of productivity per hectare indicate that density is not without importance as a factor in the productivity of land (see table XII.15).<sup>148</sup> Most of the countries in the first quartile, that is, the high-

est range of productivity, have a high density and, conversely, all the countries in the upper quartile, that is, the lowest productivity per hectare, have a low population density. Of the thirteen countries with highest yields per hectare, only one had less than two persons per hectare while, in three, population density exceeded 10 persons per hectare. In contrast, each of the thirteen countries with lowest productivity had less than one person per hectare of farm land. Unweighted average densities differed considerably for each of the four levels of productivity; they declined from 5.9 for the first quartile of high productivity countries to 2.0 for the second, 1.2 for the third and 0.34 for the fourth quartile with lowest productivity per hectare.<sup>149</sup> A comparison of the gross output per hectare and food expenditures per hectare in thirty-six countries led to the conclusion that the intensity of cultivation and output per hectare varied positively with the pressure of demand on the land cultivated.<sup>150</sup>

<sup>148</sup> The classification according to productivity was based on index numbers, with Thailand, which was at the mid-point of the range, being 100. The index numbers for the thirteen countries with highest productivity ranged from somewhat less than 200 to 600; for the next group, indices varied between somewhat over 100 to less than 200; for the third group, from about 50 to 100 and, for the

last group, from around 10 to 50. See Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture*, 1963 (1963), figure III-7.

<sup>149</sup> *Ibid.*, table III-7, p. 111.

<sup>150</sup> *Ibid.*, p. 112 and figure III-8.

TABLE XII.15. NUMBER OF PERSONS PER HECTARE OF FARM LAND IN FIFTY-TWO COUNTRIES, ACCORDING TO PRODUCTIVITY PER HECTARE, 1956-1960

Highest productivity per hectare	Number of persons per hectare	Second highest productivity per hectare	Number of persons per hectare	Third highest productivity per hectare	Number of persons per hectare	Lowest productivity per hectare	Number of persons per hectare
United Arab Republic	9.5	Sweden	1.7	Thailand	2.4	Tunisia	0.80
Netherlands	4.9	France	1.3	Yugoslavia	1.2	Brazil	0.50
China (Taiwan)	10.5	Austria	1.7	Burma	2.4	Honduras	0.54
Belgium	5.0	Finland	1.5	Greece	0.9	Morocco	0.69
Japan	13.3	United Kingdom	2.7	United States	0.4	Syria	0.37
Denmark	1.4	Indonesia	4.6	Chile	1.1	Uruguay	0.19
Germany, Federal		Portugal	2.1	India	2.4	Argentina	0.14
Republic of	3.6	Philippines	3.4	Canada	0.3	Mexico	0.27
Malaysia	3.0	Israel	1.7	Iraq	1.0	Algeria	0.20
Republic of Korea	11.7	Ireland	0.6	Iran	1.1	South Africa	0.15
Ceylon	6.4	Pakistan	3.2	Colombia	0.7	Venezuela	0.30
Norway	3.4	New Zealand	0.2	Turkey	0.5	Ethiopia	0.28
Italy	2.3	Spain	1.4	Peru	0.8	Australia	0.02
Switzerland	2.4						
Unweighted average..	5.9	Unweighted average..	2.0	Unweighted average..	1.2	Unweighted average..	0.34

SOURCE: Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), table III-7, p. 111.

## 2. AGRICULTURAL LABOUR AND ITS PRODUCTIVITY

60. Although agricultural and food production can be increased by means of adding to the area under cultivation or the number of people working the land, or both, such measures by themselves will not provide the solution to the food problem being faced by many developing countries, nor the more fundamental issue of agricultural under-development. Increasing the agricultural land or labour force without considerable investments in land, material capital and human resources and in the absence of technological progress or institutional change will in most cases rule out significant improvements in the prevailing and often inadequate *per capita* levels of food supplies and is bound to result eventually in diminishing returns to both land and labour and in the incapacity to feed a growing population. Ensuring sufficient food supplies and satisfactory levels of nutrition for a growing population can only be attained by raising the productivity of agricultural labour. Increasing output per farm worker, however, is not only a condition for solving the food problem. The increasing levels of income it causes and the more efficient employment it engenders by permitting the transfer of agricultural labour to non-agricultural sectors are essential prerequisites for and basic elements of the process of agricultural and over-all development.

61. The productivity of labour in agriculture is closely associated with the size of the agricultural labour force. Low productivity in agriculture implies not only low levels of income in this sector and an under-utilization of its labour force, manifesting itself frequently in high levels of underemployment, but also signifies that in order to provide the population with sufficient food, a large part of the total working population must be, of necessity, engaged in agricultural production. Thus, as has been noted, in developing countries agriculture may absorb as much as four fifths of the total working population.

The development process makes possible the transfer of workers from agriculture to secondary and tertiary activities, so that in the more developed countries as little as one tenth or less of the labour force is found in agriculture.<sup>151</sup>

62. According to the available data, the share of agricultural workers in the total labour force has been declining at an accelerating rate in the more developed countries. Estimates, cited in other chapters,<sup>152</sup> indicate that the proportion of the working population in agriculture in these countries was around 60 per cent at the beginning of the century and 30 per cent in 1960. Since then this process has continued at an accelerating rate. In absolute terms, the number of agricultural workers for the more developed countries, as a whole, probably did not decrease until the 1920s, but since then up to 1960, the agricultural labour force in these countries, excluding the USSR and Eastern Europe, may have been reduced by some 20 million. In contrast, the proportion of the labour force in agriculture in the developing countries, as a whole, has changed only slightly, although it has been declining in a number of such countries. Tentative estimates for 1900 suggest that at that time only somewhat less than four fifths of the total working population was engaged in agriculture and data for 1960 indicate that this proportion was still 71 per cent. In addition, the absolute size of the agricultural labour force in these countries has been growing at what appears to be an accelerating pace. The estimated increase of some 60 million agricultural workers in the less developed countries between 1950 and 1960 was higher than the estimated growth in the twenty years from 1930 to 1950.

<sup>151</sup> For a general discussion of these aspects, see chapter XIV, section A and chapter IX, section D.

<sup>152</sup> See chapter IX, section D and chapter XIV, sections B and D.

TABLE XII.16. NUMBER AND PERCENTAGE OF LABOUR FORCE IN AGRICULTURE FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1950 AND 1960

Major area and region	1950		1960	
	Agricultural labour force		Agricultural labour force	
	Number (thousands)	Percentage of total	Number (thousands)	Percentage of total
World .....	684,087	64.1	737,747	57.8
More developed regions				
Europe (excluding USSR) .....	66,434	36.6	54,767	28.6
USSR .....	52,331	55.8	46,475	42.1
North America .....	8,618	13.0	5,513	7.2
Oceania .....	1,699	31.4	1,785	27.7
Developing regions				
Africa .....	74,480	80.6	83,317	76.6
Asia .....	450,764	78.9	512,394	71.9
Latin America .....	30,028	53.2	33,573	47.9

SOURCE: International Labour Office, *Labour Force Projections, 1965-1985*, part V (1971), table 3.

Note: because of roundings, the sum of regional totals does not necessarily coincide with world total.

TABLE XII.17. NUMBER AND PERCENTAGE OF AGRICULTURAL POPULATION, FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1950 AND 1965

Major area and region	1950		1965	
	Agricultural population		Agricultural population	
	Number (millions)	Percentage of total population	Number (millions)	Percentage of total population
World .....	1,422	57	1,745	52
More developed regions				
Europe .....	129	33	100	23
USSR .....	90	50	73	32
North America .....	23	14	13	6
Oceania .....	3	22	3	19
Developing regions				
Asia (excluding China) .....	540	66	730	64
China .....	377	69	481	63
Africa .....	166	76	231	74
Latin America .....	94	47	115	74

SOURCE: Food and Agriculture Organization of the United Nations, *Production Yearbook, 1970*, vol. 24 (1971), table 6, p. 24.

63. Estimates of the absolute and relative size of the agricultural labour force for the world and major regions are shown in table XII.16. In general, these results illustrate the differences in the importance of the agricultural sector in the more developed and less developed regions and the sharp decline in the percentage share of agriculture in the more developed regions between 1950 and 1960, especially in those regions where the initial share was still high. A much slower evolution is shown for the less developed regions, with the exception of Latin America. Finally, the results show that, except for Oceania,<sup>153</sup> the number of agricultural workers declined in all

<sup>153</sup> The data for Oceania include, apart from Australia and New Zealand, also Melanesia and Polynesia and Micronesia. In the former two developed countries, the agricultural labour force declined in absolute numbers, as it did in the other more developed regions.

of the more developed regions, but increased in all of the developing ones. Rough estimates of the agricultural population and its percentage of the total population are also available for the world and different regions in two recent years (table XII.17). These results, although not directly comparable with the data on labour force in agriculture because of possible differences in economic activity rates in the agricultural and the non-agricultural sectors provide confirmation of the findings suggested by the data on labour force. In addition, they convey some indication of the capacity of the agricultural population to support itself and the non-agricultural segment. Assuming a constant relation between labour force and total population and the number of families, it may be said that in Africa the average agricultural family produced an amount of food-stuff less than one third in excess of its own, possibly inadequate, consumption. In contrast,

TABLE XII.18. INDEX NUMBERS OF OUTPUT PER MALE ENGAGED IN AGRICULTURE IN THIRTY-THREE COUNTRIES, 1959-1961, 1964-1966 AND 1969-1971  
(Italy = 100)

1959-1961		1964-1966		1969-1971	
New Zealand	1533	New Zealand	1261	New Zealand	1146
Australia	1207	Australia	1073	Australia	1001
United States	1025	United States	996	United States	955
Canada	551	Canada	619	Canada	564
United Kingdom	388	United Kingdom	396	Belgium	444
Denmark	372	Belgium	361	United Kingdom	398
Belgium	368	Denmark	323	Netherlands	351
Netherlands	332	Netherlands	299	Germany, Federal	
Germany, Federal		Germany, Federal		Republic of	312
Republic of	287	Republic of	277	Denmark	299
Argentina	266	France	243	France	263
France	248	Argentina	239	Israel	233
Israel	225	Israel	229	Argentina	213
Sweden	209	Austria	182	Austria	198
Austria	188	Sweden	171	Sweden	169
Switzerland	184	Ireland	159	Ireland	164
Ireland	177	Switzerland	148	Switzerland	158
Finland	107	Italy	100	Italy	100
Italy	100	Finland	96	Finland	98
Norway	97	Norway	79	Norway	78
Greece	66	Greece	66	Greece	63
Yugoslavia	53	Yugoslavia	45	Japan	48
Colombia	53	Japan	49	Venezuela	45
China (Taiwan)	50	Venezuela	45	Yugoslavia	42
Japan	48	China (Taiwan)	42	China (Taiwan)	38
Venezuela	45	Colombia	41	Colombia	35
Tunisia	38	Iran	30	Iran	26
Iran	36	Tunisia	28	Tunisia	25
Morocco	28	Morocco	23	Morocco	20
Algeria	28	Thailand	22	Thailand	18
Thailand	23	Algeria	18	Algeria	16
Philippines	23	Republic of Korea	18	Philippines	14
India	18	Philippines	17	Republic of Korea	14
Republic of Korea	18	India	13	India	12

SOURCE: Files of the Food and Agriculture Organization of the United Nations.

in North America the production of one family was enough to support beside itself, between 15 and 16 other families.

64. The measurement of labour productivity in agriculture is not only more complex than that of the productivity of land, but, in addition, various measures may be used to assess it. One way of expressing differences in the productivity of labour is to compare the labour input, in terms of man-hours or man-days, needed to produce a given quantity of an agricultural commodity. According to estimates of the Food and Agriculture Organization of the United Nations, the number of man-hours needed to produce that 100 kilogrammes of wheat varied from about 1 to 2 to as much as 30 to 50 hours in countries at different levels of development. The range was also found to be considerable, for instance, in the case of potatoes, but for some other products, such as sugar beets, cotton and tobacco, the differences between countries at different levels of development were much smaller.<sup>154</sup> An alter-

native method is to measure the productivity of labour in terms of an important indicator of agricultural production. Brown, for example, measured the productivity of agricultural labour in terms of grain output per person of farm population. According to his estimate, the *per capita* product of the farm population in the developed regions in 1960-1961 was about 2,200 kilogrammes, compared with only some 370 kilogrammes in the developing regions. In addition, the corresponding data for the pre-war period—1934 to 1938—indicated that the gap between the two groups of countries had widened. Whereas in the earlier period the output in the developed regions was four times that of the developing regions, by 1960-1961 this ratio had increased to nearly 5.9.<sup>155</sup>

65. Despite the problems involved in their estimation,<sup>156</sup> indices of output per male working in agriculture

<sup>155</sup> Brown, *Man, Land and Food* . . . (1963), pp. 87-88, table 31. For similar figures, see Schaub, "Agriculture's performance . . ." (1970).

<sup>156</sup> Both the estimates of labour input and output are hampered by a lack of data, as well as problems of estimation itself. Statistics on the number of man-hours spent in agricultural production are

<sup>154</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), pp. 112-113, figure III-9.

(Continued on next page)

for thirty-three countries since the late 1950s have been prepared by the Food and Agriculture Organization of the United Nations (table XII.18).<sup>157</sup> Product per worker in agriculture varies, as may be seen, between wide limits. In New Zealand, the country with highest productivity, the output per worker was some 12 to 15 times that of Italy, which, being at about the mid-point, was given the index of 100. The productivity in the latter country was, during the various periods, between some six to eight times that of the countries with the lowest output per worker. In more general terms, output per male worker in agriculture in New Zealand, Australia and the United States was for the different periods from nearly 70 to 95 times greater than in the countries in the lowest range, India, the Republic of Korea and the Philippines.<sup>158</sup> The data also suggest that since the late 1950s the relative position of the countries with low productivity with respect to the countries of high productivity has not improved, but rather deteriorated.<sup>159</sup>

66. The ranking of countries in table XII.18 also indicates, as might be expected, that the output per worker in agriculture is related to the general level of development. As a rule, the economically more developed countries with relatively high *per capita* income are found in the upper range of the table, whereas economically less developed countries are mostly in the lower range. In more specific terms, levels of productivity in agriculture have been related to two factors, both indicative of levels of development: the *per capita* expenditure on food—as an indicator of demand related to levels of income—and the proportion of the labour force in agriculture. Comparing output per man with *per capita* expenditures on food per male in the agricultural labour force, a close association between the two was found to exist.<sup>160</sup> These findings, apart from confirming the relationship between levels of productivity and agriculture and of development, also provide further evidence of the inverse relationship between agricultural productivity and the share of agricultural workers in the total labour force.

(Footnote 156 continued)

available for only a few countries and even then they are not always comparable. More data are found on the numbers of workers in agriculture, but this constitutes a much less satisfactory measure. In addition, the data often have to be limited to the male labour force because of the incomparability of data on the female labour force. Such a limitation may introduce an additional bias, especially in the less developed countries where the work of unpaid female labour in agriculture may be important. Data on agricultural production, of course, pose another series of problems. See Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 116.

<sup>157</sup> Similar data for an earlier period were published for thirty-six countries in Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), table III-11, p. 117.

<sup>158</sup> On a world-wide basis these ranges may be even wider, since output per worker is probably even lower in some less developed countries for which no data are available.

<sup>159</sup> A similar conclusion was reached by Hayami and Ruttan on the basis of estimates of productivity in 1965 and 1966 for forty-three countries. See Hayami and Ruttan, *Agricultural Development ...* (1971), table 4-2, pp. 71-73.

<sup>160</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), pp. 117-119, figure III-11. The data used for this analysis referred to twenty-eight countries in the period 1956-1960.

67. The effects of population size and growth on productivity in agriculture have been the subject of wide discussion. This question has received special attention in the context of the problems of so-called "rural overpopulation" and underemployment in agriculture in the densely settled developing countries. According to some writers, as a result of the unfavourable man-land ratio in these countries, productivity in agriculture is very low and may be even zero over a wide range. A considerable controversy exists as to the extent of underemployment in such cases, including the question whether the problem is mainly one of seasonal underemployment, and as to the assumption of zero or negligible productivity of labour. Although those with divergent views recognize that the productivity of labour in many of these countries is low, some question whether it is a result of an excessive pressure of population on agricultural resources and argue that low productivity may be to a large degree the result of other factors, such as lack of capital, institutional factors and so forth.<sup>161</sup> The implications of population growth, as opposed to its size, for agricultural productivity in the less developed countries is generally thought to be unfavourable, except under conditions where land is plentiful and distinct economies of scale would result from a larger population. In general, however, rapid growth of the agricultural population and labour force is thought to be an obstacle to increasing productivity. Although the increase of agricultural population has been accompanied in many countries by an expansion of the area under cultivation, the fact that the latter has not kept pace with population growth suggests that while the number of holdings has grown, their average size, already small in many cases, may have declined.<sup>162</sup> In more general terms, it has been noted that it is much more difficult to increase the output per worker when the ratio between agricultural workers and land is high or when their total number is growing, such as is still the case in most developing countries, than when the size of the agricultural labour force is shrinking, as it is in the developed countries.<sup>163</sup>

68. Although general studies on the subject suggest the existence of a negative association between agricultural density and the productivity of agricultural labour,<sup>164</sup> little is known about the actual relations between the two. Clark in an early study found that production per farm-worker varied inversely with the square root of male workers per thousand hectares of farm land.<sup>165</sup> In a later study a comparison of the number of persons engaged in agriculture per square kilometre of cultivable land with

<sup>161</sup> For a discussion of the literature on underemployment and the productivity of labour in densely populated, developing countries see chapter XIII, sections C and D.

<sup>162</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1965* (1965), p. 66; United Nations, *Towards Accelerated Development ...* (1970), p. 1.

<sup>163</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1955* (1955), p. 144; Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), p. 69; Schaub, "Agriculture's performance ..." (1970); Hayami and Ruttan, "Agricultural productivity differences ..." (1970).

<sup>164</sup> See chapter XIII, section D.

<sup>165</sup> *Ibid.*

the agricultural production per worker for twenty-six countries led Clark to conclude that there was little relation, if any, between the density of settlement and average agricultural product per head.<sup>166</sup> A comparison of agricultural workers per 100 hectares of agricultural land and output per agricultural worker in twenty-three countries suggested a general, but not completely consistent tendency for product per worker to be higher where the number of workers relative to the agricultural land was lower.<sup>167</sup>

69. From comparisons of the productivity of land and that of labour in forty-three countries, Hayami and Ruttan concluded that the relation between the two varied according to the availability of land. They found that the data revealed three different patterns: (1) high productivity per worker was associated with particularly favourable man-land ratios, including such cases as New Zealand, Australia and the United States; (2) comparatively low productivity per worker was associated with high output per hectare, as exemplified in particular by Japan and Taiwan in Asia; and (3) intermediate levels of productivity of both land and labour, were found in cases where land endowment falls between the two other groups, examples being the Netherlands, Denmark and Belgium.<sup>168</sup>

70. Another factor, which sometimes has been mentioned in connexion with population is the ceiling imposed on agricultural production and productivity and the limited domestic market for farm products in the developing countries.<sup>169</sup>

71. The fact that in many developing countries food production has recently lagged behind demand indicates that this ceiling has not yet been reached. It has also been recognized, however, that the effect on food production and the productivity of labour resulting from the higher demand associated with the growth of the non-agricultural population usually remains small until the stage of development has been reached where the agricultural population starts declining not only in relative, but especially in absolute terms.<sup>170</sup>

### 3. POSSIBILITIES OF INCREASING FOOD SUPPLIES

72. The continued rapid increase of population in the developing countries is a main determinant of the future requirements and demand for food, and the possibilities of increasing food supplies sufficiently are among the major issues faced by these countries. There is a measure of agreement that, even though other sources of food exist and need to be explored, the greater part of the increased

food supply in the immediate future must be provided through the increased production of farm crops and rapid agricultural development.<sup>171</sup> Most of the production needed to meet the increased requirements and demand, it is generally agreed, should take place within the developing countries themselves. Although it is recognized that these countries do not necessarily have to aim at complete self-sufficiency in food production,<sup>172</sup> it has also been pointed out that they cannot depend for the solution of their food problem on foreign trade or aid, but that substantial and rapid increases in domestic food production are essential.<sup>173</sup>

73. Virtually all authors agree that the potential for large increases in agricultural and food production exist,<sup>174</sup> but that the problem is that of the application of the necessary technology and the creation of the social and institutional conditions conducive to rapid agricultural development.<sup>175</sup> The important role of social, cultural and institutional factors in traditional agriculture is generally recognized,<sup>176</sup> but substantial differences of opinion remain as to what extent such factors as social organization and institutions, family systems and individual attitudes and motivations constitute an obstacle to agricultural development. According to one view, traditions will only change slowly and are likely to hold back progress. This opinion, however, is contested by others, who argue that given sufficient opportunities and incentives, the farmers in the developing countries will readily adopt modern methods.<sup>177</sup>

<sup>171</sup> United Nations, *Human Fertility and National Development* . . . (1971), p. 19; United States President's Science Advisory Committee, *The World Food Problem* . . . , vol. 1 (1967); Kristensen, "The approaches and findings of economists" (1967).

<sup>172</sup> However, in many developing countries, special emphasis has been given to a greater degree of self-reliance on food. See Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1971* (1971), pp. 3, 10; ———, *The State of Food and Agriculture, 1970* (1970), pp. 155, 160-162; United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1969* (1970), pp. 22-24; United Nations, *World Economic Survey, 1969-1970* (1971), pp. 118-122.

<sup>173</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1970* (1970), pp. 131-132; Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 52-54, 58; United States President's Science Advisory Committee, *The World Food Problem* . . . , vol. 1 (1967), p. 17; Brown, *Man, Land and Food* . . . (1963), pp. 98-99; Sen, "The impact of population growth . . ." (1967); Taeuber, "Demographic aspects of agricultural development . . ." (1966).

<sup>174</sup> However, pessimistic views in this respect have been expressed. See, for instance, Borgstrom, *Too Many* . . . (1969).

<sup>175</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), p. 95; ———, *The State of Food and Agriculture, 1968* (1968), pp. 95, 100-111; Pawley, *Possibilities of Increasing* . . . (1963), p. 223; United Nations, *Human Fertility and National Development* . . . (1971), p. 19; Taeuber, "Demographic aspects of agricultural development . . ." (1966).

<sup>176</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1967* (1967), pp. 75-79; United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations* . . . (1965), pp. 75-76.

<sup>177</sup> Political and Economic Planning, *World Population and Resources* (1959), pp. 35-38; Cépède, Houtart and Grond, *Nourrir les hommes* (1963), pp. 334 ff.; Harrar, "Principles and problems of increasing . . ." (1960); Schultz, *Transforming Traditional Agriculture* (1965).

<sup>166</sup> Clark, "Population growth and living standards" (1953).

<sup>167</sup> United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations* . . . (1965), pp. 64-65, table 49.

<sup>168</sup> Hayami and Ruttan, *Agricultural Development* . . . (1971), pp. 69-71, figure 4-1.

<sup>169</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1955* (1955), pp. 143-144; ———, *The State of Food and Agriculture, 1959* (1959), pp. 143-144.

<sup>170</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1963* (1963), pp. 126-127; ———, *The State of Food and Agriculture, 1968* (1968).



74. Certain organizational and institutional changes are considered essential for agricultural progress in the developing countries. In many of these countries the system of land tenure is seen as a major obstacle to raising productivity. Small and fragmented holdings may limit severely the opportunities and profitability of introducing new techniques and unsatisfactory land tenure relationships may negatively affect producers' incentives and mobility and create excessive income inequalities.<sup>178</sup> Rapid population growth may increase these problems and, especially in the densely settled areas, give rise to a demand for such reforms.<sup>179</sup> The importance of education and training for farmers and the provision of efficient extensive services have been stressed as a means of creating the incentives for taking advantage of existing technological possibilities.<sup>180</sup> Other organizational and institutional changes often mentioned include the creation of credit facilities in order to provide the substantial funds required for the application of improved technology; adequate channels of marketing, transport and storage so as to make possible the efficient supply of the new inputs, such as fertilizers and pesticides, which form part of the new technology, as well as the sale of the increased output; the use of price subsidies and price stabilization measures so as to strengthen the farmer's incentives and to assure farmers' income and so forth.<sup>181</sup> In a broad sense, as has been noted before,<sup>182</sup> agricultural development depends to a large extent on over-all economic and social development and is unlikely to succeed unless it is part of the general process of growth and transformation.

75. Although on a global scale and in many individual countries considerable possibilities remain for increasing the land under cultivation<sup>183</sup> and organized settlement schemes have been undertaken in some areas,<sup>184</sup> it is

<sup>178</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* . . . , vol. 2 (1970), chap. 11; ———, *The State of Food and Agriculture, 1968* (1968), pp. 100-101; United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations* . . . (1965), p. 35; Russell, *World Population and World Food Supplies* (1954), p. 64; Bridger and de Soissons, *Famine in Retreat?* . . . (1970), pp. 82-88; Mellor, *The Economics of Agricultural Development* (1966), chap. 14; Myrdal, "Political, social and economic aspects . . ." (1971).

<sup>179</sup> Warriner, "Land reform and economic development" (1964). See also Cépède, "Relationship between population pressure . . ." (1967).

<sup>180</sup> United Nations Educational, Scientific and Cultural Organization, *Education and Agricultural Development* (1963); Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1968* (1968), pp. 102-103; Schultz, *Transforming Traditional Agriculture* (1964); Bridger and de Soissons, *Famine in Retreat?* . . . (1970), pp. 153-167.

<sup>181</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1968* (1968), pp. 116-143; United States Department of Agriculture, *Changes in Agriculture in 26 Developing Nations* . . . (1965), pp. 81-87, 97-109; Abbott, "The role of marketing . . ." (1960).

<sup>182</sup> See section A.

<sup>183</sup> See the discussion earlier in this section.

<sup>184</sup> For a general discussion of such schemes see Lewis, "Thoughts on land settlement" (1954); Mellor, *The Economics of Agricultural Development* (1966), pp. 185 ff.; Bridger and de Soissons, *Famine in Retreat?* . . . (1970), pp. 92-95. For aspects related to population growth and pressure see Omaboe, "The population pressure . . ." (1967).

generally agreed that increases in agricultural and food production will depend mainly on increasing the productivity of the land already under cultivation. A great number of measures can be taken to raise the productivity of land, including: the greater use of machinery and capital equipment,<sup>185</sup> the increase in irrigated area and the better use of water; product diversification and crop rotation as well as the substitution of direct food production for livestock production;<sup>186</sup> a greater use of fertilizers and soil conservation practices; more protection against pests and diseases; the use of improved seeds; improvements in livestock production and forestry and farm management in general.<sup>187</sup>

76. Special attention has been given in recent years to the results of the application of the new technology in the cultivation of cereals. The availability and spread of the high-yielding varieties of rice, wheat and maize have increased production of the crops greatly in a number of countries and created the expectation of a "green revolution".<sup>188</sup> While these developments may be the beginning of a reversal of the unsatisfactory trends in food production in the developing countries and of the increasing productivity gap between them and the more developed countries, such a process will not be automatic or without problems. For the "green revolution" to succeed it will be necessary not only that the gains so far made be maintained but also that the technical breakthrough—confined largely to rice and wheat and mainly to certain areas or countries, especially in Asia—be extended to other developing countries and other crops, and to farm products in general through further agricultural research and development.<sup>189</sup> Moreover, the dissemination of the new varieties depends on certain conditions, which are not unlike those required for agricultural development along more traditional lines. In the case of rice, for

<sup>185</sup> As has been pointed out by a number of writers, there are limitations both of an economic and social nature to the degree of mechanization, such as the effect it may have on displacement of labour. Christensen, "Technologies of increasing food production" (1952).

<sup>186</sup> The importance of feed consumed by livestock as part of total food production has been stressed by various writers. See especially Borgstrom, *The Hungry Planet* . . . (1965), chap. 1.

<sup>187</sup> Food and Agriculture Organisation of the United Nations, *The State of Food and Agriculture, 1970* (1970), pp. 139-141; Cépède, Houtart and Grond, *Nourrir les hommes* (1963), pp. 321-326; Pirie, "Future sources of food supply . . ." (1962) and his *Food Resources, Conventional and Novel* (1969), pp. 33-73; Brown, *Man, Land and Food* . . . (1965), pp. 103-114; Christian, "The use and abuse of land . . ." (1965); Baade, *Der Wettlauf zum Jahre 2000* . . . (1967), pp. 35-46; Fischnich, "The possibilities of expanding . . ." (1967); Paarlberg, "Food for more people . . ." (1969); Bridger and de Soissons, *Famine in Retreat?* . . . (1970).

<sup>188</sup> Brown, *Seeds of Change* . . . (1970) and his "The agricultural revolution in Asia" (1968); d'A Shaw, *Jobs and Agricultural Development* . . . (1970), pp. 6-7; 11-13. See also Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1971* (1971), p. 5; United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1969* (1970), pp. 31 ff.

<sup>189</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1970* (1970), pp. 163-165; ———, *The State of Food and Agriculture, 1971* (1971), pp. 3-6; United Nations, *Strategy Statement on Action to Avert the Protein Crisis in the Developing Countries* (1971), pp. 19-21; ———, *World Plan of Action for the Application of Science and Technology to Development* (1971), pp. 7-8, 145-150.

instance, it was held that the success of high-yielding varieties was influenced by such factors as water control; efficiency of plant protection or resistance to pests and diseases; the yield advantage over existing varieties; the quality of new rice grains; the availability of complementary inputs; efficiency of farm management and so forth.<sup>190</sup> Finally, it has been noted that the success achieved in increasing the output of the cereals concerned creates its own problems, including the difficulties in the disposal of surpluses that have been created as a result of the rapid increase of production, the price and supply relationships; the greater concentration in holdings which may be the result of possible economies of scale with respect to the new varieties and the potential negative effect their cultivation may have on employment.<sup>191</sup> While the introduction of the high-yielding varieties is generally seen as a potential breakthrough in agricultural production, there is also a measure of agreement that for the latter to happen, continued efforts will be needed to remove the existing constraints for a wider application and to remedy the possible less favourable consequences which such a wider use might create.

77. Although agriculture is by far the main source of food supply and likely to remain so for a long period, increasing attention has been given in recent times to alternative possibilities of obtaining food, especially by using the available fishery resources and through the development of non-conventional food resources. It is estimated that while at present only between 1 and 2 per cent of the total food supply consists of fish,<sup>192</sup> fishery resources in oceans and fresh waters are such that they could provide a substantially greater proportion. Even so, there are limits to the catch that can be obtained by present-day methods: it has been estimated that the potential catch of marine fish could increase between 2 and 3 times over the 1965 level.<sup>193</sup> In addition, it is held that there are considerable opportunities for increasing food supplies through unconventional methods. Such methods could include the production of artificial food, the use of marine plankton and the cultivation of algae; the use of micro-organisms as converters of food; the extraction of

proteins from non-food materials (such as leaves) and so forth.<sup>194</sup>

78. In general, it is held that the problem of increasing food supply and agricultural production is not one of a lack of technological knowledge, but of the application of such technologies on a sufficient scale and where needed.<sup>195</sup> Under these circumstances, effective policies to mobilize capital and human resources, to implement the necessary organizational and institutional changes, together with efforts to reduce excessive rates of population growth are essential prerequisites and conditions for ensuring adequate food supplies, nutrition and levels of living of the population.

#### D. Outlook and projections

79. The outlook for feeding an increasing population has been a subject of speculation for a long time,<sup>196</sup> but has received special attention in recent decades in response to both the rapid growth of population and the desire for development and aspirations for higher levels of consumption. Since an increase in food requirements and demand—not necessarily accompanied by a proportionate increase in food production—is among the major implications of population growth, one of the main causes for concern over demographic trends in the developing countries stems from doubts about their ability to produce sufficient food to keep pace with rising population and economic demand.

80. The assessment of the possibilities of feeding a growing population in the future involves various elements. Basically, it consists of a comparison, by means of projections, of requirements of and demand for food, on the one hand, with the production of food, on the other. Projection studies stress the differences between requirements and demand: projections of requirements set out what food supplies should be to feed a growing population at the desirable nutritional standards, while those of effective demand for food attempt to predict how much food is likely to be asked for under the influence of changes in levels of income and population. However, although "effective demand" or market demand projections do not explicitly take into account nutritional requirements and, conversely, projections of nutritional requirements make no explicit allowance for consumers' preferences, the two are not completely unrelated.<sup>197</sup>

<sup>190</sup> Barker, "Economic aspects of high-yielding varieties ..." (1969); Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1970* (1970), pp. 163-164; United Nations Economic Commission for Asia and the Far East, "Planning strategies in agriculture" (1969); Johnson and Couston, "High-yielding varieties ..." (1970).

<sup>191</sup> Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1969* (1969), p. 12; ———, *The State of Food and Agriculture, 1970* (1970), p. 162; ———, *The State of Food and Agriculture, 1971* (1971), pp. 88-89; United Nations Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1969* (1970), pp. 42-43; Barker, "Economic aspects of high-yielding varieties ..." (1969); Abercrombie, "Population growth and agricultural development" (1969); Myrdal, "Political, social and economic aspects ..." (1971).

<sup>192</sup> Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 16-17; Brown, *Man, Land and Food* ... (1965), p. 34; Cépède, Houtart and Grond, *Nourrir les hommes* (1963), p. 318; Christian, "The use and abuse of land ..." (1965).

<sup>193</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development*, vol. 1 (1970), p. 280. See also Pirie, *Food Resources. Conventional and Novel* (1969) p. 135.

<sup>194</sup> Pirie, "Future sources of food supply ..." (1962) and his *Food Resources. Conventional and Novel* (1969); Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 86-88; Russell, *World Population and World Food Supplies* (1954), pp. 498-501.

<sup>195</sup> Taeuber, "Demographic aspects of agricultural development ..." (1967).

<sup>196</sup> Among the first to speculate about such possibilities was, of course, Malthus.

<sup>197</sup> Thus, demand projections generally imply that as incomes rise the consumer will not only buy more but will also change the patterns of his diet in ways that generally improve its nutritional quality. Likewise, in projections of requirements, translated into requirements for different quantities of food, care is taken to ensure that suggested changes in food consumption do not show a radical change and will cost the least to the consumer and that they are generally feasible from the points of view of the economy and production. Food and Agriculture Organization of the United Nations, *Third*

(Continued on next page)

## 1. PROJECTIONS OF REQUIREMENTS

81. Fundamentally, projections of food requirements involve the formulation of food or nutritional targets or standards for *per capita* consumption and estimates of expected future population. As part of its third world food survey, the Food and Agriculture Organization of the United Nations established international nutritional and food supply targets, especially with a view to reducing the extent of undernutrition and malnutrition in the developing countries, and derived total food requirements by means of population projections.<sup>198</sup> Targets aimed at ensuring the quantitative adequacy of the diet were expressed in terms of *per capita* daily calorie requirements, while targets for improving the nutritional quality of the food included *per capita* daily requirements of total and animal proteins—including the ratio between the two—and the percentage of total calories derived from proteins. Targets for principal food groups (cereals, starchy roots, sugar, meat, eggs etc.) were computed, taking into account nutritional targets and certain other conditions such as the cost of food to the consumer.<sup>199</sup>

82. Short-term targets for calories, based on physiological requirements and making allowance for different consumption levels of different social strata and of different family members, were set at 2,550 calories daily per head world-wide, and at 2,350 calories for the "low calorie" or developing countries. The long-term targets were increased by 50 to 100 calories to allow for increases in height and body weight of adults, resulting in a world-wide requirement of 2,600 calories per person per day and 2,450 in the low-calorie countries. Short-term total protein targets for the world were set at 75 grammes daily per person and 69 for the low-calorie countries. The corresponding animal protein requirements were 23 and 15 grammes per head daily, respectively. Long-term targets were 79 grammes of total protein for the world and 74 for the low-calorie countries and animal proteins of 28 and 21 grammes per person, respectively.<sup>200</sup>

83. The expected growth in population for the target dates<sup>201</sup> indicated that world food supplies would need to be increased by 36 per cent between 1958 and 1975 and by 123 per cent by the year 2000, merely to maintain

the existing, unsatisfactory levels of nutrition. If improvements in the diet, as formulated in the nutritional targets, were to be brought about, food supplies would have to expand 50 per cent between 1958 and 1975 and 175 per cent between the base year and 2000. In the low-calorie countries, with population increasing much more rapidly than in the world as a whole, or in the high-calorie countries, the growth in population alone would require increases in food supplies of 41 per cent between 1958 and 1975 and of 150 per cent by the year 2000. Attainment of the nutritional requirements set for these countries would raise total food needs in 1975 by 79 per cent and in 2000 by 293 per cent. For specific food groups the fulfilment of targets would mean, in most cases, even higher increases. In the case of animal products, for instance, the corresponding percentage increases would be 120 and 485 per cent for 1975 and 2000, respectively.<sup>202</sup>

84. Using a similar method, but more recent population projections with the base year 1965, Sen derived estimates of food requirements for 1985 and 2000.<sup>203</sup> The projected world population implied that food supplies would have to be raised by 34 per cent between 1965 and 1980 and by 97 per cent between 1965 and 2000, implying for both periods rates of growth of 2.0 per cent annually. For the developing regions, the percentage increase in population and thus the total requirements needed to prevent a decline in the existing levels of nutrition would be 41 per cent between 1965 and 1980 and nearly 120 per cent by the year 2000, implying growth rates of about 2.2 and 2.3 per cent annually. If nutritional targets are to be met, however, food requirements would be substantially higher, as shown in table XII.19. In order to remove existing deficiencies in diet, according to these estimates, *per capita* total food supplies would have to be increased by one quarter and food of animal origin by nearly one half between 1965 and 1980. Given the projected population estimates, this would mean that total food supplies would have to expand by three quarters and animal foods would have to double. The achievements of these targets would require that total food supplies in the developing regions would have to be increased at an annual rate of 3.8 per cent, and animal food supplies at 5.1 per cent. Projections beyond 1980 to the end of the century show some decline in the annual growth rates of food requirements in nearly all developing regions.

85. Table XII.19 also shows that there is considerable variation among the different developing regions in the growth rates of *per capita* food requirements. This results from variations in the present levels of *per capita* consumption in these regions and the fact that attainment of nutritional targets calls for faster growth rates in those areas where nutritional deficiencies are greatest. Thus, *per capita* food supplies in the Far East would have to increase by 1.7 per cent annually between 1965 and 1980, compared to only 0.7 per cent in Latin America. However, when total food supplies are considered, the differences

(Footnote 197 continued)

World Food Survey (1963), pp. 59-63; Cépède and Lengellé, *Economie alimentaire du globe* ... (1953), pp. 42-46; Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* ..., vol. 1 (1970), p. 12.

<sup>198</sup> See Food and Agriculture Organization of the United Nations, *Third World Food Survey* (1963). See also Sukhatme, "The world's hunger ..." (1961); Pawley, *Possibilities of Increasing* ... (1963), pp. 11-28; Sukhatme and Schulte, "Forecasts of nutritional requirements ..." (1967); Sen, "The impact of population growth ..." (1967); Abercrombie, "Food and agriculture" (1970).

<sup>199</sup> For the method followed in reconciling requirements based on nutritional targets with requirements in terms of principal food groups, see Sukhatme, "The world's hunger ..." (1961), pp. 496-499.

<sup>200</sup> See Food and Agriculture Organization of the United Nations, *Third World Food Survey* (1963), chaps. 1 and 5-7. As discussed in section B of this chapter, the Food and Agriculture Organization of the United Nations has recently issued new, and substantially lower, estimates of protein requirements.

<sup>201</sup> The population projections used were revised United Nations projections.

<sup>202</sup> Food and Agriculture Organization of the United Nations, *Third World Food Survey* (1963), pp. 70-74.

<sup>203</sup> Sen, "The impact of population growth ..." (1967).

TABLE XII.19. PROJECTED TOTAL AND *per capita* INCREASES IN REQUIREMENTS FOR ALL FOOD AND ANIMAL FOODS, FOR DEVELOPING REGIONS, 1965-1980 and 1965-2000

Region	1965-1980				1965-2000			
	All foods		Animal food		All foods		Animal food	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
<i>Percentage increases</i>								
All developing regions .....	75	24	112	47	226	53	379	123
Far East (including China) .....	79	29	120	58	244	72	454	176
Near East .....	75	17	121	48	181	17	255	48
Africa .....	66	14	108	41	220	28	369	86
Latin America .....	71	12	89	23	185	12	214	23
<i>Average annual rate of increase (percentage)</i>								
All developing regions .....	3.8	1.4	5.1	2.6	3.4	1.2	4.6	2.3
Far East (including China) .....	4.0	1.7	5.4	3.1	3.6	1.6	5.0	2.9
Near East .....	3.8	1.0	5.4	2.6	3.0	0.4	3.7	1.1
Africa .....	3.4	0.9	5.0	2.3	3.4	0.7	4.5	1.8
Latin America .....	3.6	0.7	4.3	1.4	3.0	0.3	3.3	0.6

SOURCE: Sen, "The impact of population growth on food supplies" (1967).

are much smaller, as the population is projected to increase more slowly in those regions where the increase in *per capita* food requirements is greatest.

86. Calculations of long-term needs for food supplies have also been prepared by the Organisation for Economic Co-operation and Development. Total requirements for the year 2050 were determined on the basis of population projections and assumptions on calorie and animal protein requirements (taking into account the prevailing levels of consumption in the most advanced countries and the effects of new techniques in protein production). According to these calculations, primary calories—that is food and feed crops—would have to multiply about fivefold for the world between 1960 and 2050, and for the less developed countries some eight to nine times. In the developed countries, where increases in consumption were assumed to be much slower, requirements would little more than double.<sup>204</sup>

87. The role of population growth in future food requirements is substantial. As seen above, the increase in population accounts for about half of the total increase in short-term and long-term food requirements for the developing regions, according to estimates in the third world food survey. Sen's estimates, based on revised population projections, show an even higher share of total increase in food requirements in the developing regions attributable to the increase in population. The long-term projections prepared by the Organisation for Economic Co-operation and Development show, in the case of the developing regions, an eight-to-ninefold increase in requirements, while the population was expected to multiply 4.5 times. In the developed regions, where only small further improvements in *per capita* requirements were considered necessary, a population increase of somewhat over 100 per cent (to the year 2050) was accompanied by an increase in total consumption of 130 per cent.

<sup>204</sup> Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 32-34, table I.4.

88. The effect of decreases in population growth on future food requirements can be estimated from another study. On the basis of two different assumptions of future fertility levels, implying annual population growth rates of 2.1 and 1.7 per cent, respectively, between 1965 and 1985, total calorie requirements were estimated to increase 52 per cent for the high-fertility variant and 42 per cent for the low-fertility variant.<sup>205</sup>

## 2. PROJECTIONS OF DEMAND

89. Projections of effective demand are, as a rule, based on trends in population and income. Although, as noted above, various population characteristics may affect demand,<sup>206</sup> the size and growth of population are generally considered to be by far the most important and are, therefore, generally singled out for purposes of projections. In the case of income, however, allowance must be made not only for its growth but also for the fact that the demand for food varies with the levels of income, as reflected in the income elasticity of demand. At different levels of income, changes in the latter may lead to a different proportional increase in the demand for food.<sup>207</sup>

90. Various recent projections of the Food and Agriculture Organization of the United Nations have included projections of demand for food.<sup>208</sup> One published in 1967<sup>209</sup> was based on food balance sheets, initially prepared for the period 1961 to 1963, showing *per capita* consumption of all food items in the diet. On the basis

<sup>205</sup> United States President's Science Advisory Committee, *The World Food Problem* . . . , vol. 2 (1967), pp. 27, 49.

<sup>206</sup> See section D. The factors discussed there include, besides population growth, its sex and age composition, and the rural-urban distribution of population.

<sup>207</sup> See section B of this chapter.

<sup>208</sup> An earlier projection was published in 1962. See Food and Agriculture Organization of the United Nations, *Agricultural Commodities Projections* . . . (1962).

<sup>209</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodities—Projections* . . . , vols. 1 and 2 (1967).

TABLE XII.20. PROJECTED GROWTH OF DEMAND FOR FOOD AND SHARE DUE TO POPULATION INCREASE,<sup>a</sup> FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-1985

Major areas and regions	Average annual increase in food demand (percentage)				Share of increase in food demand due to population increase			
	1965-1975		1975-1985		1965-1975		1975-1985	
	Low gross domestic product assumption	High gross domestic product assumption	Low gross domestic product assumption	High gross domestic product assumption	Low gross domestic product assumption	High gross domestic product assumption	Low gross domestic product assumption	High gross domestic product assumption
World .....	2.3	2.7	2.3	2.7	90	74	91	73
More developed market economies .....	1.6	1.8	1.5	1.8	71	60	75	62
North America .....	1.6	1.7	1.7	1.8	91	86	92	87
Western Europe .....	1.1	1.4	1.0	1.3	52	42	50	38
Southern Europe .....	2.2	2.9	2.1	2.6	70	53	71	56
Japan .....	2.5	3.1	1.7	2.6	35	28	48	32
Oceania .....	1.8	1.8	1.9	2.0	95	92	96	92
Developing market economies .....	3.1	3.8	3.0	3.9	84	68	82	65
Far East .....	3.0	3.9	3.0	4.0	82	65	79	58
Near East .....	3.3	4.1	3.6	4.2	81	66	77	65
Africa .....	2.8	3.6	3.1	3.9	88	70	86	69
Latin America .....	3.1	3.6	3.0	3.4	91	80	91	81
Centrally planned economies .....	2.3	2.8	2.3	2.7	75	62	79	66
Eastern Europe and USSR .....	2.0	2.3	1.8	2.1	57	50	60	53
Asian centrally planned economies ....	2.7	3.4	2.7	3.3	73	58	76	62

SOURCE: Food and Agriculture Organization of the United Nations, *Agricultural Commodities—Projections* ..., vol. 1 (1967), p. 34.

Note: countries included in each region are listed in Food and Agriculture Organization of the United Nations, *Agricultural Commodities—*

*Projections* ..., vol. 2 (1967), statistical appendix, tables 1.1 and 1.2, pp. 1-4, 6-9.

<sup>a</sup> The remainder is due to the income effect.

of the quantities of food consumed in the base period, the *per capita* demand for food was projected, assuming constant prices and taking into account the income elasticities of demand. Income elasticities and appropriate demand functions were selected on the basis of the analysis of historical data, results of food consumption surveys and intercountry comparisons. *Per capita* projections were multiplied by the projected population in 1975 and 1985 to obtain national totals of food demands and these results were then aggregated by commodities and commodity groups to obtain regional and world totals.<sup>210</sup>

91. The annual growth rates of demand for food implied under different variants of these projections are shown in table XII.20. The variants presented are based on the United Nations medium population projections and two different assumptions regarding the future growth of gross domestic product: a lower rate broadly conforming to recent trends and a higher rate based on targets formulated in national plans or announced otherwise.<sup>211</sup> According to these projections, world demand for food was estimated to increase at an annual rate of 2.3 per cent under the low gross domestic product assumption and 2.7 per cent under the high variant. These rates remained unchanged during the two decades of the projection period. For the developing regions food

demand was projected to increase at a rate about twice as fast or more than in the developed regions. For the former regions, under the low gross domestic product assumption, the annual growth rate in demand was 3.0-3.1 per cent, as compared to 1.5-1.6 per cent for the more developed regions. The lowest projected growth rates for food demand were in Western Europe and the highest in the Near East.

92. As part of these projections, estimates were also obtained of the levels of expected future calorie consumption and their relation to requirements. For most of the developed regions, where consumption generally exceeded requirements in the base period, consumption was expected to rise only slightly under all variants. More substantial increases were projected for Japan and Southern Europe, where initial calorie consumption was also relatively low. In all of the major developing regions calorie intake was estimated to be below needs in 1962, but was projected to exceed requirements in all cases by 1975, if only by a small margin under the low gross domestic product (GDP) assumption. Substantial improvements in calorie consumption were foreseen in all these regions by 1985 under the assumption of high GDP growth.<sup>212</sup>

93. Projections of the future demand for food with special reference to the developing countries were prepared more recently as part of a study of the food supply and agricultural development problems faced by these

<sup>210</sup> *Ibid.* On the methodological aspects of the study see also Goreux, "Prospects for agricultural ..." (1969).

<sup>211</sup> The published projections contained two additional variants for the 1975-1985 period, based on the United Nations low population projections, combined with the two assumptions on growth of domestic product.

<sup>212</sup> See Food and Agriculture Organization of the United Nations, *Agricultural Commodities—Projections* ..., vol. 1 (1967), table 7 p. 36.

countries.<sup>213</sup> According to these projections, total food demand in the developing countries would increase by 142 per cent between 1962 and 1985, with percentage increases amounting to about 120 per cent in Latin America and in Africa south of the Sahara, over 140 per cent in the Near East and north-west Africa, and more than 150 per cent in Asia and the Far East.<sup>214</sup>

94. The most recent of the demand projections prepared by the Food and Agriculture Organization of the United Nations<sup>215</sup> followed basically the same methodology adopted in the earlier studies. For high-income countries, including Eastern Europe and the USSR, only one assumption on growth of domestic product was made, reflecting for the most part recent trends. Two assumptions on the future growth of gross domestic product, based on recent trends and the targets of the Second United Nations Development Decade, respectively, were used for the developing countries and the Asian centrally planned economies.<sup>216</sup> One population projection, based on the medium variant of the United Nations projections as assessed in 1968, was adopted.

95. The projected demand for 1980, based on the assumption that past trends in the growth of gross domestic product would continue, implied annual growth rates of 2.5 per cent for the world, 1.7 per cent for the high-income countries and 3.6 and 3.0 per cent for the developing countries and the centrally planned economies of Asia, respectively.<sup>217</sup> In *per capita* terms, the increase in the demand for food was similar in different regions—with a percentage rise of 7.9 per cent for the world,<sup>218</sup> 7.2 for the high-income countries and 8.2 per cent for the developing countries. Under the high assumption of growth of gross domestic product, the *per capita* demand would expand 8.9 per cent in the high-income countries and 12.8 per cent in the developing countries.<sup>219</sup> Estimates were also prepared of the demand for calories and proteins expected in 1980 and its relation with requirements. The calorie intake per head for the world as a whole was expected to exceed requirements by 5 per cent. The excess of calorie intake over requirements would be more than 20 per cent in the high-income countries, including Eastern Europe and the USSR, but barely 1 per cent in the developing countries. In the Asian

centrally planned economies, calorie consumption was expected to fall 7 per cent short of requirements. The demand for total proteins by 1980 was expected to surpass the recently proposed requirements—which were greatly reduced in comparison with earlier estimates—by a considerable margin both in the more developed and less developed regions.<sup>220</sup>

96. A relatively simple method was used by the Organisation for Economic Co-operation and Development for projecting the future demand for food, in conjunction with projections of production, for the developing countries in the period 1962 to 1985. Total food demand was projected on the basis of one assumption about future population growth, two assumptions of growth of gross domestic product and income available for consumption, and estimates of income elasticity for demand corresponding to each of the income assumptions. According to the low-income estimate, the total demand for food in the developing countries would increase by 3.25 per cent annually. Under the high-income assumption, the annual growth rate would be 3.40 per cent.<sup>221</sup>

97. According to the available projections, the effect of population growth on the increase in the demand for food is considerably greater than the income effect in nearly all regions. Data on the percentage shares of increase in food demand due to population growth, given in table XII.20, show that population growth accounts for the larger share of the projected demand in both developed and developing regions, with the percentages being, on the whole, higher for the latter group of countries. Despite significant expected increases in income and high-income elasticities of demand in these countries, the demographic factor is predominant owing to the rapid rate of population growth. In the economically more advanced regions, the rate of population growth is much lower, but so is the income elasticity of demand. Even under the high-income assumptions for the developed countries, the effect of population growth outranks the income effect for this group as a whole. Of the different subregions, only Western Europe and Japan show lower or about equal shares for population as compared with income in the different variants.

98. The importance of the population factor in estimating the future demand for food in the developing regions is confirmed by the projections for the Provisional Indicative World Plan for Agricultural Development. Of the expected total increase in food demand between 1962 and 1985, more than 70 per cent would be due to population growth compared with less than 30 per cent resulting from the income effect. Among the different regions, population growth accounted for the largest share of total demand in Latin America (88 per cent) as a result of the high rate of population growth and relatively low elasticity of demand for food in that region. In Africa south of the Sahara, north-west Africa and the

<sup>213</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* (1970). See also ———, *Provisional Indicative World Plan for Agricultural Development. Summary and Main Conclusions* (1970).

<sup>214</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* . . . , vol. 1 (1970), table 2, p. 15.

<sup>215</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodity Projections* . . . , vol. 1 (1971). Although these are the most recent demand projections published by the Food and Agriculture Organization of the United Nations, the 1967 projections are used for the most part in this chapter because of their greater regional detail and longer projection period.

<sup>216</sup> Most of the projections used and the results published were based on the low assumption of growth of gross domestic product.

<sup>217</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodity Projections* . . . (1971), table 1, p. 25.

<sup>218</sup> *Ibid.*, table 3, p. 30. Data exclude the Asian centrally planned economies.

<sup>219</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodity Projections* . . . (1971), table 5, p. 33.

<sup>220</sup> *Ibid.*, table 4, p. 31 and table 6, p. 57. See section B of this chapter for a discussion of the revised calorie and protein requirements used in these projections.

<sup>221</sup> Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), pp. 22-26, tables 1.2 and 1.3.

Near East, the corresponding proportion was about three quarters, and in the Far East about two thirds.<sup>222</sup>

### 3. PROJECTIONS OF PRODUCTION AND THE RECONCILIATION OF DEMAND AND SUPPLY

99. The main interest in estimating future food requirements and demand lies in their relation to the expected levels of supplies. Although the latter include both home-produced food as well as the balance of imports and exports, projections of production serve to determine the capacity of domestic production to satisfy requirements or demand as well as to indicate the possible need for imports. Production projections are especially relevant in view of the food problem of the developing countries associated with rapid population growth. By revealing possible imbalances, they make it possible to indicate the direction of economic changes and policy measures necessary to adjust supply and demand.

<sup>222</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* . . . , vol. 1 (1970).

100. The projection of production is recognized to be a much more difficult task than that of demand.<sup>223</sup> The relationships between the productivity and output of agriculture, on the one hand, and its inputs—particularly land, labour and capital—are complex. Apart from these factors, many other ones—technological progress and changes in agricultural policies, to name but two—may considerably alter the volume and growth of production. However, in spite of their limitations, projections of production in conjunction with those of demand are, as noted, helpful in providing a basis for the understanding of the food problem, particularly that facing the developing countries.

101. Although it is generally accepted that the problem of increasing food supplies and output will depend mainly on raising agricultural productivity and that labour is an important factor in this regard, in practice most production projections do not directly take into account the effects on agricultural production of the population factor, operating through its effect on the

<sup>223</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodities—Projections* . . . , vol. 1 (1967), pp. 12-13.

TABLE XII.21. AVERAGE ANNUAL GROWTH RATES OF PRODUCTION AND DEMAND FOR FOOD, FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1953-1975

Major areas and regions	Production trends		Production projections, 1962-1975		Demand projections, 1962-1975	
	1953-1963	1958-1963*	Low gross domestic product assumption	High gross domestic product assumption	Low gross domestic product assumption	High gross domestic product assumption
World .....	2.8	2.6	2.3	2.7	2.3	2.7
More developed market economies .....	2.4	2.7	2.0	2.1	1.7	1.9
North America .....	1.8	2.0	1.9	2.0	1.6	1.6
European Economic Community .....	2.3	3.2	1.8	2.0	1.4	1.7
Northern Europe .....	2.3	3.4	1.6	1.8	0.9	1.1
Southern Europe .....	3.8	2.9	2.3	2.7	2.4	3.0
Japan .....	3.6	2.3	2.5	2.6	2.8	3.3
Oceania .....	3.5	4.8	2.2	2.5	1.9	1.9
South Africa .....	3.6	3.9	3.0	3.4	3.1	3.6
Developing market economies .....	3.0	2.9	2.8	3.6	3.2	3.7
Far East .....	3.0	3.0	2.8	3.5	3.2	3.9
India .....	2.6	2.5	2.9	3.8	3.3	3.8
Near East .....	3.2	2.5	2.3	3.6	3.4	4.0
Africa .....	2.5	2.9	2.8	3.5	2.9	3.4
Latin America .....	3.0	2.5	3.0	3.6	3.2	3.5
Centrally planned economies .....	...	...	2.4	2.8	2.5	2.8
Eastern Europe and USSR .....	4.2	2.1	2.1	2.5	2.1	2.3
Asian centrally planned economies .....	...	...	2.7	3.0	3.4	2.9

SOURCE: Food and Agriculture Organization of the United Nations, *Agricultural Commodities—Projections* . . . , vol. 1 (1967), p. 48.

Note: countries included in each region are listed in Food and Agriculture Organization of the United Nations, *Agricultural Commodities—Projections* . . . , vol. 2 (1967), statistical appendix, tables 1.1 and 1.2, pp. 1-4, 6-9.

\* Computed from three-year averages for 1957-1959 and 1962-1964.



labour force. The effects of population and labour force growth are usually treated implicitly through assumptions concerning the rate of increase in the productivity of agricultural labour. Sukhatme and Schulte have noted the difficulties in assessing the possible effects of population on food production in areas where a large proportion of the population is dependent on agriculture.<sup>224</sup>

102. Several projections of food production on a world-wide scale have been prepared by the Food and Agriculture Organization of the United Nations. Past trends and projections of food production and corresponding projections of demand, published in 1967, are presented in table XII.21. The data suggest that, for the world as a whole, production trends are expected to be capable of meeting the growing demand, since the rates of increase of projected production exactly match those of projected demand during the period 1962-1975. World-wide projections, however, conceal imbalances in demand and production between the more developed and less developed regions. Under the low-income assumption, demand was expected to outpace production by a substantial margin in the developing regions, while the relationship between demand and production was the reverse in the developed regions. The high-income assumption implied a great deal less disparity between demand and production, although even on this basis, production was not expected to quite match demand in the developing regions, while it would slightly exceed demand in the developed regions. The gap between demand and production varied considerably within the group of developing regions. It was especially large in the Near East under the low-income assumption, but even under the high-income assumption it was substantial both in the Near East and Far East. Among the more developed regions, a projected large excess of production over demand is seen for Northern Europe, while considerable, though smaller, production excesses also appear for North America, Western Europe and Oceania.

103. Recent projections published in 1971 suggested a somewhat more favourable outlook for the developing regions. According to these estimates, agricultural production in the developing market economies was expected to grow at an annual rate of 3.3 per cent between 1970 and 1980, and at a *per capita* rate of 0.6 per cent. In the high-income countries the corresponding projected rates were 2.1 and 1.1, respectively.<sup>225</sup>

<sup>224</sup> Sukhatme and Schulte, "Forecasts of nutritional requirements . . ." (1967).

<sup>225</sup> Food and Agriculture Organization of the United Nations, *Agricultural Commodity Projections . . .*, vol. 1 (1971), table 1, chap. 1, p. 13.

104. Various comparisons have been made of growth rates in production and demand and their reconciliation, particularly for the developing countries. According to the Food and Agriculture Organization of the United Nations, production in the developing countries would have to increase at an annual rate of 4.3 per cent between 1967 and 1985, compared with an actual average rate of about 2.7 per cent between 1956 and 1966 in order to meet an increased rate of demand of 3.9 per cent between 1962-1985, since production had already remained behind demand for the period 1962 to 1967.<sup>226</sup> According to a study by the Organisation of Economic Co-operation and Development, total food demand was expected to increase, under the high-income assumption, by 3.4 per cent compared with a rate of growth of food production of 3.1 per cent. Under the low-income assumption, the gap would be wider, with total food demand increasing at a rate of 3.25 per cent annually compared with 2.60 per cent for production.<sup>227</sup>

105. In general, comparisons between the demand for and the production of food suggest that, in the developing countries, where two thirds of the world population lives, demand, no matter how it is measured, tends to outpace production. The role of population in this regard is fundamental. Whereas population growth increases requirements for food and, as has been shown, is also by far the main factor in the growth of the demand for food, there is no such direct relation between population and the growth of production. Efforts to narrow the gap between demand and supply must either be directed towards increasing food production to meet demand or else limiting demand so as to reduce it to a level consistent with supplies. The first approach stresses agricultural development in the developing countries as the only solution to their food problem. The second approach, given the importance of the population factor in determining demand, points to the need for stabilizing population growth, the implications of which have been widely studied. Most demographers and economists are of the opinion, however, that the solution to the food problem in the developing countries lies in the combination of efforts to promote agricultural development while simultaneously reducing population growth to a more manageable rate.<sup>228</sup> Even so, in view of the urgency of the food situation in these countries, international trade and aid are seen as essential elements in the short run for the long-term solution to the problem.

<sup>226</sup> Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development . . .*, vol. 1 (1970), pp. 13-14.

<sup>227</sup> Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), table 1.2, p. 23.

<sup>228</sup> See section A of this chapter.

## Chapter XIII

### DEMOGRAPHIC ASPECTS OF SAVINGS, INVESTMENT, EMPLOYMENT AND PRODUCTIVITY

1. Various factors account for the growing interest during recent years in the demographic aspects of economic growth. At the basis of this trend is the widespread preoccupation, especially in the economically less advanced countries, with the problems of economic progress and development. But an important additional element in this evolution was the emergence in these countries of new demographic trends during the past few decades when, as a result of rapidly decreasing mortality and stable, high levels of fertility, an upsurge in population growth, with wide economic ramifications, occurred. Both these factors, together with the better understanding of the processes of economic growth and demographic change, have contributed much to an increased knowledge of the demographic-economic relationship. Nevertheless, this knowledge is far from complete and substantial gaps still persist.

2. This chapter and the following one contain a review of the existing literature on the demographic aspects of economic growth. The present chapter is concerned with the general nature of these relationships and considers, in particular, the influence of population size, composition and distribution, as well as trends and components of population growth on what are among the main direct determinants of economic growth: savings and investment, employment and productivity. Demographic aspects of economic growth in modern times is the subject of the next chapter.

3. Economic growth, in the sense of a sustained increase in national product or income in the aggregate or per head, may be considered to depend primarily upon the nation's resources, the efficiency with which they are used and the institutional framework within which the economy operates.<sup>1</sup> More specifically the output or

product of an economy, given its institutional framework,<sup>2</sup> can be seen as a function of its volume of human, natural and capital resources and their levels of productivity.<sup>3</sup>

4. Population is only one of the many variables which affect the factors of production and, through them, the levels and trends of total and *per capita* income and differences of opinion exist as to the relative importance of the demographic, as compared with other factors. According to some writers, demographic factors have only a limited bearing upon economic growth, while others assert that these factors exert a considerable and, in some cases, even a decisive influence on economic progress. One major reason for a less than complete understanding of these relationships is the lack of adequate data and information. The elucidation of the pertinent relationships is further hampered by the limitations of the analytical framework. It has been pointed out that changes in one factor, such as savings, induced by demographic factors will in turn have effects on the volume, composition and distribution of output. These latter changes will again influence savings in subsequent periods and so forth. Any attempt to take into account these induced effects would necessitate the construction of a comprehensive and fully integrated model of the economy, reflecting not only its existing structure but also its dynamics.<sup>4</sup>

#### A. Demographic aspects of savings

5. Savings and investment, together with financing, are the three stages of capital formation which may be distinguished.<sup>5</sup> Saving may be described as the activity

<sup>1</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 23-46; Adelman, *Theories of Economic Growth and Development* (1961), pp. 8-24; Peterson, *Income, Employment and Economic Growth* (1962), p. 459; Gill, *Economic Development: Past and Present* (1964), pp. 3-22; Meade, *A Neo-classical Theory of Economic Growth* (1964), pp. 8-18; Bruton, *Principles of Development Economics* (1965), pp. 11-20. This approach to the problem of economic growth is not the only one, nor is it without its limitations. Attempts to explain economic growth include, at the one extreme, those approaches where one specific factor, for instance capital formation, is singled out as the moving force of the economy and, at the other extreme, those which involve a compilation of an as nearly complete as possible list of factors relevant to economic growth, including in addition to the direct determinants also indirect causes or conditions of growth. For listings of the many factors which may be involved in economic growth, see Spengler, "Theories of socio-economic growth" (1949); and his "Economic factors in the development ..." (1951). See also Rostow, *The Process of Economic Growth* (1960), chaps. 1 and 3.

<sup>2</sup> On the importance of social, cultural and political institutions for economic growth, in this context, see: Williamson, "Introduction" (1954), pp. 3-21; Kristensen *et al.*, *The Economic World Balance* (1960), pp. 37-38, 49-52; Rostow, *The Process of Economic Growth* (1960), pp. 70-72; Adelman, *Theories of Economic Growth and Development* (1961), pp. 8-24; Gill, *Economic Development: Past and Present* (1964), pp. 19-20. For an attempt to explore some of the relationships between population and non-economic determinants of economic growth, particularly between population growth and structure and qualitative characteristics of the labour force, see Leibenstein, "The impact of population growth ..." (1967).

<sup>3</sup> The specific relationships between population and natural resources are discussed in chapter XI. The demographic aspects of the size, composition and dynamics of the labour force are dealt with in chapter IX.

<sup>4</sup> Faaland, "Demographic aspects of savings ..." (1966), pp. 297-303.

<sup>5</sup> Friend, "The concept and measurement of savings" (1953); National Bureau of Economic Research, *Capital Formation and* (Continued on next page)

by which claims to production which could be exercised in favour of current consumption are not used to that end and so become available for other purposes. Investment is then the activity by which resources are actually committed to the production of capital goods. Financing is the step linking these two other phases of capital formation. Nevertheless, this distinction between the three elements of capital formation is generally relevant only when each of them constitutes a separate act arrived at by different decision-makers. In economies where the forces of the market are the main determinants of supply and demand,<sup>6</sup> savings by individuals or households will mostly satisfy these conditions as opposed to savings in the corporate or public sector where, as a rule, savings and investment decisions coincide and are determined mostly by investment opportunities or requirements. In the centrally planned economies, the predominant part of the production capacity is publicly owned and, according to Bor, the socialist State, by establishing through plans the production targets for consumer goods, as well as for the capital goods which are needed for the production of the latter, determines the levels at which human needs are satisfied.<sup>7</sup> In addition, savings by individuals and households are most directly determined by demographic characteristics such as age composition, size and structure of the household and the economic activity status of their members, population growth and so forth. For these reasons the discussion in this section will mainly focus on savings in the household sector.

6. Even though savings and investment may be separate acts arrived at by different decision-makers, they are not necessarily independent. The desired, or *ex ante* savings may differ from the level of investment prevailing at a given time, as reflected in the distribution of production between consumer and investment goods. If the aggregate desired savings exceeds the level of investment, a process of contraction will ensue until the savings is reduced to the level of investment. On the other hand, a deficiency of *ex ante* savings will induce an expansion of output and employment as a result of a higher demand for consumer goods, provided that underutilized capital and labour resources do exist. If the latter condition does not obtain, the movement towards equilibrium will involve inflationary price movements resulting in a reduction of real consumption and, hence, an increase in real savings. This simplified outline of a rather complex argument implies that in discussing savings, the level of investment must also be specified.<sup>8</sup> Unless otherwise stated in the

(Footnote 5 continued)

*Economic Growth* ... (1955), p. 4; Dieterlen, *L'investissement* (1957), pp. 37-40; Meier and Baldwin, *Economic Development* ... (1957), pp. 337-338.

<sup>6</sup> These economies are often referred to as market economies to distinguish them from the centrally planned economies, where supply and demand are conciliated through the decisions of the central authorities, and from the pure subsistence economy, where production and consumption take place mainly within the household unit and exchange between units is negligible.

<sup>7</sup> Bor, *Planovyi balans narodnogo* ... (1959), p. 8.

<sup>8</sup> The argument in its modern form was presented by Keynes, *The General Theory of Employment, Interest and Money* (1951). For a comprehensive discussion of these aspects, see, for instance, Lewis, *The Theory of Economic Growth* (1963), pp. 213 ff.; Dieterlen, *L'investissement* (1957), chap. 4.

following, it will be assumed that investment demand is sufficiently high to make the desired level of savings possible.

7. Savings decisions form part of the fundamental economic choice that permits the allocation of income between current and future use in so far as income can be either consumed or invested. Savings as such may be defined as the excess of income over consumption. No unanimity exists regarding the determinants of savings and different factors are thought to affect public, corporate and private savings. As far as the latter are concerned, their dependence on income and consumption has been generally accepted, but various theories as to the interrelations between income, consumption and savings have been proposed.<sup>9</sup> According to Keynes, consumption will increase with income, though not in the same proportion, and therefore savings as a residual after consumption will depend on income.<sup>10</sup> Another theory, rather than stressing the absolute level of income as a determinant of savings, holds that consumption as well as savings patterns of different individuals and households are interdependent and that an individual's behaviour regarding savings is mainly affected by his relative position in the income distribution.<sup>11</sup> According to a more recent theory, the permanent income hypothesis, consumption and savings decisions are not based so much on present income as on the expected income over the life span.<sup>12</sup> The close relation between age and economic resources in the course of an individual's life and the association of that relation with family status has been noted for a long time,<sup>13</sup> but the development of the permanent income hypothesis together with the research on family formation, growth and dissolution, the so-called theory of the life cycle of the family,<sup>14</sup> has given a prominent place to life-cycle analysis in the income, consumption and savings theory of the family.<sup>15</sup>

<sup>9</sup> For a review of different theories of private savings, see Farrell, "The new theories of the consumption function" (1959); Eizenga, *Demographic Factors and Savings* (1960), pp. 22-45; Eicher, *Consommation et épargne* ... (1961); Ferber, "Research on household behavior" (1962); Byé, *L'épargne dans le Marché commun* ... (1963), pp. 227-268.

<sup>10</sup> Keynes, *The General Theory of Employment, Interest and Money* (1951); Barrère, *Théorie économique et impulsion keynésienne* (1952), pp. 391-397. Hansen, *A Guide to Keynes* (1953), pp. 69-70.

<sup>11</sup> Brady and Friedman, "Savings and the income distribution" (1947); Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (1949), pp. 17-46, 111-118.

<sup>12</sup> Modigliani and Brumberg, "Utility analysis and the consumption function ..." (1954); Friedman, *A Theory of the Consumption Function* (1957). Some of the theoretical considerations underlying this theory were anticipated by Harrod, *Towards a Dynamic Economics* ... (1948, 1963 ed.).

<sup>13</sup> Seebohm, *Poverty, a Study of Town Life* (1922), pp. 170-171; Sydenstricker, King and Wiehl, "The income cycle ..." (1924); Woytinsky, *Earnings and Social Security in the United States* (1943), pp. 228-249.

<sup>14</sup> Kirkpatrick, Tough and Cowles, *The Life Cycle of the Farm Family* (1934); Glick, "The family cycle" (1947); and his "The life cycle of the family" (1956).

<sup>15</sup> Fisher, "Income, spending and saving patterns ..." (1952); Lydall, "The life cycle in income ..." (1955); Brady, "Family saving, 1888 to 1950" (1956).

## 1. POPULATION SIZE, DENSITY AND SAVINGS

8. Provided that in two populations of differing size aggregate income is the same while savings is the residual after basic consumption requirements have been met, the larger of the two will be characterized by a lower capacity to save than a smaller one. However, this lower saving potential, rather than being due to population size, is a result of lower *per capita* income in the larger population; which has to distribute the same product among more members and has to devote a larger share of total income to satisfying consumption needs. Any inferences regarding the effect of population size on savings should, therefore, take into account the existing level of *per capita* income.<sup>16</sup>

9. Arguments regarding the effect of population size and density on the savings potential have centred mainly on the higher levels of *per capita* public expenditures in small nations. The reasoning is that a country with fewer inhabitants is likely to find itself in a less favourable position than one with a larger population inasmuch as the cost of maintenance of administration and other public services—such as transportation, communications and other public utilities—requires some minimum expenditure, which does not necessarily increase proportionately with the size of the population.<sup>17</sup> If this argument were valid for current public expenditures, the higher *per capita* level of such expenses would, given levels of *per capita* income, lower the saving capacity of smaller nations as compared with larger ones.<sup>18</sup> Little is known, however, about the effects of population size on various categories of government expenditures.<sup>19</sup> A study of current public expenditures—including administration; roads; transportation; government services to labour, agriculture and industry; education; health; mass entertainment and defence—of a few developed countries suggested, according to Robinson, that despite theoretical advantages which would accrue in that respect to larger nations, it was doubtful whether the effect of population size was significant on the whole. As far as specific categories of expenditures were concerned, his tentative conclusion was that only in general administration and defence, economies of scale might favour larger nations in that respect. In some of the categories of expenditures considered, and especially in education, population density rather than population size might, he argued, have some effect on *per capita* spending.<sup>20</sup>

<sup>16</sup> Faaland, "Demographic aspects of savings . . ." (1966).

<sup>17</sup> Vakil and Brahmananda, "The problems of developing countries" (1960); Lewis, *The Theory of Economic Growth* (1963), pp. 72-73. Sauvy, *Théorie générale de la population*, vol. I . . . (1956), pp. 274-276, has pointed out that to the extent that public expenditures are independent of the size of the population, an increase in those expenditures will also raise the size of the optimum population.

<sup>18</sup> This reasoning, it must be remembered, is valid only if it applies to current expenditures. Higher capital outlays under these conditions could, in fact, have the opposite effect on savings if the funds used for financing these projects would otherwise have been used for consumption. On the other hand, higher *per capita* outlays may lead to higher current expenditures for maintenance, servicing and so forth.

<sup>19</sup> Frankel, "The growth of public employment . . ." (1957).

<sup>20</sup> Robinson, "The size of the nation . . ." (1960). See also Martin and Lewis, "Patterns of public revenue and expenditure" (1956).

## 2. AGE DISTRIBUTION AND SAVINGS

10. Age and the age distribution of a population are usually considered to be among the most important demographic variables that affect saving capacity and patterns. The importance of the age distribution transcends its own significance also in the sense that the age structure of a population is the result of present and past levels of mortality, migration and especially fertility. The implications of the age distribution for savings manifest themselves both through the nature of the population as consumers and as producers. Since consumption needs are associated with the age of the individual, total consumption requirements and the residual of income for savings are not independent of the age distribution. The mechanism by which the age distribution may affect savings through the production side is somewhat more complex. Age being closely associated with participation in the labour force, the age distribution is one of the main determinants of the proportion of the population economically active and the relation between non-workers and workers, i.e., the dependency ratio. Given the size of the population, this ratio determines the size of the labour force and thus the productive capacity or total output or income. *Per capita* income as the determinant of saving capacity is, however, a function of total income and total population, which includes both workers and non-workers. Thus given the levels of labour productivity, the higher the proportion of dependants the lower will be income per head and the savings potential. In other words, a higher dependency ratio will tend to depress the level of savings, other conditions being the same. Even though conceptually these effects of the age distribution are clear, in practice they may be difficult to assess, both because of other factors involved as well as because of the close association of age with other factors in savings.<sup>21</sup> In addition, the age distribution is essentially a slowly changing characteristic, so that changes in the age distribution are likely to have only a gradual effect on savings.<sup>22</sup>

### (a) Age distribution, consumption and savings

#### (i) Consumption scales, the age distribution and needs

11. People in different age groups have different needs and, with changes in the age distribution, the demand for certain categories of goods and services as well as total needs are likely to change.<sup>23</sup> The age distribution, being a factor in setting total consumption needs will, given the level of income, also determine the part of the latter which could be saved. The study of changing needs with

<sup>21</sup> Brady, "Family saving, 1888 to 1950" (1956).

<sup>22</sup> Fisher, "Family life cycle analysis . . ." (1955).

<sup>23</sup> Quillon, "Les besoins comparés . . ." (1948); Sauvy, "Social and economic consequences of the ageing . . ." (1948); Spengler, "The economic effects of changes . . ." (1956); United Nations, *The Aging of Populations . . .* (1956), pp. 61-62; Neisser, "The economics of a stationary population" (1944); Coale and Hoover, *Population Growth and Economic Development . . .* (1958), pp. 238-239; Spengler, "Economics and demography" (1959); Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche . . .* (1960), pp. 314-316; Stassart, *Les avantages et les inconvénients économiques . . .* (1965), pp. 44-67; Kleiman, "Age composition, size of households . . ." (1966).

TABLE XIII.1. ESTIMATED NEEDS PER THOUSAND POPULATION  
IN VARIOUS STABLE POPULATIONS

Expectation of life (in years)	Percentage of total population aged			Needs per 1,000 population <sup>a</sup>	
	0-14 years	15-59 years	60 years and over	Hypothesis A	Hypothesis B
<i>Gross reproduction rate: 3.0</i>					
30 .....	41.3	54.5	4.1	863	793
70.2 .....	47.3	48.4	4.3	845	764
<i>Gross reproduction rate: 1.0</i>					
30 .....	16.3	65.0	18.7	895	919
70.2 .....	19.5	58.6	21.9	876	903

SOURCE: United Nations, *The Aging of Populations* ... (1956), tables 15 and 40.

<sup>a</sup> The needs were calculated on the basis of the following assumptions:

Hypothesis A: the index of the needs of an adult (15-59 years) was assumed to be 1.0; for children (0-14 years) and aged persons (60 years and over) 0.7.

Hypothesis B: the needs of an adult (15-59 years) and of an aged person (60 years and over) were assumed to be 1.0; for children (0-14 years) 0.5.

age is usually based on consumption scales which assign weights to individuals in different age groups according to their needs and which make it possible to express the needs of each individual in terms of adult equivalents.<sup>24</sup> Such weights may be based either on the observation of actual consumption patterns or on studies establishing standard requirements, but in general the results,<sup>25</sup> although they vary considerably, confirm the existence of different consumption needs for persons in different age groups, thus providing indirect evidence of the potential effect of the age distribution on savings.

12. Distinguishing between a few broad age classes—children, adults and aged persons—the needs of children are nearly universally found to be less than those of an adult, but the relation between the requirements of the latter and those of aged persons is less clear.<sup>26</sup> On the basis of one study, which estimated the needs of children and aged to be similar, each representing about 70 per cent of the requirements of an adult,<sup>27</sup> estimated needs per 1,000 population for various stable populations with different levels of expectation of life at birth and gross reproduction rates have been calculated.<sup>28</sup> An alternative calculation, assuming a child's needs to be half those of an adult or aged person was also made<sup>29</sup> (see table XIII.1).

<sup>24</sup> One of the main practical purposes of consumption scales is to express family size in some standard unit which permits a comparison of income levels of families, not biased by family composition. Sydenstricker and King, "The measurement of the relative ..." (1921); International Labour Office, *Methods of Family Living Studies* ... (1949), pp. 28-29.

<sup>25</sup> Various scales as well as their uses and limitations are discussed by Woodbury, "Economic consumption scales ..." (1944). See also Woytinsky and Woytinsky, *World Population and Production* ... (1953); Wold, *Demand Analysis* ... (1953), pp. 221-224; Prais and Houthakker, *The Analysis of Family Budgets* ... (1955); Kleiman, "Age composition, size of households ..." (1966).

<sup>26</sup> See also the discussion in chapter VIII, section D.

<sup>27</sup> Quillon, "Les besoins comparés ..." (1948).

<sup>28</sup> United Nations, *The Aging of Populations* ... (1956), p. 62.

<sup>29</sup> Coale and Hoover, *Population Growth and Economic Development* ... (1958), pp. 238-239, used for India the following weights: 1.0 for each male over 10 years; 0.9 for each female over that age and 0.5 for children below that age.

According to the results, assuming the needs of children and aged persons to be identical, the needs of a "young" population—with a gross reproduction rate of 3.0 and a high proportion of children—are about 4 per cent lower than those of an "old" population—with a gross reproduction rate of 1.0 and comparatively high proportions in adult and advanced ages. Under the second hypothesis, the differences are more substantial: the needs of the "older" population would be about 16 to 18 per cent higher than those of the young population. The change of a "young" population to an "old" one, resulting from a decline in fertility, would thus bring with it a significant increase in the needs per 1,000 population. However, in the process of demographic aging as it has occurred in the past, when both fertility and mortality declined, a compensating effect on total needs occurs owing to the influence of lower mortality on the age distribution.<sup>30</sup> Passing from a stable population with a high fertility and mortality—a gross reproduction rate of 3.0 and an expectation of life at birth of 30 years—to one where both fertility and mortality are low—1.0 and slightly over 70 years, respectively—total consumption needs would increase only somewhat more than 1 per cent under the first assumption, but for the second hypothesis the needs would be raised by as much as 14 per cent (see table XIII.1). Nevertheless, compared to the important shifts in the age distribution and the considerable period which normally would be required to bring about such a transition, the effect on consumption needs and the saving potential is relatively small.

13. A certain controversy persists regarding the effect of compensation on total needs which supposedly would occur as a result of the process of aging. In general, the aging of a population<sup>31</sup> involves an increase in the proportion of persons in adult ages accompanied by an older age distribution of this population and a significantly higher proportion of persons in advanced ages; these increases are compensated by a decline in the relative

<sup>30</sup> United Nations, *The Aging of Populations* ... (1956), p. 62.

<sup>31</sup> The process of aging of a population should be distinguished from individual aging. See chapter VIII, section D.

number of children and young people. The implications of the aging process on consumption needs manifest themselves through the combined effect of these changes,<sup>32</sup> but most of the discussion of the changes in needs associated with the aging process have centred on the question of what effect the shift in the relative importance of children and aged persons would have on total consumption expenditures. A number of authors are of the opinion that an effect of compensation exists in the sense that the increased cost of maintaining the elderly population would be accompanied by lower expenditures for supporting a smaller proportion of children, but most of them are less clear on whether such a compensation would be complete.<sup>33</sup> Those who hold the opinion that with the process of aging the cost of maintaining the dependent population increases base their position on various arguments. In the first place, they contend that the cost of education does not decrease as much as the number of children; the increased years of schooling and the deferment of the age of entry into the labour force would tend to absorb the economies which might have become possible as a result of the decline in the number of children.<sup>34</sup> In the second place, it is argued that the cost of maintaining an aged person is higher than that of maintaining a child.<sup>35</sup> Another circumstance which,

according to some writers, affects the burden of supporting the young as compared with the aged is that while the cost of children is mainly the natural responsibility of the family, the older generation is maintained to a much larger extent by means of taxation or other money transfers. Psychologically, it is argued, the burden may appear to be much heavier in the latter case.<sup>36</sup> A further complicating factor is that, given the different needs of the young and aged, shifts in the age distribution between them will not only change total demand, but also its structure.<sup>37</sup> Even among those who are of the opinion that in principle the aging process makes it possible to reduce in relative terms the expenditures for the young, the view is found that such a reduction will not be automatic nor will an increase in savings necessarily follow.<sup>38</sup>

(ii) *Household size and composition, the age distribution and consumption needs*

14. Findings as to the implications of the age distribution for consumption based on the needs of individuals appear to be on the whole inconclusive. In part this is due to the fact that whereas demographic analysis is concerned mainly with the individual as the basic unit, a meaningful analysis of private savings is possible, as a rule, only in terms of households. Adult equivalent scales, it was found, did not provide for the effects of a varying family composition on the modes of expenditure and the family's consumption appeared to change in more complicated ways than those implicit in the use of those scales.<sup>39</sup> In economics of consumption, it is, therefore, usual to take as the basic entity the household or family.<sup>40</sup>

<sup>32</sup> Eicher, *Consommation et épargne* ... (1961), noted also that much of the literature on the effects of aging limits the discussion to the increase in the number of aged without taking into account the associated changes in the other age groups. See also Spengler, "Aging populations ..." (1963).

<sup>33</sup> Thompson, "Outstanding population trends ..." (1940); Neisser, "The economies of a stationary population" (1944); Letinier, "Vue d'ensemble des conséquences ..." (1948); Fromont, *Démographie économique* ... (1947), p. 144; Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche* ... (1960), pp. 254, 314-315; Stassart, *Les avantages et les inconvénients économiques* ... (1965), p. 56.

<sup>34</sup> Fromont, *Démographie économique* ... (1947), p. 144; Sauvy, *L'Europe et sa population* (1953), p. 79; and his *Théorie générale de la population*, vol. 2 ... (1959), pp. 62-63; and his "La vieillesse économiquement inactive" (1960); Spengler, "Aging populations ..." (1963). For a discussion of these arguments see also Stassart, *Les avantages et les inconvénients économiques* ... (1965), pp. 54-60, who also notes that sometimes it has been argued that the decrease in fertility, which was the main factor underlying the aging process, was partly based on the desire of parents to provide a lesser number of children with a longer and better education. Also, in this connexion, see Spengler, "Population movements, employment and income" (1938). The author observed in more general terms that the changing patterns of living, which contribute to a reduction of fertility and the number of children, may have brought about other changes which prevent an increase or even cause a decline in the propensity to save. Boverat, "Vieillesse de la population ..." (1948), thought that social pressures towards earlier retirement of older persons would, in addition to the later entry of the young into the labour force, increase the dependency load further. However, the increase in the proportions of the population in working ages may ameliorate the tendency towards a higher dependency burden. In the case of Great Britain it was noted that, if as estimated, the working population would grow at a higher rate than the population in inactive ages, this would help to offset the increase in the number of elderly persons. Shenfield, *Social Policies for Old Age* ... (1957), p. 6. The decline of fertility may also make it possible for more women to seek gainful employment. See chapter IX. The effects of the age distribution and aging on dependency is discussed in more detail in the following subsection.

<sup>35</sup> Sauvy, *L'Europe et sa population* (1953), pp. 78, 81-84; his *Théorie générale de la population*, vol. 2 ... (1959), pp. 62-63; and his "La vieillesse économiquement inactive" (1960). Renggli, "Die wirtschaftlichen Auswirkungen der Überalterung" (1938), assumed,

however, that old people tend to consume less than young adults. For a discussion of the higher cost of social services for older persons as compared with children and young people see Paish and Peacock, "Economics of dependence ..." (1954); Shenfield, *Social Policies for Old Age* ... (1957), pp. 12-13.

<sup>36</sup> Fromont, *Démographie économique* ... (1947), pp. 137, 142; Sauvy, *L'Europe et sa population* (1953), pp. 78-79; and his *Théorie générale de la population*, vol. 2 ... (1959), p. 62; and his "La vieillesse économiquement inactive" (1960); Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche* ... (1960), pp. 325-329; Stassart, *Les avantages et les inconvénients économiques* ... (1965), pp. 64-65. Most of these writers point out, however, that under the prevailing family systems in many developing countries, the older generation is directly supported by the household.

<sup>37</sup> Baker, "Significance of population trends ..." (1937); Coale, "Population change and demand ..." (1960); Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche* ... (1960), pp. 314-316; Stassart, *Les avantages et les inconvénients économiques* ... (1965), p. 60.

<sup>38</sup> Neisser, "The economics of a stationary population" (1944); Shenfield, *Social Policies for Old Age* ... (1957), p. 13.

<sup>39</sup> Allen, "Expenditure patterns ..." (1942); Forsyth, "The relationship between family size ..." (1960).

<sup>40</sup> Dewhurst et al., *America's Needs and Resources* ... (1955), pp. 38-39, 165-167; Prais and Houthakker, *The Analysis of Family Budgets* ... (1955), p. 11; Johnson, *Money, Trade and Economic Growth* (1962), pp. 182-187; and David, *Family Composition and Consumption* (1962), pp. 4-6. The latter two authors noted also that in order to take the individual as the basic unit, some theory of the decision-making process within the household should exist. See also Kuznets, "Quantitative aspects of the economic growth of nations, VIII ..." (1963).



In the present context two aspects of family consumption behaviour are of special relevance: first, many goods must be considered as being consumed not by the individual but by the family and, second, there may be substantial economies involved in supporting a larger, rather than a smaller, family and a larger, rather than a smaller, number of dependants. The relations between demographic characteristics and phenomena and those of households are not always well defined and invariable. Household formation, growth and dissolution respond, in addition to demographic factors, to social, cultural and economic conditions. Nevertheless the increase, size and composition of households depend to a great extent, given other factors, on population growth and structure and its determinants—fertility, mortality and migration—and ultimately on the age distribution. While no simple generalization is possible concerning the relation between age distribution and size of households, empirically a younger age distribution is usually accompanied by a larger average size of the household.<sup>41</sup>

15. The significance of the size of households for consumption and savings is twofold: there exists a positive correlation between household size and household income, and variations in household size may account for considerable variations in consumption.<sup>42</sup> Usually, larger families tend to spend more on consumption expenditures of different kinds and much of the evidence suggests that this latter factor dominates the income effect, thus making for a potential negative effect of family size on savings. An early survey in the United States revealed that, while families without children or with only one child were able to save on the average a small but not insignificant part of income, families with two or more children showed only a very small margin between income and expenditure.<sup>43</sup> According to a study undertaken in the United Kingdom, the proportion of families having no national savings certificates was much higher among families with three or more children than in husband-wife families.<sup>44</sup> In order to determine the effect of family size on consumption, a method for determining what level of income would be required to satisfy the family's needs when the number of children varied was applied to the results of two pre-war surveys in the United Kingdom and the findings tended to confirm the effect of family size on levels of living.<sup>45</sup> Indirect evidence as to the possible

effects of household size on savings was obtained in a number of investigations on the relations between levels of living and the number of children in the household in France. The earlier of these investigations, limited to working-class families, provided ample evidence of the negative association between levels of living and number of children, despite the counteracting effect of family allowances;<sup>46</sup> a lowering of the levels of living as the number of children in the family increased was also found in the case of employees.<sup>47</sup> A later study, based on French data, estimated the effects of the size of the family on levels of living in more specific terms.<sup>48</sup> An analysis of the income and expenditures of managerial groups in France also showed that with the increase in the number of members of the family, the proportion of income consumed increased and that of income saved declined.<sup>49</sup>

16. The effect of the addition of a member to a household is not limited to the total level of consumption, but extends to the composition of the goods and services consumed, the shift depending to a great extent on whether the commodity is a necessity or a luxury.<sup>50</sup> The findings of a number of studies suggest that with the increase in the size of the family, income being given, a larger proportion of income has to be spent on necessities, thus reducing the level of living and the capacity to save. Henderson found that an increase in family size, without a corresponding higher income, changed especially the expenditure on standard food and different classes of clothing and luxuries, but had only a small effect on other items of expenditure. The impact of an additional child was to increase expenditure on food and children's clothing, which was paid for by a substantial cut in expenditure for adult clothing and luxuries. Parents, according to Henderson, thus curtailed their expenditure on non-essentials to pay for their children.<sup>51</sup> Woytinsky and Woytinsky, among many others, presented evidence that expenditure for food took up a comparatively larger proportion of income

require an increase of nearly 20 per cent to this income in order to maintain the previous level of living. If no additional income would be forthcoming, the family's level of living would decline to that of a family without children and an income of 15 per cent less.

<sup>46</sup> Quillon, "Comparaisons des revenus ..." (1946); Michot, "Comparaison des revenus et des besoins ..." (1947); Girard, "Les budgets familiaux en 1946" (1948); Malignac, "Minimum vital et niveau d'existence ..." (1949).

<sup>47</sup> Tabah, "Niveau de vie des familles suivant le nombre d'enfants" (1951).

<sup>48</sup> Martin, "Niveau de vie des familles ..." (1956), concluded that taking the level of living of a single person as 100, the index for workers' families in which the wife worked, dropped to 87 for one child, to 70 for two children, and to 69 and 62, respectively, for three and four children. In the case of families of government employees where the wife did not work and the level of living of a couple without children was taken as 100, the index decreased to between 75 and 80 for a family with two children, to between 69 and 77 for a family with three children, and to between 61 and 70 for a family with four children, the ranges corresponding to different ranks and income of the employees.

<sup>49</sup> Byé, *L'épargne dans le Marché commun* ... (1963), pp. 375-376.

<sup>50</sup> Prais, "The estimation of equivalent ..." (1953).

<sup>51</sup> Henderson, "The cost of children, parts 1-3" (1949, 1950). The percentage decrease in expenditure on non-essentials was estimated to be about 20 per cent for a single child, 30 per cent for two children, and 35 per cent for three children.

<sup>41</sup> See chapter X. Brady, "Family saving, 1888 to 1950" (1955), pointed out that the economic resources of individuals in different age groups vary, and that at the same time the available resources determine to a great extent whether a person can live independently or must form part of a household with persons able to support him. Particularly children, and to a lesser extent the elderly, the widowed and the disabled, fall into the dependent category.

<sup>42</sup> Prais and Houthakker, *The Analysis of Family Budgets* ... (1955), p. 88.

<sup>43</sup> Lorimer and Roback, "Economics of the family ..." (1940); United States, National Resources Planning Board, *Family Expenditures in the United States* (1941), p. 20; Jones, "Secular trends and idle resources" (1944).

<sup>44</sup> Madge, *Wartime Pattern of Saving and Spending* (1943), pp. 58-61.

<sup>45</sup> Henderson, "The cost of a family" (1949); and his "The cost of children, parts 1 and 2" (1949, 1950); Nicholson, "Variations in working class family expenditures" (1949). Henderson estimated that the first child in a family with an income of £5 per week would



as the size of the family increased.<sup>52</sup> Houthakker, analysing the effects of the size of households, as well as of income on the expenditure on food, clothing and miscellaneous expenses on the basis of some forty surveys in over thirty countries, calculated elasticities with respect to the size of household. These elasticities, that is the proportionate increase in expenditure which results from a given proportionate increase in the size of the household, were found to be positive for food, small but positive for clothing and housing and predominantly negative for miscellaneous, including luxury, expenditure.<sup>53</sup> In general, these results suggest that with increasing family size, basic expenditures such as those on food would increase at the cost, particularly, of miscellaneous and luxury expenditures, and, in so far as savings might be classified under this category, savings. Kyrk, analysing data for the United States, concluded that a family whose size increased without a change in income would accommodate itself to the new situation by decreasing savings and various other budget categories.<sup>54</sup> Brady and Friedman noted that, in general, all available studies indicated that an increase in the size of the family within the same income bracket would cause savings to decrease.<sup>55</sup> David has drawn attention to another factor which may exert a further unfavourable influence on savings under these conditions: considering that households are likely to exhibit a certain inertia in their preferences and that even after changes in the size of the family occur, consumption patterns may not adapt themselves automatically and immediately, a reduction in the established level of saving would be an immediate consequence if the size of the family increases and income would remain the same.<sup>56</sup>

17. Although an increase in family size is usually associated with higher consumption expenditure, two factors tend to ameliorate some of the less favourable effects on savings. In the first place, the composition of the family tends to vary, especially as far as the age of its different members is concerned, with the size of the family. The number of persons in a family is not a satisfactory measure of its economic size since, from the point of view of needs, the different individuals cannot be considered equivalent.<sup>57</sup> To the extent that larger families are likely to have a larger number of children, whose needs are less than those of an adult, family size is not an entirely satisfactory basis for estimating con-

sumption needs.<sup>58</sup> In the second place, a larger family may have the benefit of considerable economies of scale. Economies of scale in consumption imply that with given levels of income per person, but not per family, a larger household may be able to maintain a higher level of living than a smaller one. The best-known examples of such economies in consumption are found in the case of foodstuffs; they include buying large quantities; buying commodities which are only sold in certain minimum quantities; economizing in the storage and preparation of food and so forth. The economies of scale for other items of consumption are more difficult to specify—one example is the handing down of clothing from older to younger children—and in some cases even diseconomies of scale may exist. In practice, it may be difficult to determine the extent of economies of scale, even if allowance is made for the effect of differences in family composition: differences in levels of consumption may reflect differences which depend on the size of the household; larger families may be inclined to purchase, on the average, goods of lower quality; or any savings resulting from economies of scale may be used to raise consumption or the quality of the goods consumed.<sup>59</sup>

18. Evidence as to the effect of these factors has been found in a number of studies. The results of a survey in France showed that although total expenditures of the family increased with the number of children, they decreased per unit of consumption as the family became larger, a finding confirmed by later investigations.<sup>60</sup> In the case of working-class families in Great Britain it was found that, at the average standard of living of these families, the amount spent on the second child was more than one third less than that spent on the first child.<sup>61</sup> Another study, also based on data for Great Britain, found considerable differences in expenditures for each child as the number of them in the family increased.<sup>62</sup> Data for rural families in the United States revealed that while an increase in the size of the family also increased

<sup>52</sup> Woytinsky and Woytinsky, *World Population and Production* ... (1953).

<sup>53</sup> Houthakker, "An international comparison of household expenditure patterns ..." (1957). He suggested, with many reservations, the following elasticities with respect to family size: food + 0.3; housing 0.0; clothing 0.0; and "miscellaneous" -0.4.

<sup>54</sup> Kyrk, *Economic Problems of the Family* (1933), pp. 359-362.

<sup>55</sup> Brady and Friedman, "Savings and the income distribution" (1947).

<sup>56</sup> David, *Family Composition and Consumption* (1962), p. 9. See also Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (1949), p. 24.

<sup>57</sup> Friedman, "A method of comparing incomes ..." (1952); Brown, "Economics, nutrition and family budgets" (1955); David, *Family Composition and Consumption* (1962), pp. 7-8; Kleiman, "Age composition, size of households ..." (1966).

<sup>58</sup> Different methods can be used for taking into account this effect of the age composition of the family. One of them consists of distinguishing a number of different household types according to their composition. An alternative approach consists in the derivation of equivalent adult scales, based not on individual needs, but on family expenditures and taking into account family composition. Sydenstricker and King, "The measurement of the relative ..." (1921); Allen, "Expenditure patterns ..." (1942); Henderson, "The cost of a family" (1949); Friedman, "A method of comparing incomes ..." (1952); Prais, "The estimation of equivalent ..." (1953); Brown, "Economics, nutrition and family budgets" (1955); Prais and Houthakker, *The Analysis of Family Budgets* ... (1955), pp. 127-139; Forsyth, "The relationship between family size ..." (1960); Ferber, "Research on household behavior" (1962); Kleiman, "Age composition, size of households ..." (1966).

<sup>59</sup> Prais and Houthakker, *The Analysis of Family Budgets* ... (1955), pp. 146-148; David, *Family Composition and Consumption* (1962); Kleiman, "Age composition, size of households ..." (1966).

<sup>60</sup> Institut national d'études démographiques, "Les dépenses de 1080 familles ..." (1947); —, "Les dépenses de 939 familles de militaires ..." (1947); Martin, "Niveau de vie des familles ..." (1956); Pressat, "Un essai de perspectives de ménages" (1959).

<sup>61</sup> Nicholson, "Variations in working class family expenditures" (1949).

<sup>62</sup> Henderson, "The cost of children, parts 1, 2 and 3" (1949, 1950).

consumption, the elasticity of consumption with respect to family size was estimated to be, on the average, only 0.11.<sup>63</sup> More recent data for Canada suggested an elasticity of less than 0.1.<sup>64</sup> As far as specific categories of consumptions are concerned, evidence as to the existence of possible economies of scale is most abundant in the case of foodstuffs. Whereas most findings agree that such economies with respect to foodstuffs exist,<sup>65</sup> evidence as to economies of scale for other items of consumption is much more limited and controversial. Many investigations have shown expenditure on food per unit of consumption to decrease with the number of members in the family.<sup>66</sup> According to Hollingworth and Baines, a survey of food consumption in Great Britain revealed that when income and demographic structure were both held constant, food expenditure for each additional person in the household after two declined progressively. They attributed the smaller *per capita* expenditure to such factors as lower income per head and to the larger proportion of children with lower needs, but the economies which obtained in providing for large numbers were thought to be an important third factor.<sup>67</sup> Girard concluded that although the expenditure on foodstuffs per unit declined with the number of children in the family, the nutritional value did not: he found that although families with three children spent less on food per consumption unit than families with no children, the diet of the former had a higher calorie content and was richer in protein. He attributed this situation, however, mainly to the rationing system which favoured larger families in buying certain products, such as milk, at lower prices.<sup>68</sup> Prais and Houthakker obtained estimates of the economies of scale with respect to food expenditure from pre-war data for Great Britain. The results indicated that of households with the same level of income per person, those with a larger number of members would, as a result of economies of scale, enjoy a standard of living which was higher by 13 per cent of the ratio of their size. However, their findings also suggested that the economies of scale were negligible in the case of clothing and that diseconomies of scale existed in the case of durable goods, but the latter was in their opinion rather the result of

shifts in tastes which accompany a changing family size than of diseconomies of scale in a strict sense.<sup>69</sup>

19. Very few estimates of the quantitative importance of family size and age composition on levels of consumption and savings do exist. Brady has estimated that at given income levels consumption expenditures increase at the sixth root of the family size.<sup>70</sup> Eizenga, on the basis of data for the United States, found that changes in the family size and structure between 1900 and 1950, other conditions (particularly the age distribution and the income distribution) remaining the same, would have led to an increase of the saving-income ratio of nearly 200 per cent. However, his findings also suggested that changes in the age distribution would have led to only comparatively small increases in this rate.<sup>71</sup> In more general terms, the measurement of the effect on saving of the individual's consumption needs and the size and composition of the household in so far as related to age and age distribution is a difficult task. Consumption patterns respond to a great number of factors, among which are the level and distribution of income and assets, the social and cultural environment and the socio-economic group to which the individual or family belongs.

#### (b) *Age distribution, dependency, income and savings*

20. The implications of the dependency burden, as determined by the age distribution, for *per capita* savings manifest themselves primarily through the levels of *per capita* income. The effect of the dependency factor may be illustrated by assuming two populations with an identical number of workers, the same productivity of labour, but differing in the number of dependants and thus also in total population, the population with the higher dependency burden being also larger in size. The total product of these two populations would be the same, but the *per capita* income would be lower in the population with the larger number of dependants, since the identical product would have to be shared by more people. *Per capita* savings in the population with the higher dependency load would tend to be lower as compared with the other population for two reasons. In the first place, even if the proportion of total income saved, or the saving-income ratio would be the same in the two populations, *per capita* savings would be lower in the higher dependency population since total savings would have to be divided among a larger number. However, in so far as savings is a function of income, in the sense that a lower *per capita* income leads to lower savings, the

<sup>63</sup> Tobin, "Relative income, absolute income and savings" (1951); see also Tacke, "Der Einfluss der Bevölkerungsvermehrung ..." (1963). If, however, the lowest income group was eliminated, the elasticity decreased to 0.05.

<sup>64</sup> Choudhry and Kotowitz, "Some simple economic-demographic relationships ..." (1967); Asimakopulos, "Analysis of Canadian expenditure surveys" (1965).

<sup>65</sup> Gibson, Readman and Warnock, "Food and family size" (1955). Basing themselves on the result of a national food survey in Great Britain, the authors concluded, however, that average expenditure on foodstuffs increased by roughly the same amount for each child.

<sup>66</sup> Lorimer and Roback, "Economics of the family ..." (1940); Institut national d'études démographiques, "Les dépenses de 1080 familles ..." (1947); ———, "Les dépenses de 939 familles de militaires ..." (1947).

<sup>67</sup> Hollingworth and Baines, "A survey of food consumption in Great Britain" (1961). For a two-person family the expenditure was 31 shillings per week for each; for a third person the amount was less than 25 shillings and for a fourth member it declined further to less than 20.

<sup>68</sup> Girard, "La ration alimentaire dans les ménages ..." (1947).

<sup>69</sup> Prais and Houthakker, *The Analysis of Family Budgets* ... (1955).

<sup>70</sup> Brady, "Family saving, 1888 to 1950" (1956); Coale, "Population change and demand ..." (1960); Eicher, *Consommation et épargne* ... (1961), p. 42.

<sup>71</sup> Eizenga, *Demographic Factors and Savings* (1960), pp. 90-92, 96-101, 104. See also Stassart, *Les avantages et les inconvénients économiques* ... (1965), pp. 129-130.

assumption of an equal saving-income ratio for the two populations must be discarded and a lower ratio assumed for the population with the lower *per capita* income and the higher dependency burden, resulting in further decrease of *per capita* savings in that population. Under these conditions, the difference in *per capita* savings would thus exceed those in income per head.

21. A theoretical model for populations with high and low fertility and correspondingly different age distributions was developed by Coale in order to show, among other things, the income and savings effects of differences and changes in these demographic variables. He found that, under the assumptions made, a population with a high fertility might, because of its higher dependency burden, be obliged to utilize nearly all of its income for consumption. Given the same labour force and the same total income, a low-fertility population would thus be able to save and invest more, and through these higher investments increase its income faster in subsequent periods.<sup>72</sup>

22. The argument concerning the effect of the age distribution on *per capita* savings through the dependency ratio implies various assumptions; it supposes, apart from the effect age distribution has on consumption, a direct relation (i) between the age distribution and the dependency ratio (defined as the ratio between the economically inactive and the economically active population);<sup>73</sup> (ii) between the relative size of the labour force and *per capita* income; and (iii) between *per capita* income and *per capita* savings.

23. As pointed out in earlier chapters, the age composition is one of the factors which determine the distribution of the population between workers and non-workers, since the extent to which people participate in the labour force varies considerably with age. It has become customary in this connexion to divide the population into three broad age groups: children who have not yet reached working age, adults of working age, and elderly persons past working age.<sup>74</sup> Given other factors, in particular, the size of the active population and its level of productivity, an increase in the inactive population means a decrease in the levels of living of the population.<sup>75</sup> High

dependency ratios, it has been noted, would thus make for high consumption and consequently low savings.<sup>76</sup>

24. The actual size of the labour force, however, is not only determined by the age structure of the population; it depends, also, on patterns of behaviour as reflected in the age-specific activity rates. As discussed in an earlier chapter,<sup>77</sup> in many developing countries the pressures resulting from an unfavourable age distribution and low levels of living may elicit a larger labour force participation through earlier age of entry into, and later withdrawal from, the labour force. As far as the latter is concerned, however, it has been found that, on the whole, the less developed countries are unable to counterbalance the effect of an unfavourable age composition through higher labour force participation. In general, the dependency load of these countries is considerably higher than that of the more industrialized nations.<sup>78</sup> In addition, it has been pointed out that the significance of higher participation rates for income is likely to be small, since the productivity of children and aged persons is often very low.<sup>79</sup> In fact, to the extent that children have to leave school at an early age to look for work, the long-term effect of a higher labour force participation of young people on economic progress may even become negative.<sup>80</sup>

25. It has also been argued, however, that the presence of a large number of children in dependent age groups may itself provide an additional incentive to save.<sup>81</sup> According to another view, under conditions where the average size of the family is large and the outcome of conscious planning, having children might be considered simply as one type of consumption chosen in preference to others<sup>82</sup> without, it being implied, affecting necessarily the saving ratios very much.

26. That differences in the age structure and dependency ratios could, in principle, have an important effect on *per capita* income and savings has been suggested by a number of studies. According to Stigler, an economy in which the percentage of children drops from 40 to 25 could, other things remaining equal, increase its *per capita* income by roughly 25 per cent.<sup>83</sup> Spengler noted that the increase in the population aged between 15 and 64 years from under 60 per cent in 1841 to 70 per cent in

<sup>72</sup> Coale, "Population and economic development" (1963); and his "Population change and demand ..." (1960). See also Gendell, "The influence of fertility trends ..." (1965). For earlier attempts to measure the changing relationships between the capacity to produce and consumption needs as the age distribution changes, see Günther, "Der Geburtenrückgang als Ursache ..." (1931); Thompson and Whelpton, *Population Trends in the United States* (1933), pp. 168-170.

<sup>73</sup> See chapter IX.

<sup>74</sup> Spengler, "The economic effects of changes ..." (1956); Letinier, "Vue d'ensemble des conséquences ..." (1948); Durand, "Population structure as a factor ..." (1953); Lorimer, "Dynamics of age structure ..." (1951); United Nations, "Age structure and labour supply" (1955); Sauvy, *Théorie générale de la population*, vol. 1 ... (1956), p. 89; Jaffe and Stewart, *Manpower Resources and Utilization* (1951), pp. 287-304; Piatier, *Equilibre entre développement économique* ... (1962), pp. 61-75; Vincent, "Vieillessement de la population ..." (1946); Enke, *Economics for Development* (1963), p. 358.

<sup>75</sup> Sauvy, *Théorie générale de la population*, vol. 1 ... (1956), p. 90.

<sup>76</sup> Faaland, "Demographic aspects of savings ..." (1966).

<sup>77</sup> See chapter IX.

<sup>78</sup> Durand, "Population structure as a factor ..." (1953); United Nations, "Age structure and labour supply" (1955); United Nations, *Demographic Aspects of Manpower* ... (1961), pp. 6-10. See also chapter IX.

<sup>79</sup> Durand, "Population structure as a factor ..." (1953); Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 126-131.

<sup>80</sup> Lorimer, "Dynamics of age structure ..." (1951); Enke, *Economics for Development* (1963), p. 358.

<sup>81</sup> Kuznets, "Population change and aggregate output" (1960). For different views see: Quandt, "Population change and aggregate output; comment" (1960); Coale, "Population change and demand ..." (1960).

<sup>82</sup> Leibenstein, *Economic Backwardness* ... (1957), pp. 161-163; Okun, *Trends in Birth Rates* ... (1958), pp. 174-182; Becker, "An economic analysis of fertility" (1960); Kuznets, "Population change and aggregate output" (1960). Easterlin, "Towards a socio-economic theory of fertility ..." (1969), developed the theory of fertility behaviour as part of the theory of choice of the household.

<sup>83</sup> Stigler, *Trends in Employment* ... (1956), pp. 18-19.

1939 in England would permit, by itself, an increase of about one sixth in *per capita* income.<sup>84</sup> Singer, taking the proportion of the population in productive ages in the United Kingdom as a basis, calculated that in a number of developing countries this proportion was one sixth less, which would imply—given other conditions—that output in the developing countries would only for this reason be already one sixth lower than that of Britain.<sup>85</sup>

27. It has been pointed out, nevertheless, that in attempting to estimate the effects of the dependency ratio on levels of income, it would be necessary to take into account that membership in the labour force does not necessarily imply actual employment for the person concerned. The argument has been advanced that although with a given population the magnitude of the potential labour force input depends on the portion of the population in active ages, the age distribution is not necessarily the effective constraint on labour force input. In fact, in many developing countries, high levels of unemployment and underemployment of persons in adult ages prevail and as long as much an under-utilization of the labour force exists, the age structure of the population does not limit *per capita* income.<sup>86</sup> A similar argument was used by Sauvy, who concluded that if the marginal productivity of labour is very low, the addition to the population of a new inactive member, whose needs would be below those of a worker, could have a less unfavourable effect upon levels of living than the addition of a new worker.<sup>87</sup>

28. The effect of differences in the dependency ratio on savings, as a result of variations in the age distribution, is generally assumed to be indirect, in the sense that the dependency ratios would affect *per capita* income and, through the latter, *per capita* savings. Evidence as to the relation between savings and income does exist, but is far from conclusive. According to a United Nations study,<sup>88</sup> total domestic savings, expressed as a percentage of gross domestic product, were as a rule not as high in the developing as compared with the developed countries, but exceptions existed. On the other hand, the study concluded that the experience of the less developed countries offered only limited support for the hypothesis that variations in domestic savings are the result of differences in the level of *per capita* income; differences in the distribution of income and the degree of dependence on the export sector were thought to be factors which played a more important role. Leff, in a recent study based on data for 74 countries in various stages of development, found a high correlation between dependency and saving ratios and, in addition, the results suggested that the direct relation between the dependency and the saving ratio was at least as important as the indirect one through *per capita* income.<sup>89</sup>

29. Of special interest in the present context are the household or private savings. Kuznets, comparing consumption and *per capita* income in fifty-six countries, concluded that a distinct negative association existed between the share of private consumption expenditures in total product and in *per capita* income.<sup>90</sup> The previously cited United Nations study found, however, that in developed countries household savings varied considerably, but that these variations were associated much more with the rate of growth and the distribution of income than with the level of disposable income of the households. Apart from these factors, the age composition of the different populations was thought to have a certain, but not ascertainable effect on savings. As far as the developing countries were concerned, savings did not appear to have been significantly related to the disposable income of the household sector; the factors more likely to be involved were, according to the report, the level of *per capita* income and the distribution of income.<sup>91</sup>

30. In general terms, it has been assumed that neither a very young nor a very old population is likely to have a very high rate of savings. It has been asserted that, given the level of *per capita* income, it would appear that the greatest savings may be possible in a population with a large proportion of adults, such as those presently found in most of the highly industrialized nations.<sup>92</sup>

#### (c) Age distribution, income distribution and savings

31. Another approach to the problem of savings stresses the interdependence of consumption and savings patterns in an economy and argues that both are determined by the relative position of the individual or the family in the income distribution rather than by the absolute level of income. According to Duesenberry, the propensity of an individual to save can be regarded, *ceteris paribus*, as a rising function of his position in the income distribution.<sup>93</sup> It has also been pointed out that the interdependence of consumption behaviour may also be operative among nations; the existence of such a "demonstration effect" among countries would imply that if two previously isolated economies came into contact, the consumption patterns of the richer country might be imitated by the poorer one. Nurkse, in fact, attributes the high propensity to consume in the less developed countries at least in part to this demonstration effect.<sup>94</sup>

<sup>84</sup> Kuznets, "Quantitative aspects of the economic growth of nations, VII . . ." (1962).

<sup>85</sup> United Nations, *World Economic Survey, 1960* (1961), pp. 25-29, 72-73.

<sup>86</sup> Notestein, et al., *The Future Population of Europe . . .* (1944), p. 161.

<sup>87</sup> Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (1949), p. 45; Brady and Friedman, "Savings and the income distribution" (1947); Eicher, *Consommation et épargne . . .* (1961), pp. 48-54.

<sup>88</sup> Nurkse, *Problems of Capital Formation . . .* (1953), chap. 3. For a critical review of this thesis, see Viner, "Stability and progress . . ." (1958); Hagen, *On the Theory of Social Change . . .* (1962), pp. 41-42.

<sup>84</sup> Spengler, "Demographic patterns" (1954).

<sup>85</sup> Singer, "Population and economic development" (1957).

<sup>86</sup> Hicks, "A note on the burden . . ." (1965). See also Spengler, "The economic effect of changes . . ." (1956).

<sup>87</sup> Sauvy, *Théorie générale de la population, vol. 1 . . .* (1956), pp. 90-93.

<sup>88</sup> United Nations, *World Economic Survey, 1960* (1961), pp. 60-68.

<sup>89</sup> Leff, "Dependency rates and saving rates" (1969).

on the rate of population growth and its components. In a stationary population, savings and dissavings will be equal and net savings zero, since the amount saved by persons in the active ages will equal, *ceteris paribus*, the savings used up by the aged. In a growing population, however, the ratio of people of working age to those past working age will be higher than in the corresponding stationary population; hence savings will become, on balance and in contrast to the case of the stationary population, positive.<sup>106</sup> This effect of the age distribution on savings is, however, relevant only if the retired are assumed to live on their lifetime earnings. If the maintenance of the aged is a family responsibility, as is often the case in the less developed countries, no need exists to save for old age and the burden of the aged population should fall on current production. Likewise, if the older people are supported by a social security system which finances benefits from current receipts, no need exists to save for old age in the course of the active life span.<sup>107</sup>

37. Where the provision for old age is left to the individual, the uncertainty he faces regarding the number of years he can expect to survive after retirement may, in the case where he requires substantial security, lead to over-saving. If all individuals want to make sure of having an income for the longest period they could expect to survive, the corresponding savings would be much higher than those required for the average period of survival. This effect may be particularly important if mortality is high. On the other hand, the uncertainties which the individual has to face in making his saving decisions can be eliminated if savings are pooled. If savings for old age take the form of the purchase of life annuities, the cost of them—that is the savings to be made—depends mainly on the levels of mortality and is only to a limited extent affected by the age distribution: the lower the level of mortality for the insured group, the higher will be the cost for the participant.<sup>108</sup>

38. Besides these demographic factors, the importance of savings for old age will depend on a number of other variables, among them the desired standard of living after and before retirement, the cost of annuities and the rate of interest, the average time between saving and dissaving, the level of income and so forth.

<sup>106</sup> Neisser, "The economics of a stationary population" (1944); Harrod, *Towards a Dynamic Economics* . . . (1948, 1963 ed.), p. 45; Modigliani, "The life cycle hypothesis of saving . . ." (1966). On this point see also Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (1949), p. 42.

<sup>107</sup> United Nations, *The Aging of Populations* . . . (1956), pp. 74-82, discusses the burden of supporting the aged under different systems and demographic conditions.

<sup>108</sup> Vincent, "Vieillesse de la population . . ." (1946), argued that in the case of a system of capitalization, as under a system where current benefits are paid out of current contributions, the burden of the aged falls on the society anyway, since the latter has to keep the value of money constant in order to insure the purchasing power of the annuities, a process which takes place at the cost of society. Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (1949), pp. 42-43, noted that the manner in which savings for old age are invested is very important in determining income after retirement.

#### (e) *The life cycle and savings*

39. At the basis of the theory of the life cycle is the observation that in the course of his lifetime the individual passes through a number of distinct stages, which might be studied, in particular, with reference to his family status. The life cycle of a family begins at marriage and continues throughout the life span of the married, being divided into different stages marked by the birth of children, the period of education, that of the departure of children, and that of the death of each of the spouses.<sup>109</sup> The existence of such stages in the economic conditions of the individual and the family is equally obvious. Emerging from adolescence, the youth goes to work, his earnings increasing as he acquires more skills and experience and reaching at some stage a peak, after which income will decline gradually and, on retirement, rapidly.<sup>110</sup> As in the case of the family life cycle, the pattern of these changes, although not completely uniform, is at given times and places sufficiently stable to consider it as a life cycle typical for the great majority of the population. Lansing and Morgan argued that the use of the life cycle as an explanatory variable in an investigation of economic behaviour may be regarded as an alternative to the use of age: the stage in the life cycle at which an individual finds himself is intimately related to his age, and consequently any factor closely associated with one is certain to be associated with the other.<sup>111</sup>

40. The life cycle, according to a number of authors, is also found in the case of personal savings. Nevertheless, the exact nature of a life cycle in family savings is not altogether clear, as it depends both on the income life cycle, as a main determinant of savings, and the life cycle of the family, the different stages of which affect both the level and structure of their expenditures. The findings of different studies suggest that because of the interdependence of these two factors, no necessarily uniform pattern of savings during the family's life cycle emerges. Woytinsky, comparing variations in family income by the age of the family head with variations in the needs of the family according to its size, found that the cycle of the level of living of the family had three low points: one at the beginning of married life, one when the head of the family was in his forties, and one when he was 65 years or older. The high points were found between ages 25 to 34 and from 55 to 64.<sup>112</sup> Analysing data on household savings for the United States, according to the age of the head of the household, Fisher found that, on the average, dissavings were typical for households with a head aged between 18 and 24 years: small savings took place in those cases where the head was between 25 and 34 years or 65 years and over. Average savings were highest in those house-

<sup>109</sup> Fisher, "Family life cycle analysis . . ." (1955); Glick, "The family cycle" (1947). See also chapter X.

<sup>110</sup> Lydall, "The life cycle in income . . ." (1955); Brady, "Family saving, 1888 to 1950" (1956); Fisher, "Income, spending and saving patterns . . ." (1952).

<sup>111</sup> Lansing and Morgan, "Consumer finances over the life cycle" (1955).

<sup>112</sup> Woytinsky, *Earnings and Social Security in the United States* (1943), pp. 232-239.

holds where the head was middle-aged, that is between 45 and 64 years.<sup>113</sup> Brady, however, contended that fundamental differences in the standards of living of the population over 30 years were disappearing and that the main effect of the age distribution on expenditures and savings would be that which resulted from its influence on the proportion of single individuals, couples living alone, and newly established couples below that age.<sup>114</sup>

41. Lydell, basing himself on data for the United Kingdom, noted that fluctuations over the life cycle in the number of dependants were to some extent, but not completely, offset by variations in the level of income; an appreciable fall in the average income per person among families with heads aged between 25 to 44 years, and also among elderly people, was found to exist. Nevertheless, classifying savings according to the age of the head of the household, savings were highest in those households where the head was in the middle ages. In general, savings were small in the younger age groups, increased gradually to reach a maximum in middle ages and then declined again to become negative in the most advanced ages.<sup>115</sup> Modigliani and Ando, analysing the same data, thought that the behaviour of the saving-income ratio as a function of age seemed to conform fairly well to the pattern implied by the life-cycle model.<sup>116</sup>

42. The relation between savings and age in the course of a family's life cycle is, however, influenced by another factor: the needs for durable consumer goods which, according to a number of authors, change significantly during the life cycle, and the inclusion or exclusion of expenditures on durables in savings classified by age will substantially influence the results.<sup>117</sup> Morgan asserted that the stage of the life cycle had a considerable impact on expenditures on such goods, starting when the family is founded and has to accumulate a certain set of household goods.<sup>118</sup> Lydall found an appreciable negative correlation between saving and the acquisition of durable consumer goods and, in so far as the latter is considered as a form of consumption, it had an important effect on savings. Contrary to saving patterns, expenditure on these goods was comparatively large in families with a head under 35 years of age, when families are established and growing; they reached a maximum in the 35-44-year age group, and declined sharply after that.<sup>119</sup> Lansing and Morgan found that if expenditures on consumer durables were considered as savings, young married couples saved more than other families.<sup>120</sup> David, who

made a detailed study of expenditures on selected durable consumer goods, including housing, found that the acquisition of some durables appeared to be related more to the age and marital status of the head of the household than to family size. He suggested, however, that the acquisition of assets at particular stages of the life cycle when families reached a critical size or when members reach a particular age, should be further explored.<sup>121</sup>

### 3. POPULATION GROWTH AND SAVINGS

43. An increase in population tends in the first instance to increase the levels of consumption. The influence of population growth on the demand for consumer goods is generally recognized and is evident in the incorporation in models of the size of population as one of the factors on which consumption depends.<sup>122</sup> The effects of population growth on savings are not easily determined in practice, however. Differences in the rate of population growth imply, as a rule, differences in the age distribution, consumption needs and income and these tend to affect savings. These indirect consequences of differences in the levels of population growth manifesting themselves either through such demographic variables as fertility, mortality, migration and the age distribution, or through the levels of income may not be insignificant.

#### (a) Fertility, mortality, population growth and savings

44. The interrelations between the growth of population, in so far as they are determined by the components of natural growth, fertility and mortality,<sup>123</sup> and savings capacity and performance are the result mainly of the interdependence between population growth, its components and the age distribution. The level of fertility, given mortality, will determine the rate of growth of population, but is also a major determinant of the proportions of the population in active and inactive ages, including the distribution of the latter between young and aged dependants; the size and composition of the family; the workload of the housewife and, thus, her availability for work outside the home.

45. To the extent that a lower level of mortality affects the age distribution, it will generally result in a slight increase in both the proportion of young and aged persons.<sup>124</sup> In terms of dependency ratios then, an improve-

<sup>113</sup> Fisher, "Income, spending and saving patterns ..." (1952); Eicher, *Consommation et épargne* ... (1961), p. 43.

<sup>114</sup> Brady, "Family saving, 1888 to 1950" (1956).

<sup>115</sup> Lydall, "The life cycle in income ..." (1955); Eicher, *Consommation et épargne* ... (1961), p. 43; Fisher, "Exploration in savings behavior" (1956).

<sup>116</sup> Modigliani and Ando, "Tests of the life cycle hypothesis of savings" (1957).

<sup>117</sup> Klein and Morgan "Results of an alternative statistical treatment ..." (1951); Morgan, "Consumer investment expenditures" (1958).

<sup>118</sup> Morgan, "Consumer investment expenditures" (1958).

<sup>119</sup> Lydall, "The life cycle in income ..." (1955).

<sup>120</sup> Lansing and Morgan, "Consumer finances over the life cycle" (1955).

<sup>121</sup> David, *Family Composition and Consumption* (1962), pp. 96-97. See also Choudhry and Kotowitz, "Some simple economic-demographic relationships ..." (1967); Faaland, "Demographic aspects of savings ..." (1966).

<sup>122</sup> Goodwin, "A model of cyclical growth" (1955); Kaldor, "The relation of economic growth ..." (1954); Matthews, "The savings function ..." (1954); Klein and Goldberger, *An Econometric Model of the United States, 1929-1952* (1955), chap. 2; Cornwall, "Economic implications of the Klein-Goldberger model" (1959). See also Tacke, "Der Einfluss der Bevölkerungsvermehrung ..." (1963); Coale, "Population change and demand ..." (1960). Ferber, "The accuracy of aggregate savings ..." (1955), concluded that the adjustment of economic variables for changes in population tended to improve the accuracy of predictions of the levels of savings.

<sup>123</sup> The effects of international migration on savings are discussed later in this chapter.

<sup>124</sup> See chapters V and VIII.



ment in mortality may tend to reduce the population's capacity to save, although probably not in a significant manner. In an indirect way, however, mortality declines may exert a favourable influence on savings for several reasons. As has already been discussed, saving for old age, provided the responsibility for it falls on the individual, may increase if, as a result of mortality decline, the number of years expected to be spent in retirement increases. Also, lessened morbidity and increased capacity to work, associated with lower mortality, would compensate, at least in part, if not outweigh, the adverse effects of a mortality decrease on savings. Finally, the prolongation of life is in itself a primary goal in economic growth and development; hence, whatever the net effect of such a trend on accumulation or on other economic variables may be, these effects should remain subject to the aim of lowering mortality.

(b) *Population growth, economic growth and savings*

46. Population growth is associated with a higher total demand for consumer goods, but implies at the same time an increased potential production as a result of the increase in the number of workers. The effect of population growth on consumption and savings would thus depend on the consequences the increased population would have for employment and income. If it could be assumed that the increase in population would not by itself create employment and income and also that families without income must make some minimal consumption expenditures, then an increase in aggregate consumption and a fall in savings, given income, would be inevitable. Even if it were assumed that income would rise as a direct consequence of population growth, the question whether savings would rise, fall or remain constant would depend on whether the increase in income exceeded, fell short of or equalled the increase in consumption.<sup>125</sup> This net effect on savings is the more important, since savings determine capital formation and thus will affect future economic growth. If population growth would hamper economic growth, it would, therefore, not only discourage savings in the current period, but through its negative effect on capital formation, also hamper future growth of income.<sup>126</sup>

<sup>125</sup> Choudhry and Kotowitz, "Some simple economic-demographic relationships ..." (1967). Anderson, "Population size and demand" (1961), taking consumer demand as a function of income and the size of population and ignoring the effect of the latter on income, distinguished three categories of demand which would respond in a different manner to population size: (A) necessities, which account for a larger share of the consumer's budget at low, rather than at high levels of income, and for which population increase will raise demand; (B) articles which account for the same share of the budget at all levels of income and for which population size is immaterial; and (C) luxuries, which account for a larger share of the consumer's budget at high rather than at low levels of income, for which the effect on demand of population growth will tend to neutralize that of an increase in income. See also Tacke, "Der Einfluss der Bevölkerungsvermehrung ..." (1963).

<sup>126</sup> Spengler, "Demographic patterns" (1954); Coale, "Population and economic development" (1963).

(i) *Population growth and savings in the less developed countries*

47. Contemporary literature on the interrelations between population and economic growth has given a great deal of attention to the problem of total savings, as opposed to savings in the household sector discussed in the preceding pages, and capital formation in the economically less developed countries with low levels of income and high rates of population growth. Many writers believe that voluntary savings in these countries would be insufficient, given the low levels of income, to create capital at the rate needed for economic development. Very low *per capita* incomes make for low total savings and the dearth of savings maintains incomes at a low level.<sup>127</sup> It is often assumed that over-all savings in the poorest developing countries amount to no more than between 4 and 6 per cent of national income.<sup>128</sup> Findings with respect to savings in developing countries show, however, wide variations. Net domestic savings as a percentage of gross domestic product in thirty-one developing countries varied from -4 to 16 per cent over the period 1950-1959. In seven of these countries savings were less than 4 per cent of gross domestic product; in five they were between 4 and 7 per cent; in ten between 7 and 10 per cent; and in nine countries savings amounted to 11 or more per cent.<sup>129</sup> Data for a more recent period, in most cases 1963-1965, revealed that the median of net domestic savings as a percentage of gross domestic product for thirty-three countries was 8 per cent. In six of these thirty-three countries, savings were negative or lower than 4 per cent of gross domestic product; in nine, savings were between 4 and 6 per cent; in nine, between 7 and 10 per cent and, in nine others, more than 11 per cent.<sup>130</sup> However, such figures may underestimate the real capital formation to the extent that they do not take into account investments in kind.

48. Several other factors in addition to low income are thought to be responsible for low savings in these countries. One of these is the distribution of income. Many authors recognize that the potential for savings in the less developed countries is not as low as might be suggested

<sup>127</sup> Gambino, "La libertad económica ..." (1946); Rosenstein-Rodan, "The international development ..." (1944); Prebisch, *The Economic Development of Latin America ...* (1950), p. 5; Leibenstein, *Economic Backwardness ...* (1957), p. 52; Nurkse, *Problems of Capital Formation ...* (1953), pp. 5, 57; Brand, *The Struggle for a Higher Standard of Living* (1958), pp. 56-61; Higgins, *Economic Development ...* (1959), chap. 23; Bruton, *Principles of Development Economics* (1965), pp. 127-128; Bernstein, "Financing economic growth ..." (1953). Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 301.

<sup>128</sup> United Nations, *Measures for the Economic Development ...* (1951), p. 35. Lewis, *The Theory of Economic Growth* (1963), pp. 216, 225, 335. Shonfield, *The Attack on World Poverty* (1960), pp. 61-62. Leibenstein, *Economic Backwardness ...* (1957), p. 52; Myint, *The Economics of the Developing Countries* (1965), pp. 98-100. The latter author points out that recent literature estimates savings in these countries to be somewhat higher. See also Cairncross, *Factors in Economic Development* (1962), pp. 53-55.

<sup>129</sup> United Nations, *World Economic Survey, 1960* (1961), table 2.2, p. 61.

<sup>130</sup> United Nations, *World Economic Survey, 1967; Part 1 ...* (1968), table 40, p. 78.



by the level of income since as a result of the very unequal distribution of income, a large share is retained by the higher income groups, who are most likely to save. The authors point out, however, that much of these savings escape through ostentatious consumption, or are used for speculative or financial gains instead of productive investment or are lost to the country because of transfer abroad.<sup>131</sup> Also, many other savings among large sections of the population are not primarily determined by investment motives, but are hoarded, spent on such luxury goods as jewellery, precious ornaments and gold, used to acquire foreign assets, or to pay for marriage ceremonies, dowries and so forth.<sup>132</sup> Whereas the view that measures to increase voluntary domestic savings alone are unlikely to provide the financial resources needed for development is not infrequently found, many writers are of the opinion that domestic savings in the less developed countries could be much higher than usually assumed if sufficient economic incentives existed or appropriate measures were taken.<sup>133</sup> It is thought that through taxation, the creation of savings institutions, measures designed to change traditional attitudes and so forth, the funds used for luxury consumption and non-productive investment or held in the form of hoardings could be directed into productive investment.<sup>134</sup> However, in general, it is recognized that the potential of capital formation in the economically less developed countries is limited and that in order to bring about a significant increase in their rate of economic growth a substantial volume of foreign capital would be needed.<sup>135</sup>

<sup>131</sup> Bonné, *Studies in Economic Development* ... (1957), p. 38; Meier and Baldwin, *Economic Development* ... (1957), pp. 303-310; Belshaw, *Population Growth and Levels of Consumption* ... (1956), p. 116; Leibenstein, *Economic Backwardness* ... (1957), pp. 52-53; United Nations, *Towards a Dynamic Development* ... (1963), p. 4; Higgins, *Economic Development* ... (1959), chap. 23; Lewis, *The Theory of Economic Growth* (1955), pp. 225-239.

<sup>132</sup> United Nations, *Measures for the Economic Development* ... (1951), p. 35; Shenoy, "Savings, inflation and economic development ..." (1953); Kuznets, *Economic Change* ... (1953), pp. 175-176; Belshaw, *Population Growth and Levels of Consumption* ... (1956), p. 116; Brand, *The Struggle for a Higher Standard of Living* (1958), pp. 159-160. Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 58, 302.

<sup>133</sup> Leibenstein, *Economic Backwardness* ... (1957), pp. 52-53; Belshaw, *Population Growth and Levels of Consumption* ... (1956), p. 116; United Nations, *Towards a Dynamic Development* ... (1963), pp. 31-35; Hirschman, *The Strategy of Economic Development* (1958), pp. 2-4; Rosenberg, "Capital formation in underdeveloped countries" (1960). Sometimes it has been suggested that consumption could be reduced through inflation, which would raise prices and reduce the volume of consumption. See, however, Lewis, *The Theory of Economic Growth* (1963), pp. 216-225; Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 119-123; United Nations, *Measures for the Economic Development* ... (1951), pp. 42-43; Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 308-317.

<sup>134</sup> Another possibility, that of creating additional capital through the use of surplus labour in the production of certain capital goods, has been widely discussed and is considered in section C.

<sup>135</sup> For estimates of the external needs of capital of developing countries see, especially, United Nations, *Measures for the Economic Development* ... (1951), chap. 40; Millikan and Rostow, *A Proposal, Key to an Effective Foreign Policy* (1959); Hoffman, *One Hundred Countries* ... (1960); Rosenstein-Rodan, "International aid for underdeveloped countries" (1961); United Nations, *The Capital Development Needs* ... (1962).

49. The problems of low savings in developing countries are accentuated by rapid population growth. While the prevailing low levels of saving make it difficult to create the productive assets needed to maintain the increased population at the same levels of living,<sup>136</sup> in addition, population growth may tend to further depress savings through the pressure it exercises as a result of increased consumption needs. Unless population growth induces, directly or indirectly, output to expand at least proportionately to its own increase and causes no rise in the propensity to consume, it will tend to increase the proportion of national income devoted to consumption, and a large part of whatever higher output might occur would be dissipated by population increase.<sup>137</sup> The association of high dependency ratios with high population growth further tends to affect unfavourably the rapid increase in savings.<sup>138</sup> "The source for increasing the volume of investment", it has been noted, "is the 'ploughing back' of portions of future increases in income. This task is handicapped if these increases have instead to be devoted each year to sustaining a larger population."<sup>139</sup> "Rapid population growth and the dependency characteristics that go with it" it has also been observed, "tend to reduce the rate of saving and investment and to create employment problems."<sup>140</sup> In many developing countries, it is asserted, savings have been barely sufficient to keep pace with population growth and little, if any, new capital has actually become available for increasing the levels of living.<sup>141</sup>

#### (ii) *Population growth and savings in the more developed countries*

50. Unlike the situation in countries in the process of development, the implications for capital formation of a possible decline in population growth or numbers in the economically advanced countries, received considerable attention some decades ago. Fears as to the negative effects of a declining population on economic growth, in general, and on investment and savings, in particular, found their expression particularly in the so-called "stagnation thesis". According to this thesis, anticipated in some aspects by Keynes and developed by Hansen, Higgins and others, a declining population tends in two ways to diminish the volume of employment and income, namely through (a) reducing the rate of investment and (b) increasing the propensity to save.<sup>142</sup>

<sup>136</sup> See section B of this chapter.

<sup>137</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 303; Brand, *The Struggle for a Higher Standard of Living* (1958), pp. 59-60; Bonné, *Studies in Economic Development* ... (1957), p. 254.

<sup>138</sup> Ohlin, *Population Control and Economic Development* (1967), p. 55.

<sup>139</sup> United Nations, *Inquiry Among Governments on Problems Resulting* ... (1964), pp. 8-9.

<sup>140</sup> Correa, "Statement by the rapporteur" (1966), pp. 303-304.

<sup>141</sup> United Nations, *Measures for the Economic Development* ... (1951), p. 35; ———, *Towards a Dynamic Development* ... (1963), pp. 35-36; ———, *Economic Survey of Asia and the Far East, 1966* (1967), p. 16.

<sup>142</sup> Keynes, "Some economic consequences of a declining population" (1937); Hansen, "Economic progress and declining ..." (1939); his "Extensive expansion and population growth" (1940);  
(Continued on next page)

51. According to the stagnation theory, the main implication of a declining population growth was the disappearance of investment opportunities. Views as to the effects of a slower growth of population on savings are less clear. Hansen thought that, given the well-established consumption and savings patterns developed over the past, the decrease in investment opportunities, following the disappearance of the stimulus provided by population growth and territorial expansion, would not spontaneously increase consumption or lower savings.<sup>143</sup> He referred also to the likelihood that increased savings would be associated with a decline in the size of the family.<sup>144</sup> In both cases, the result would be an excess of savings over investment which, because of a failing demand, would cause employment and income to fall, bringing about a drop in consumption and a further contraction in employment and income. Robinson did not agree that a decrease in population growth might increase savings, but saw, on the other hand, no reason to assume under these conditions a decline in thriftiness, which would offset the decline in investment opportunities.<sup>145</sup>

52. Although the stagnation theory has been challenged, especially in so far as it assumed that investment outlets would disappear, so has the contention that savings might increase or not adapt to the existing levels of investment. Terborgh thought that any negative effect which lower population growth would have on investment opportunities would be balanced at least in part by reduced savings. He argued that as a substantial part of savings is motivated by the desire for certain durable goods, such as household equipment and automobiles, that portion of savings might disappear if the demand for such goods contracted as a result of lower population growth. These lower savings would compensate, at least partially, for the decline in investment caused by the lower population growth.<sup>146</sup> The relative importance of factors tending to increase savings and those tending to decrease them is uncertain. Spengler listed the following as factors which might lead to an increasing propensity to consume under these conditions: an increase in the marginal productivity of labour and, therefore, the wage level; the possible introduction of a system of family subsidies in order to promote larger families; and an age distribution more favourable to consumption. In particular, the two first factors would favour mostly the lower income groups, whose savings, as a rule, are

small. These factors, according to Spengler, should be balanced against the possible positive effects on savings which might result from a more favourable ratio between population and resources and other implications of the lower population growth.<sup>147</sup>

53. More recently, the argument, at least in developed countries, that population growth could call forth forces which would tend to augment savings has been advanced, in particular by Kuznets. As reasons for his argument, he mentioned that where population grows through natural increase, not all the added outlays would necessarily be at the expense of otherwise proportionately larger savings. A higher number of children may in fact provide an incentive to save more. Likewise, some components of saving tend to increase when the population is growing, this being particularly true of savings for old age and future expenses. Finally, to the extent that consumption patterns are interdependent, the lower levels of consumption in low-income families which would result from population growth could depress the levels of consumption in higher income classes and in this manner raise their savings.<sup>148</sup> Stassart thought, however, that it was doubtful whether population growth by itself would lead to higher private or public savings, but argued that it might have a positive effect on corporate savings.<sup>149</sup>

#### 4. INTERNATIONAL MIGRATION AND SAVINGS

54. International migration may have various effects on savings. By influencing the age distribution and the ratio of workers to dependants, it may affect the levels of income and consumption, and thus savings. In addition, there are the direct effects international migration can have on income and income distribution and the saving capacity. Finally, there are the movements of capital and transfer of funds which occur as a direct result of international migration, and which may affect capital formation both in countries of emigration and immigration.

55. The influence which international migration can have on savings capacity through its effects on the age distribution and the ratio of workers to non-workers is twofold. International migrants may have labour force participation rates which differ from those of non-migrants, but, more importantly, the migrants are likely to include higher proportions of persons in the sex-age groups where activity rates are high.<sup>150</sup> Changes in the age composition resulting from migration will have implications for savings not unlike those discussed in the preceding subsections.

56. Emigration or immigration, by reducing or increasing the population, may indirectly affect savings in the long run through induced changes in the levels and distri-

(Footnote 142 continued)

and his *Fiscal Policy and Business Cycles* (1941), pp. 352-360; Higgins, "Concepts and criteria of secular stagnation" (1948). See also: Adler, "Absolute or relative decline ..." (1945); Myrdal, *Population: A Problem for Democracy* (1940), p. 160; Sweezy, "Secular stagnation" (1943); Reddaway, *The Economics of a Declining Population* (1939), p. 114; Duvaux, *La théorie de la maturité économique ...* (1958), p. 167; Stassart, *Les avantages et les inconvénients économiques ...* (1965), pp. 181-190.

<sup>143</sup> Hansen, *Fiscal Policy and Business Cycles* (1941), p. 306.

<sup>144</sup> Hansen, "Extensive expansion and population growth" (1940).

<sup>145</sup> Robinson, "Economic consequences of a decline in the population ..." (1951).

<sup>146</sup> Terborgh, *The Bogey of Economic Maturity* (1945), pp. 47-63. See also: Reddaway, *The Economics of a Declining Population* (1939), p. 116; United Kingdom, Royal Commission on Population, *Report of the Economics Committee ...* (1950), vol. 3, p. 45.

<sup>147</sup> Spengler, "Population movements and economic equilibrium ..." (1940).

<sup>148</sup> Kuznets, "Population growth and aggregate output" (1960).

<sup>149</sup> Stassart, *Les avantages et les inconvénients économiques ...* (1965), pp. 126-133.

<sup>150</sup> See chapter VII, section D.

bution of income.<sup>151</sup> Voluntary migrations, it is often pointed out, respond to a great extent to the expectation or desire on the part of the migrant to improve his standard of living.<sup>152</sup> In general, the aggregate income in the countries of immigration would almost certainly increase as a result of immigration. As for *per capita* income, immigration is held to be advantageous in sparsely settled countries where an inflow of immigrants would make it possible to use natural resources more effectively<sup>153</sup> or, in general terms, where the population is below optimum size.<sup>154</sup> The effect which international migration can have on consumption, as one of the main determinants of saving, is not entirely clear. It has been argued, on the one hand, that to the extent that immigrants are often used to living at lower levels prior to migration, they may not immediately adopt the patterns of consumption of the countries of immigration, and thus, out of a given income, are able to save more.<sup>155</sup> Isaac has also noted that since immigration requires additional capital outlays for installing and equipping the immigrants, these investments may have to be obtained through a contraction of consumption.<sup>156</sup> Finally, there are the effects which immigration may have on the distribution of income through its effect on wages.<sup>157</sup> By potentially lowering the wages of the unskilled labour market, in which immigrants compete most directly with native workers, income in other occupations might tend to increase in relative terms, thus increasing the saving capacity of these workers.<sup>158</sup>

57. A last factor to be considered in the present context is the effect on savings of capital movements directly associated with immigration or emigration. These capital transfers can take the form of: (a) funds brought in by immigrants; (b) remittances by immigrants; and (c) funds taken out by returning migrants. The available evidence suggests that while the first type of transfers may be of relatively little importance, remittances by immigrants and capital taken out by returning migrants may sometimes be substantial. Migrants have been said to save considerable amounts, even from meagre incomes, especially if they had families to support in their coun-

tries of origin.<sup>159</sup> These remittances, which in recent times have become important, especially in shorter intra-continental movements,<sup>160</sup> tend to affect savings both in countries of emigration and immigration. According to Sauvy, saving for this purpose will make more of a difference in the country of immigration, because the immigrant who saves would curtail in particular those expenses which would have been most beneficial for the country.<sup>161</sup> Immigrant remittances received in the countries of emigration, according to a number of writers, have contributed considerably to relieve the existence of population pressure.<sup>162</sup> Lewis thought that, though these remittances, as a rule, were a minor part in the balance of payments, they lightened the burden which countries of emigration had to suffer because the young people were leaving.<sup>163</sup> In addition to remittances by immigrants, considerable funds have been taken back by returning migrants to their countries of origin.<sup>164</sup>

## 5. INTERNAL MIGRATION AND SAVINGS

58. The possible effects of internal migration on savings are in some aspects similar to those of international migration, but in others, different. Like international movements, internal migration may affect levels of saving through changes in the level of income, but it does not cause direct changes in the age distribution of the nation's population, nor as a rule does it influence international movements of capital in a direct manner. Nevertheless, age selectivity also operates in internal migration and changes in the age distribution resulting from these internal movements, together with differences in labour force participation rates and levels of productivity, may in turn affect income and savings. Likewise, the transfer of money by migrants to their families or relatives who remained behind may not be without its effect on levels of saving. In general, with the possible exception of the effects of rural-urban migrations, little is known about the consequences of the redistribution of the population within a country for levels and patterns of savings.

### (a) Rural-urban migration, urbanization and savings

59. Since rural-urban migration responds to a great extent to economic factors, particularly the real or assumed better opportunities for employment, these movements are heavily weighted in favour of young adults and thus frequently cause significant changes in the age distribution of both urban and rural populations. While this characteristic might make for a lower dependency ratio in urban areas, this does not necessarily follow since as a rule

<sup>151</sup> Thompson, "The demographic and economic implications . . ." (1947), thought that, in the case of the United States, migrants might have contributed to a relatively high rate of population growth which was possibly one factor in that nation's rapid economic expansion.

<sup>152</sup> Isaac, *Economics of Migration* (1947); Taft and Robbins, *International Migrations . . .* (1955), p. 67; Sauvy, *Richesse et population* (1944), pp. 170-172; and his *Théorie générale de la population*, vol. 1 . . . (1956), p. 302; Spengler, "Effects produced in receiving countries . . ." (1958); and his "The economic effects of migration . . ." (1958); Vance, "Prerequisites to immigration . . ." (1958).

<sup>153</sup> Thomas, "The economic aspect" (1955); Lewis, *The Theory of Economic Growth* (1963), pp. 360-361.

<sup>154</sup> Spengler, "Effects produced in receiving countries . . ." (1958). Isaac, *Economics of Migration* (1947), pp. 70-78, discusses also the limitations of the optimum criterion.

<sup>155</sup> Taft and Robbins, *International Migrations . . .* (1955), p. 77.

<sup>156</sup> Isaac, *Economics of Migration* (1947), p. 198.

<sup>157</sup> For a discussion of the effects of international migration on wages, see chapter VII, section D.

<sup>158</sup> Spengler, "Effects produced in receiving countries . . ." (1958).

<sup>159</sup> Taft and Robbins, *International Migrations . . .* (1955), pp. 77, 80.

<sup>160</sup> Borrie, "International migration as related to . . ." (1966), pp. 138-145.

<sup>161</sup> Sauvy, *Théorie générale de la population*, vol. 1 (1956), p. 310.

<sup>162</sup> Taft and Robbins, *International Migrations . . .* (1955), p. 80. For an analysis of the possible effects of remittances from abroad for economic growth in Italy in the early 1900s, see Parenti, "The role of emigrants' remittances . . ." (1967).

<sup>163</sup> Lewis, *The Theory of Economic Growth* (1955), pp. 360-361.

<sup>164</sup> Isaac, *Economics of Migration* (1947), p. 247; Taft and Robbins; *International Migrations . . .* (1955), p. 80.

labour force participation rates, at least for males, are higher in rural areas, mainly as a result of earlier age of entry and later age of withdrawal, and the effect of a more favourable age distribution in urban areas on economic activity rates may be compensated for by the higher participation rates in rural areas. Findings in this respect seem to be far from conclusive.<sup>165</sup>

60. Evidence as to the effect of income differentials between urban and rural areas on savings is likewise inconclusive. Although it has been argued that in the developing countries, rapid urbanization might appear to create the conditions for increasing savings, by developing the monetary economy, stimulating the circulation of goods and services and through expanding public institutions concerned with savings, it is also recognized that this result does not necessarily follow. A closer examination of changes in patterns of living and consumption following urbanization suggests, in fact, that very rapid urban growth tends to reduce the rate of savings. Whereas the saving capacity of low-income urban groups is very small, savings in the urban higher income groups is reduced by the high propensity to spend.<sup>166</sup> A number of comparative studies have established the fact that, at the same level of income, the rural population saves more than the city population and the evidence suggests, moreover, that these differentials persist if the population is further subdivided, e.g. into small town and city population, or according to the size of towns and cities.<sup>167</sup>

61. A number of explanations have been proposed for such differentials. One of them is that rural savings appear higher because in rural areas part of the household production and consumption escapes measurement, as a result of which income and consumption are underestimated.<sup>168</sup> Other interpretations accept the existence of a higher propensity to consume in urban areas, attributing it both to the higher cost of living (the fact that the urban consumer must pay more for certain goods and services) and to the standard of living (the fact that the urban consumer leads a more expensive type of life in the urban community).<sup>169</sup> Some authors have pointed out that the rural population spends less on such consumption items as housing rents, transportation and also on durable consumer goods, although apparently not on food.

<sup>165</sup> See chapter IX. It has been argued that a higher dependency ratio in rural areas might also be compensated for by remittances of migrants to their families. United Nations, "Implications of population trends ..." (1963).

<sup>166</sup> United Nations, Economic Commission for Latin America, "Creation of employment opportunities ..." (1961).

<sup>167</sup> Kuznets, *Shares of Upper Income Groups* ... (1950); United States, Bureau of Labor Statistics, *Spending and Saving in Wartime* (1945); Badouin, "L'élasticité de la demande ..." (1949), pp. 96-97; Morgan, "Factors related to consumer saving ..." (1954); Eicher, *Consommation et épargne* ... (1961), p. 32; Byé, *L'épargne dans le Marché commun* ... (1963), p. 385; Morgan, "Analysis of residuals ..." (1954). For a different opinion see, however, Mitra, "The demographic aspects of capital formation ..." (1967). Also Faaland, "Demographic aspects of savings ..." (1966).

<sup>168</sup> Kuznets, "Quantitative aspects of the economic growth of nations, VII ..." (1962); Byé, *L'épargne dans le Marché commun* ... (1963), p. 389.

<sup>169</sup> Morgan, "Factors related to consumer saving ..." (1954); Kuznets, "Quantitative aspects of the economic growth of nations, VII ..." (1962).

However, findings in this respect often differ.<sup>170</sup> Byé thinks that, in addition, farmers have usually stronger incentives to save because of such factors as the need to build up reserves against bad harvests, the cycle in agricultural activity during the year, as well as the fact that many of them are individual *entrepreneurs*.<sup>171</sup>

62. Several authors have concluded from the fact that, with given income, saving is higher in rural than in urban areas, the increasing urbanization in the developed countries in the course of the last century has been a factor in the stability of the average propensity to consume.<sup>172</sup> Duesenberry has shown, however, that this factor could have increased the propensity to consume by one per cent at most in the course of the last fifty years.<sup>173</sup> Nevertheless, in general the redistribution of population operates, according to Spengler, to reduce the supply of savings in the long run, if, as it appears to be the case, such a process transfers people from situations in which the propensity to consume is relatively low to situations in which it is relatively high and if the effects of this transfer are not offset by accompanying increases in *per capita* income.<sup>174</sup>

## 6. DEMOGRAPHIC AND NON-DEMOGRAPHIC DETERMINANTS OF SAVINGS

63. The foregoing discussion has been concerned primarily with the possible influences of demographic factors on savings and, particularly, savings in the household sector, to the virtual exclusion of non-demographic determinants of this process. The arguments reviewed suggest that demographic factors may affect savings in a number of ways, and that population may play a significant, though not a crucial role, in savings decisions and performance.

64. Many of the arguments surveyed relate to demographic factors as determinants of savings capacity, or motives for saving, especially in the household sector, and it is difficult to determine to what extent these factors are important for actual savings levels and patterns. It would appear that only in the extreme cases where consumption is depressed to its subsistence level are actual savings likely to be greatly influenced by savings capacity, as determined by demographic factors among others. In other cases, the savings capacity is mainly useful as a theoretical concept, reflecting the lower levels of consumption. The actual levels and patterns of savings of households under these circumstances will depend to a great extent on other factors, such as levels and distribution of income. The direct effect of demographic factors may thus not be so evident, though they may of course have indirect repercussions on the main determinants of savings.

<sup>170</sup> Byé, *L'épargne dans le Marché commun* ... (1963), p. 389; Dewhurst et al., *Europe's Needs and Resources* ... (1961), p. 156.

<sup>171</sup> Byé, *L'épargne dans le Marché commun* ... (1963), pp. 389-390.

<sup>172</sup> Kuznets, "Proportion of capital formation ..." (1952); Smithies and Mosak, "Forecasting postwar demand" (1945); see also Eicher, *Consommation et épargne* ... (1961), p. 32.

<sup>173</sup> Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (1949).

<sup>174</sup> Spengler, "Economics and demography" (1959).

65. On the whole, a number of the findings discussed suggest that demographic factors may exert an influence on savings in the household sector, be it directly or indirectly. The problem lies mainly in assessing the impact of population in quantitative terms and its relative importance as compared to other determinants. In addition, it must be taken into account that the studies reviewed in this section dealt, with only few exceptions, with savings in the household sector. To the extent that the importance of this kind of savings is or was minimal, as in the centrally planned economies; insufficient, as in the developing countries; or declining in relative terms, as in the case of many developed, private enterprise economies, the role of demographic factors is further circumscribed.

66. It is within this context that the influence of demographic factors as compared with non-demographic determinants of savings must be considered. Although the available evidence is incomplete and this discussion has singled out mainly the demographic aspects, the findings nevertheless suggest that population and demographic factors may play a significant, though not a crucial role, in private savings.

## B. Demographic aspects of investment

67. Whereas the foregoing section dealt mainly with demographic factors in so far as they affect the supply of part of the funds available for capital formation, the present section is primarily concerned with the problem as to how these factors influence the demand for and the availability of capital goods and investment. The problems of defining investment are multiple, in part because the word has been used in different meanings, including that of the actual spending of money for the purchase of capital goods or even the acquisition of securities or other financial claims. Investment in cash or kind in the sense of capital formation has been interpreted in two ways, the first giving emphasis to the capacity of the goods concerned to satisfy future needs, the second stressing the nature of investment as contributing to the future production process. Those who stress the former approach are inclined to consider expenditures on at least some durable consumer goods as investment; while those who emphasize the contribution of capital goods to future production as the basic element in investment tend to exclude all durable consumer goods, except in most cases dwellings, from capital formation, but would include certain other expenditures which would facilitate future production. To the extent that the latter can be increased not only through the additions to the stock of capital goods, but also by higher levels of education, technical training and knowledge on the part of the population, by improvements in health and living conditions and so forth, expenditures in these fields are to an increasing degree being considered as "investment in man" and as increasing the "human capital". Thus, depending on the purpose, the range of items included in capital formation may vary from a narrow interpretation, which includes only physical plant and equipment, to one which also includes current expenditures for research, health and, particularly, educa-

tion, in so far as they contribute to improved technology and increased productivity of labour.<sup>175</sup>

68. The determination of the stock of capital goods and of investment involves a number of problems. In national income accounting, the definition of investment used is, for practical reasons, mostly a narrow one and would include as a rule two types of capital formation: investment in fixed capital, consisting of dwellings, non-residential buildings, other construction and works, transport equipment, machinery and other equipment; and, inventories which include raw materials, unfinished products, and finished products meant to be sold.<sup>176</sup> An important distinction in capital formation is that between gross and net investment. In each period capital goods are used, they are subject to wear and tear, obsolescence and accidental damage, and this process, sometimes referred to as capital consumption, means that some portion of the current production of capital goods must be set aside to allow for capital consumption and to maintain intact the stock of physical assets. Gross investment, then, refers to the total output of capital goods and net investment is differentiated from it in that it is measured after allowances are made for depreciation, obsolescence and accidental damage of the capital goods in a given period.<sup>177</sup>

69. It has become customary in demographic literature to distinguish a number of different types of investment and, although the classifications used differ, they bring

<sup>175</sup> For a discussion of general problems concerning the definition of capital and investment see United Nations, *Concepts and Definitions of Capital Formation* (1953); Kuznets, "International differences in capital formation and financing" (1955); Spengler, "Capital requirements and population growth ..." (1956). For an early review of definitions of capital, see: Fisher, *The Nature of Capital and Income* (1912), chap. 4. Definitions of capital and investment in a narrow sense may be found in: Dieterlen, *L'investissement* (1957), pp. 21-31; Kindleberger, *Economic Development* (1965), pp. 84-85; Clark, *The Conditions of Economic Progress* (1957), p. 566; Peterson, *Income, Employment and Economic Growth* (1962), pp. 43-45, 198. A broader definition of capital and investment is found in: Hicks, *The Social Framework* ... (1952), p. 73; Sauvy, "Investissements démographiques ..." (1959). On the subject of "investment in man" and "human capital", see: Adler, "The fiscal and monetary implications ..." (1952); Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 108-109; Schultz, "Investment in human capital" (1961); Bonner and Lees, "Consumption and investment" (1963); Robertson, "Stability and progress ..." (1958); Kuznets, "Population, income and capital" (1954); Viner, "Stability and progress ..." (1958). Keynes, *The General Theory of Employment, Interest and Money* (1951), pp. 61-62, noted that a uniform definition of capital and investment was not essential as long as the one adopted is reasonable for the purpose it is to serve.

<sup>176</sup> United Nations, *Concepts and Definitions of Capital Formation* (1953), pp. 14-15.

<sup>177</sup> *Ibid.*, pp. 9, 11-14; Peterson, *Income, Employment and Economic Growth* (1962), pp. 45-46. One of the main problems in the measurement of capital formation, which is the estimation of the actual volume of capital goods expressed in terms of money value, is even felt more severely in the case of capital consumption and net capital formation. Whereas, in principle, gross investment can be measured without too many problems, capital consumption can as a rule not be observed and must, therefore, be imputed. Kuznets, *Capital in the American Economy* ... (1961), pp. 58-60. The concept of "new investment" used in socialist countries is defined as gross investment from which are subtracted discarded fixed assets valued at replacement cost and by accidental damages of capital. See: United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1955* (1956), p. 198; Shonfield, *Modern Capitalism* ... (1965), p. 6.

out the fact that capital formation can take different forms, each of which has its own significance. One such classification divides capital into directly productive and not directly productive capital, or social overhead capital. While the former stands for investment in enterprises in the usual sense, not directly productive capital is defined as those basic services, which although themselves not directly productive are essential for the functioning of productive activities in a narrow sense. In its more restricted meaning, social overhead capital consists mainly of transportation, communications and power, including thus roads, railways, telegraph, telephone, power installations, waterworks and so forth. The investments in these types of activities are sometimes referred to as investments in infrastructure. In its broader sense, social overhead capital includes all public services, among them the maintenance of law and order, other aspects of administration and also education and public health.<sup>178</sup> Another classification distinguishes between enterprise capital, social overhead capital in the sense of investment in infrastructure and human capital.<sup>179</sup> To the extent that investments in infrastructure are really not "social", it has been suggested that the expression economic overhead capital should be used for them and to limit social overhead capital to social investments in their narrow sense.<sup>180</sup> In relation with a similar classification—private investment, investment in infrastructure and social investment—it was noted that social investment played a double role in the sense that it not only increased man's capacity as a producer, but contributed at the same time to his well-being, which is the ultimate goal of economic growth.<sup>181</sup>

70. The role of capital formation in the process of economic growth has been widely discussed in economic literature. As a reaction to a one-sided emphasis on investment in the physical stock of plant and equipment, particularly in the developing countries, it has been stressed that capital is not the only factor in economic growth, but it is also recognized that it remains important. This is especially true where investment is used in its broader sense to include investments in infrastructure and human capital. Although not denying the importance of directly productive capital, a number of writers have stressed the importance of investment in infrastructure,<sup>182</sup> and in view of the impossibility of explaining long-run trends in economic growth in terms of physical capital, or employment,<sup>183</sup> recent literature has directed its attention to

other factors in economic growth, among which human capital was considered to be one of the most important.<sup>184</sup> Although the importance of human capital for economic growth has been widely recognized,<sup>185</sup> the problems of defining the concept<sup>186</sup> and of the valuation of the relevant investment<sup>187</sup> remain important obstacles to an adequate analysis of the role of this factor in economic growth.

71. The importance assigned to demographic factors in the process of capital formation has increased considerably in recent decades as a result of the increasing preoccupation with economic growth and the implications of demographic trends for the latter in many developing countries. However, in view of the limited saving capacity of these countries, this discussion has been mainly focused on the requirements for capital formation which result from the high levels of population growth and associated demographic characteristics found in many of these countries. Much less is known about the actual influence of demographic factors on the level and structure of investment. As far as the economically more developed countries are concerned, the effect of demographic factors on investment has been primarily discussed, especially a few decades ago, in the context of a decline in population or its rate of growth, which was thought to affect unfavourably the investment opportunities and the outlook for economic growth. However, since such a demographic trend is no longer clear and the other premises on which this "stagnation thesis" was based appear not to have been confirmed, attention in these countries has shifted more to the ways in which demographic factors may affect investment in specific sectors, such as education, housing, transport, urban facilities and so forth. In the socialist countries, according to Bor, the needs of the economy and population are established in the preparation of plans and, depending on the level of development and the country's possibilities, the resources necessary for the allocations of these needs are determined.<sup>188</sup>

(1962); Kendrick, *Productivity Trends in the United States* (1961); Solow, "Technical change and ..." (1957); Schultz, "Capital formation by education" (1960); Correa, *The Economics of Human Resources* (1963).

<sup>184</sup> The role of human capital was already discussed by a number of early economists. For a review of these earlier writings, see Schultz, "The concept of human capital ..." (1961); Johnson, "The place of learning, science ..." (1968); Vaizey, *The Economics of Education* (1962), chap. 1; Bowman, "The human investment revolution ..." (1966).

<sup>185</sup> Schultz, "Investment in man ..." (1959); Kuznets, "Population, income and capital" (1954); Bonner and Lees, "Consumption and investment" (1963).

<sup>186</sup> Debeauvais, "The concept of human capital" (1962); Bowman, "Human capital: concept and measures" (1961, 1962). Shaffer, "Investment in human capital: a comment" (1961), is of the opinion that because of these problems the application of the capital concept to man is not appropriate. Schultz, "The concept of human capital ..." (1961); and Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964). The latter authors considered the major categories of human investment to be formal education, on-the-job training; study programmes for adults and self-development; improvement in health; improvement in nutrition; migration to adjust to changing job opportunities.

<sup>187</sup> United Nations, *Concepts and Definitions of Capital Formation* (1953).

<sup>188</sup> Bor, "Draft relating to ..." (1963).

<sup>178</sup> Hirschman, *The Strategy of Economic Development* (1958), pp. 85-86; Nurkse, *Problems of Capital Formation* ... (1953), pp. 152-154.

<sup>179</sup> Goode, "Adding to the stock ..." (1959).

<sup>180</sup> Wang, "Some problems of international comparison ..." (1955).

<sup>181</sup> Piatier, *Equilibre entre développement économique* ... (1962), pp. 46-57, discusses also the classifications of capital and investment suggested by other authors.

<sup>182</sup> For instance, Rostow, in "The take-off into self-sustained growth" (1956), places special emphasis on the role of railways as initiators of rapid economic growth. See also Bruton, "Growth models and underdeveloped countries" (1955); Adler, "The fiscal and monetary implications ..." (1952).

<sup>183</sup> Among the studies on economic growth, which revealed the inadequacy of capital and labour as explanatory factors, see Denison, *The Sources of Economic Growth in the United States* ...



## 1. POPULATION SIZE, DENSITY AND INVESTMENT

72. To the extent that the satisfaction of the needs of each individual presupposes the existence of certain capital goods, the total capital requirements of a population are not independent of its size. A larger population having a larger working force will need more capital to provide the workers with the needed equipment, plants etc., and it will also require a higher investment in infrastructure and human capital. Of more importance in the present context is the question whether the size of the population, and also its density, will have any effect on *per capita* capital needs. It may be argued that whatever the size of the country some minimum expenditures, both current and on capital, have to be made and that, other conditions remaining the same, a smaller country may find itself in this respect in a less favourable situation than a larger one. As has been discussed earlier in relation to current expenditures,<sup>189</sup> the functioning and maintenance of administration and other public services require certain investments, which may be to some extent independent of the size of the nations. Similar considerations relate to the effect of population density on investments, and it is possible, in fact, that density might even have a more important effect than the size of population, since the types of services, such as transportation, communications and so forth, are likely to depend more on the patterns of settlement of the population and its density than on its size. Meaningful comparisons of *per capita* investment in this respect are, however, difficult since besides "technical" factors, social and political considerations determine these categories of capital outlays.

73. Many writers have noted that a larger population may have the benefit of considerable economic advantages stemming from the possibilities of an increased division of labour and other economies resulting from large-scale production. Such economies of scale would raise the levels of productivity of the factors of production, including capital,<sup>190</sup> and thus given the level of *per capita* income, the investment needs might be correspondingly lower in a larger population. While diseconomies of scale arising with respect to certain products and activities may give rise to an international division of labour, some investments in such sectors as transport, communications, education, health and housing, among others, do not lend themselves easily to the international division of labour or the productivity criterion to which other products or services may be subjected. These limitations of the productivity criterion and the international division of labour<sup>191</sup> are found in both smaller and larger nations, and the question whether their adverse effect upon capital requirements will be greater in the one or in the other is difficult to answer, since besides the factors here mentioned, the actual levels of investment in these activities will, to a considerable extent, be determined, as noted, by other considerations.<sup>192</sup>

<sup>189</sup> See section A of this chapter.

<sup>190</sup> See section D of this chapter for a discussion of the effects of population size on economies of scale and productivity.

<sup>191</sup> Lewis, *The Theory of Economic Growth* (1963), p. 323; Kuznets, "Economic growth of small nations" (1960).

<sup>192</sup> Robinson, ed., *Economic Consequences of the Size of Nations* ... (1960).

## 2. AGE DISTRIBUTION AND INVESTMENT

74. The implications of the age distribution for capital formation are basically the result of the fact that an individual's needs and his economic status are closely associated with his age. Differences in the age distribution, which imply variations in the relative numbers of workers and non-workers and the structure within each of these groups, may affect capital requirements in different ways. In the first place, a higher proportion of workers in the total population will create a need for a larger share of productive capital in order to provide the workers with the necessary machinery, tools, equipment and so forth. On the other hand, in so far as a higher dependency ratio is associated with a lower ratio of the working to the total population, the maintenance of the same *per capita* income in a population with a high dependency ratio as in that with a low dependency ratio will require a higher productivity per worker in the former. This in turn is likely to be accompanied by a higher per worker requirement for capital and possibly a higher *per capita* outlay. In the second place, to the extent that the different needs of members of given age groups include to a varying degree expenditures to be classified as investment, differences in the age distribution may thus be associated with different requirements for investment in certain types of social overhead and human capital. Although the effect of the age distribution on investment in productive capital is not independent of its effect on social overhead and human capital, in general it may be thought that the age distribution may affect both the level and composition of investment.

75. Little is known about the over-all effect of the age distribution on investment levels and structure, but some of the literature discusses the effects the dependency ratio has on the structure of investment and the levels of not-directly productive investment. The argument is that in so far as the care and maintenance of the dependent population presupposes the existence of a given stock of capital, which includes schools, health facilities, such as hospitals, residential housing and others, the larger the proportion of dependants, the higher will be the share of these not-directly productive investments in the total. Particularly in the case of developing countries, it was noted, a high dependency ratio resulting in a diversion of capital into various activities, which are not directly productive, tends to impede the growth of productive capital and, therefore, the rate of economic development.<sup>193</sup>

76. The age composition is an important factor, especially as far as investments in education are concerned. The larger the proportion of children of school-age in the population, the greater will be the proportion of national income which must be spent to provide education at a given standard.<sup>194</sup> Likewise, the age structure of the

<sup>193</sup> Singer, "Population and economic development" (1955); Hicks, "A note on the burden ..." (1965).

<sup>194</sup> United Kingdom, Royal Commission on Population, *Report of the Economics Committee* ... (1950), vol. 3, pp. 48-49; Eicher, "La rentabilité de l'investissement humain" (1960); Piatier, *Equilibre entre développement économique* ... (1962), pp. 34-35; Phillips, "Education and development" (1964); Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964), p. 36.



population may be related to the demand for housing. Other factors being equal, the needs for investment in housing may be greater in countries with an older population, given the smaller size of the household associated with lower fertility, the lower proportion of child dependants who live as members of a household, and the higher proportion of aged dependants, some of whom will live by themselves. However, the size of the dwelling required in a young population may on the average be larger than in an old population.<sup>195</sup> Differences in the age structure may also influence investment in health and health facilities, and in other activities of social welfare.<sup>196</sup>

### 3. POPULATION GROWTH AND INVESTMENT

77. The literature on the effect of demographic factors on investment has given special attention to the consequences of population growth for capital formation. The significance of the former for investment rests on the fact that an increase in population assumes, under normal conditions, a rise, though not necessarily proportional, in the stock of capital goods in order to provide the larger population, or labour force, with the necessary material equipment and capital goods. Much of the literature on the interrelation between population growth and investment is concerned with the consequences of a lack of correspondence between the rate of expansion of the two, either because the actual rate of capital formation tends to fall short of the required rate, as in the case of many developing countries, or because the rate of population growth shows a tendency to remain below the prevailing rate of capital formation, as was feared in the case of the economically more developed countries some decades ago.

#### (a) *Population growth and the required rate of investment*

78. The effects of population growth on investment may be illustrated by means of a simplified model of an economy, based on the analysis of the process of economic growth originated by Harrod and Domar. The point of departure of this so-called Harrod-Domar model is that economic growth is associated with an increase in capital.<sup>197</sup> In its most simple form, the Harrod-Domar type model, first, takes an increase in output as a function of current investment and the capital-output ratio and secondly, relates the increase in income to the increase in

investment and the inverse of the marginal propensity to save.<sup>198</sup>

79. The studies on the effects of population growth on investment requirements based on the Harrod-Domar model depart from the premise that an increase of output or income depends on an addition to the stock of capital. The ratio between a net increase in the stock of capital, that is net investment, and the increase of output associated with it determines the amount of investment needed to obtain a given increase in output. This ratio which is variously called the marginal or incremental capital-output ratio or capital coefficient, may be simply defined as the investment needed to produce an additional unit of output.<sup>199</sup> For instance, assuming a marginal capital-output ratio of 4 to 1, this means that in order to raise national income by 1 per cent, an annual net investment of 4 per cent of national income is required. For an increase of output of 2 per cent, the investment should be raised to 8 per cent and so on.

80. The impact of changes in population size on investment requirements can now be evaluated. Given the above assumption, an increase of population of 1 per cent calls for a total output also 1 per cent higher if *per capita* income is to be maintained at its previous level. This increase in total output will require an investment which, in the case of a marginal capital-output ratio of 4 to 1, represents 4 per cent of national income. The effects of the level of population growth on investment needs can be seen by comparing two hypothetical economies characterized by the same capital-output ratio, but with differing rates of growth of population. Assuming the capital output ratio to be 4 to 1 and the rates of population growth 1 and 3 per cent annually, the first population will, as seen before, have to invest 4 per cent of national income in order to maintain *per capita* income. However, the population growing at the rate of 3 per cent will need to raise its income by 3 per cent, if *per capita* income is to remain the same, which will require an investment rate also three times as high as in the first population, or 12 per cent of national income. From this illustration it is clear that a high rate of population growth will require a very high rate of capital accumulation merely to maintain the existing levels of income or, alternatively stated, given a certain level of capital accumulation, economic

<sup>195</sup> Henry, "Structure de la population et besoins de logements" (1949); United Nations, *The Aging of Populations* ... (1956), pp. 70-72.

<sup>196</sup> Perrott and Holland, "Population trends and problems of public health" (1940), pp. 359 ff.; Kuznets, "Quantitative aspects of the economic growth of nations, VII ..." (1962).

<sup>197</sup> Harrod, "An essay in dynamic theory" (1939); and his *Towards a Dynamic Economics* ... (1948, 1963 ed.). Domar, *Essays in the Theory of Economic Growth* (1957), contains a collection of his writings on this subject. Both Harrod and Domar were not so much concerned in their analysis with the requirements of capital formation, but rather the opposite problem. Harrod, noting that a change in output would affect current investment, inquired whether a given rate of income growth would be high enough to adduce additional investment expenditures sufficient to absorb current savings. Domar took as his point of departure the fact that net investment raises the productive capacity and, given this effect of investment, he set out to determine how income had to grow in order to maintain full employment.

<sup>198</sup> For a discussion of Harrod-Domar models, see Baumol, *Economic Dynamics* ... (1951), pp. 36-54; Hamberg, *Economic Growth and Instability* ... (1956); Meier and Baldwin, *Economic Development* ... (1957), pp. 100-112; Higgins, *Economic Development* ... (1959), pp. 144-166; Peterson, *Income, Employment and Economic Growth* (1962), pp. 475-503.

<sup>199</sup> Much literature exists on the subject of the capital-output ratio including the works of Harrod and Domar. See, for instance, Lewis, *The Theory of Economic Growth* (1963), pp. 201-213; Leibenstein, *Economic Backwardness* ... (1957), pp. 176-184, 195-198; Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 90-99; Tinbergen, *The Design of Development* (1958), pp. 70-76. A distinction must be made between the marginal and the average capital-output ratio, the latter being the quantity of capital needed for the production of a unit on the average, whereas the former relates net additions of capital or investment to the corresponding increase in output. While both ratios may be the same, they are not necessarily so. Sauvy, "Investissements démographiques ..." (1959), criticized the use of the expression capital-output ratio and suggested the use of its inverse, which is the capital "productivity", calling it the "national rate of interest or return".

growth, i.e., increasing *per capita* income, will be much slower in a population characterized by a high rate of population growth than in one where growth is slow. Returning to the previous illustration and assuming net investment to be 12 per cent of national income in both economies, the one with a population growth of 1 per cent will experience an increase of *per capita* income of approximately 2 per cent; the population with a growth rate of 3 per cent will only be able to maintain its existing levels of living.<sup>200</sup>

81. The achievement of the same developmental objective thus requires a much greater effort when the rate of population growth is higher. On the basis of varying assumptions regarding the levels of incremental capital-output ratios, the rate of population growth, and percentage increases in *per capita* income, estimates of investments have been worked out by the United Nations Economic Commission for Asia and the Far East (see

<sup>200</sup> Various simple formulae have been suggested for determining the required investments, given the increases in population and *per capita* income. Harrod, *Towards a Dynamic Economics* ... (1948, 1963 ed.), p. 28, gives the proportion of income to be saved and invested as:  $a + b + ab$ , where  $a$  indicates the investment required to maintain *per capita* output when population is increasing at a given rate, and  $b$ , the investment required to make possible a given increase in output. The term  $ab$  is, according to Harrod, small and can be neglected. Singer, "The mechanics of economic development ..." (1952), proposed the following formula:

$$D = sp - r$$

where

$D$  = growth in *per capita* income;  
 $s$  = net savings;  
 $p$  = productivity of capital;  
 $r$  = population growth.

Spengler, "Capital requirements and population growth ..." (1956), suggested the following:

$$y' = \frac{1 + as}{1 + p}$$

where

$y'$  = annual percentage rate of growth of *per capita* income;  
 $a$  = average propensity to form capital;  
 $s$  = the ratio of national income to wealth;  
 $p$  = population growth.

United Nations, Economic Commission for Asia and the Far East, "Population trends and related problems ..." (1959), includes the formula:

$$k = R[(1 + p)(1 + y) - 1] = R(p + y) + R(py)$$

where

$k$  = annual rate of capital requirements as a ratio of national income;  
 $p$  = rate of population growth;  
 $y$  = rate of desired increase in *per capita* income;  
 $R$  = incremental capital-output ratio.

In most cases, it was noted, the term  $R(py)$  can be ignored. Tabah, "Capital requirements of the developing countries ..." (1967) gave this formula:

$$I_n = \frac{1}{\lambda} \frac{R_0}{P_0} P_n e^{\varphi n} (\varphi_n + \varphi_n)$$

where

$I_n$  = investment in period  $n$ ;  
 $P_n$  = population in period  $n$ ;  
 $R_n$  = national income in period  $n$ ;  
 $\varphi_n$  = population growth in period  $n$ ;  
 $\varphi$  = rate of growth in *per capita* income;

$\frac{1}{\lambda}$  = national rate of return on investments (i.e. the inverse of capital-output ratio).

table XIII.2).<sup>201</sup> On the basis of illustrative projections of population growth and various assumptions regarding rates of growth of income, Leibenstein calculated required rates of investment.<sup>202</sup> Similar calculations were made by Tabah in order to determine the effects of declining fertility on capital requirements.<sup>203</sup>

82. An alternative, but less direct approach, for determining the investments needed to absorb the effect of population growth takes as its point of departure the stock of capital per worker, called the capital-labour ratio, and the growth of the labour force.<sup>204</sup> Given the needed capital resources per worker and the increase in the number of workers, it is possible to derive the total investment needs. Such an estimate does not necessarily coincide with that which would be obtained using the capital-output ratio and the total population as a basis, for two reasons: first, the growth of the labour force does not necessarily coincide with the rate of growth of population and, secondly, the productivity of labour may not be constant, so that a given capital-labour ratio may result in different levels of growth of income.<sup>205</sup>

83. The formulae for estimating the investments to be made on the basis of the capital-output ratio have been refined and developed into models by various writers. These refinements consist of a differentiation among different types of investments with different effects on output. Other approaches and models differentiate among sectors of the economy—mainly agriculture and non-agriculture—with different capital-output ratios. A number of these studies are mainly concerned with the needs for external financing in the developing countries and do not study in detail the effects of population growth.<sup>206</sup>

84. An important distinction has been made by Sauvy who classified investments into "demographic investments" and "economic investments" in order to differentiate between the effects of population growth and those of the desired increase of income levels on investments. Demographic investments are defined as those which are

<sup>201</sup> United Nations, Economic Commission for Asia and the Far East, "Population trends and related problems ..." (1959).

<sup>202</sup> Leibenstein, *Economic Backwardness* ... (1957), pp. 217-252.

<sup>203</sup> Tabah, "Le problème population-investissement-niveau ..." (1956).

<sup>204</sup> Tinbergen, *The Design of Development* (1958), pp. 71-72; Spengler, "Capital requirements and population growth ..." (1956).

<sup>205</sup> Kurihara, *National Income and Economic Growth* (1961), p. 135, discusses the relation between the capital-output ratio, on the one hand, and the capital-labour ratio and the productivity of labour, on the other hand, giving the formula:

$$\frac{k}{y} = \frac{k}{N} \div \frac{y}{N}$$

where

$y$  = output;  
 $k$  = stock of capital;  
 $N$  = input of labour.

<sup>206</sup> Millikan and Rostow, *A Proposal: Key to an Effective Foreign Policy* (1957), pp. 95-100; General Agreement on Tariffs and Trade, *International Trade*, 1959 (1960), pp. 49-51; Rosenstein-Rodan, "International aid for underdeveloped countries" (1961); Hoffman, *One Hundred Countries* ... (1960), p. 46. For a review of some of these studies, see United Nations, *The Capital Development Needs* ... (1962), pp. 9-47; Tabah, "Capital requirements of the developing countries ..." (1967); Balassa, "The capital needs of developing countries" (1964).

TABLE XIII.2. CAPITAL REQUIREMENTS FOR A GIVEN ANNUAL RATE OF INCREASE OF PER CAPITA INCOME  
(Percentage of national income)

Percentage increase of per capita income	Incremental capital-output ratio								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
(a) If population increases by 0 per cent per annum									
0 .....	0	0	0	0	0	0	0	0	0
1 .....	0.5	1	1.5	2	2.5	3	3.5	4	4.5
2 .....	1.0	2	3	4	5	6	7	8	9
3 .....	1.5	3	4.5	6	7.5	9	10.5	12	13.5
4 .....	2.0	4	6	8	10	12	14	16	18
5 .....	2.5	5	7.5	10	12.5	15	17.5	20	22.5
(b) If population increases by 1 per cent per annum									
0 .....	0.5	1	1.5	2	2.5	3	3.5	4	4.5
1 .....	1.0	2	3	4	5	6	7	8	9
2 .....	1.5	3	4.5	6	7.5	9	10.5	12	13.5
3 .....	2.0	4	6	8	10	12	14	16	18
4 .....	2.5	5	7.5	10	12.5	15	17.5	20	22.5
5 .....	3.0	6	9	12	15	18	21	24	27
6 .....	3.5	7	10.5	14	17.5	21	24.5	28	31.5
(c) If population increases by 1.5 per cent per annum									
0 .....	0.75	1.5	2.25	3	3.75	4.5	5.25	6	6.75
1 .....	1.25	2.5	3.75	5	6.25	7.5	8.75	10	11.25
2 .....	1.75	3.5	5.25	7	8.75	10.5	12.25	14	15.75
3 .....	2.25	4.5	6.75	9	11.25	13.5	15.75	18	20.25
4 .....	2.75	5.5	8.25	11	13.75	16.5	19.25	22	24.75
5 .....	3.25	6.5	9.75	13	16.25	19.5	22.75	26	29.25
(d) If population increases by 2 per cent per annum									
0 .....	1	2	3	4	5	6	7	8	9
1 .....	1.5	2	4.5	6	7.5	9	10.5	12	13.5
2 .....	2	4	6	8	10	12	14	16	18
3 .....	2.5	5	7.5	10	12.5	15	17.5	20	22.5
4 .....	3	6	9	12	15	18	21	24	27
5 .....	3.5	7	10.5	14	17.5	21	24.5	28	31.5
(e) If population increases by 2.5 per cent per annum									
0 .....	1.25	2.5	3.75	5	6.25	7.5	8.75	10	11.25
1 .....	1.75	3.5	5.25	7	8.75	10.5	12.25	14	15.75
2 .....	2.25	4.5	6.75	9	11.25	13.5	15.75	18	20.25
3 .....	2.75	5.5	8.25	11	13.75	15.5	19.25	22	24.75
4 .....	3.25	6.5	9.75	13	16.25	19.5	22.75	26	29.25
5 .....	3.75	7.5	11.25	15	18.75	22.5	26.25	30	33.75
(f) If population increases by 3 per cent per annum									
0 .....	1.5	3	4.5	6	7.5	9	10.5	12	13.5
1 .....	2.0	4	6	8	10	12	14	16	18
2 .....	2.5	5	7.5	10	12.5	15	17.5	20	22.5
3 .....	3.0	6	9	12	15	18	21	24	27
4 .....	3.5	7	10.5	14	17.5	21	24.5	28	31.5
5 .....	4.0	8	12	16	20	24	28	32	36
(g) If population increases by 3.5 per cent per annum									
0 .....	1.75	3.5	5.25	7	8.75	10.5	12.25	14	15.75
1 .....	2.25	4.5	6.75	9	11.25	13.5	15.75	18	20.25
2 .....	2.75	5.5	8.25	11	13.75	16.5	19.25	22	24.75
3 .....	3.25	6.5	9.75	13	16.25	19.5	22.75	26	29.25
4 .....	3.75	7.5	11.25	15	18.75	22.5	26.25	30	33.75
5 .....	4.25	8.5	12.75	17	21.25	25.5	29.75	34	38.25

SOURCE: United Nations, Economic Commission for Asia and the Far East, "Population trends and related problems . . ." (1959).

required to absorb the impact of population growth, that is, those investments necessary to maintain the prevailing level of living or to make possible the same levels of consumption despite the increase of population. Economic investments are those that tend to increase the level of income. Only in a stationary population, when the economic activity rates at each age and, therefore, the size and age composition of the active population, remain constant, would all capital formation represent economic investments. Where population is growing, part of the forthcoming investments would have to be reserved for providing the increased population with the same stock of capital and, given a constant capital-output ratio, the same income. Given the level of capital formation, the higher the level of population growth, the higher would be demographic investments and the lower would be the residual left for "economic investments".<sup>207</sup>

85. Tabah, taking as a point of departure a Harrod-Domar type model and distinguishing between demographic and economic investments, shows how, given the capital-output ratio, the investment ratio as a percentage of national income is a positive function of population growth. The model also reveals in what manner the relation between increases in the level of living and those of investment, which is constant in the absence of population growth, changes when demographic investments take place and then depends on the rate of population growth. Given a constant investment ratio, population growth will exert an unfavourable influence on consumption and levels of living or, alternatively stated, the unfavourable effect on consumption and levels of living and economic investments will be lower, the lower the increase of population.<sup>208</sup>

86. A somewhat different approach giving more emphasis to the population variable is followed by Coale and Hoover who, in a model designed to evaluate the economic repercussions of a reduction in fertility with special reference to India, distinguished between investments made in equipment or those which assist directly in raising aggregate output, and those investments which serve primarily the welfare of the population and which have, as a rule, only an indirect or delayed effect on production. They subdivided the latter type of investment into those which are needed for current population and those required by the increase of population. On the basis of various assumptions concerning the relations between outlays for the population increase and those for the existing population, between the outlays for the current population and national income, and between the growth of *per capita* welfare-type outlays for the increase of population and that for the current population, they estimated the total "welfare-type" investments needed. Since the effect on output of directly productive investments, welfare-type investments benefiting the labour force and welfare-type investments benefiting the rest of the population is different, Coale and Hoover estimated the effect of each of

these investment outlays which made it possible to calculate the combined productive effects—called "equivalent growth outlays"—of these different categories. The resulting formula takes into account the effect of the rate of population growth on productive capacity through investments in equipment, tools etc. as well as the delayed or lower direct productivity of investments in the "welfare" category. The effect of these equivalent growth outlays on output was estimated by means of the capital-output ratio.<sup>209</sup>

87. The basic model for estimating the investment needs has been refined also by distinguishing between two or more sectors with differing capital-output ratios. Particularly in view of the important differences between the average and marginal capital-output ratio in the agricultural and the non-agricultural sector, as well as the changes in the share of these sectors in output and employment which occur as a result of development, a number of estimates of capital requirements have been elaborated on the basis of models which distinguish between these sectors. One of the first studies of this type, aimed at estimating the needs for external financing, provided estimates of capital needed for transferring population out of agriculture into non-farm occupations and for increasing agricultural yields. Assumptions were made, as to the transfers out of agriculture, of the amount of capital required for each person absorbed into non-agricultural employment and on this basis total capital needs were estimated. Although it was noted that population growth would absorb part of the resulting increase of income, it could not be calculated by how much this would affect the standard of living.<sup>210</sup>

88. A numerical model was used by Singer to estimate investment requirements and the growth of income. Assuming population to be distributed in a given ratio—70 to 30—between agriculture and non-agriculture and to grow at 1.25 per cent annually in both sectors, but with all natural increase in the agricultural sector being transferred to non-agricultural activities so that the agricultural population remains constant, Singer then estimated capital requirements separately for three categories of the population. They were: persons transferred from agriculture for which an estimate of capital per person (or per worker) was made; the constant agricultural population for which an estimate of income was made based on: (1) the rate of increase of production required to feed an increasing population, (2) a given increase in consumption levels and (3) a certain proportion of agricultural product to be transferred to the non-agricultural sectors; and, finally, the natural increase of the population in the non-agricultural sectors for which the desired increase of income was estimated. Assuming for these three categories of population appropriate capital-output ratios, investment requirements and the rate of increase of national income could be calculated. Singer concluded that in an economy with a low *per capita* income (around \$100), with net savings not representing more than 6 per

<sup>207</sup> Sauvy, *Théorie générale de la population*, vol. 1 ... (1956), pp. 288-290; his *De Malthus à Mao-Tsé-Toung* ... (1958), p. 113; and his "Investissements démographiques ..." (1959).

<sup>208</sup> Tabah, "Le problème population-investissement-niveau ..." (1956). See also his "Capital requirements of the developing countries ..." (1967).

<sup>209</sup> Coale and Hoover, *Population Growth and Economic Development* ... (1958), chap. 17.

<sup>210</sup> United Nations, *Measures for the Economic Development* ... (1951), pp. 75-80.

cent of national income and with an over-all capital output ratio of the order of 5 to 1, no economic development would be possible if population increased at a rate of 1.25 per cent annually.<sup>211</sup> A similar analysis was presented by Spengler, who assumed the number of agricultural workers to decrease and estimated the necessary capital needed to equip new workers as well those transferred out of agriculture and to increase the capital of other workers over a certain period. He found that nearly 14 per cent of national income would have to be invested annually if population increased at 1 per cent a year and nearly 20 per cent of national income had to be invested if the population growth were 2 per cent.<sup>212</sup>

89. A mathematical model, used by Sinha with special reference to India, took into account more explicitly the effect of levels of population growth and assumed also a two-sector economy. Sinha included in his model an investment function similar to that used by Coale and Hoover; he estimated the initial and marginal saving ratios, supposing the capital-output ratio for agriculture to be constant and that for the non-agricultural sector to be either constant or increasing at a given rate. Making certain hypotheses regarding labour force growth (in particular, that the active population in agriculture would remain constant) and agricultural and non-agricultural *per capita* income, he calculated for different population projections the employment requirements as against the expected expansion of employment. Sinha thus determined capital-formation requirements as a function of labour, the growth of which he supposed would vary directly with that of population.<sup>213</sup>

90. Some analysts of the effects of population growth, while noting that the capital-output ratio does not explicitly make allowance for the contribution of labour,<sup>214</sup> have suggested the use of the Cobb-Douglas production function.<sup>215</sup> Belshaw assumed constant returns to scale and values of the product elasticities based on a number of empirical studies—0.75 for the product

elasticity of labour and 0.25 for that of capital. After establishing that in order to maintain real income per head when population and the labour force were increasing at a given identical rate, the capital stock would have to increase at the same rate as the population, he illustrated the depressive effects of increases in population and labour force, with capital remaining constant, on growth and levels of living.<sup>216</sup> Coale and Hoover used the Cobb-Douglas production function to estimate, on the basis of different population and labour projections, the future capital stock of India.<sup>217</sup> A modified Cobb-Douglas production function was also used in a model to determine, *inter alia*, the interrelations between different levels of population growth, expansion of employment, the growth of capital stock and *per capita* income as well as the corresponding average and marginal capital-output ratios. This permits the assessment, for example, of levels of demographic variables and their changes on the most important economic factors.<sup>218</sup>

91. The various models and their applications discussed above all lead to the conclusion that, given the ratio of capital accumulation, a higher population increase implies a slower growth of *per capita* income, or, conversely, that, with a higher rate of population growth, a higher rate of capital formation is required in order to maintain existing levels of living. The relative significance of a given differential in demographic growth will depend to a great extent on the capital-output ratio, or the capital-labour ratio; the higher they are, the higher the rate of capital formation required to absorb the effects of population growth.

92. The determination of the capital-output ratio, however, presents a number of problems. In the first place, the capital-output ratio is not a sharply defined concept; as a rule, it relates to net investment, although it may be applied also to gross investment. In the second place, all the problems related to the definition of capital apply equally to the capital-output ratio. The definition of capital and the capital-output ratio may or may not take into account investments in so-called "human capital" such as education, training and health, fields where investment needs are often related to demographic factors. Another source of non-comparability is that the definition of capital may be restricted to reproducible capital only, or may include, also, land and natural resources. In the third place, it has been argued that the capital-output ratio depends on the "gestation period" of the investment, which varies according to the type of investment and the degree of utilization of the equipment. Apart from these methodological aspects, the basic statistical information needed to estimate the capital coefficient is often subject to a considerable margin of error, especially in the developing countries.<sup>219</sup>

<sup>211</sup> Singer, "The mechanics of economic development . . ." (1952).

<sup>212</sup> Spengler, "Economic factors in the development . . ." (1951).

<sup>213</sup> Sinha, "Population growth and balance . . ." (1959).

<sup>214</sup> In order to take into account the contribution of labour, the use of modified capital-output ratios has been proposed. These alternative approaches incorporate assumptions as to the trends in the marginal productivity of labour different from the one implied in the conventional capital-output ratio, viz., that the marginal productivity of labour equals its average productivity. United Nations, Economic Commission for Europe, *Some Factors in the Economic Growth . . .* (1964), chap. 2, pp. 31-36; Kuznets, "Quantitative aspects of the economic growth of nations, VI . . ." (1961).

<sup>215</sup> Cobb and Douglas, "A theory of the production function" (1928); Douglas, *The Theory of Wages* (1934), chaps. 5 to 9. This function can be expressed in the following form:

$$P = b L^{\alpha} C^{\beta}$$

where

- $P$  = index of physical volume of output;
- $L$  = employed labour (in standard units);
- $C$  = employed capital (in standard units); and
- $b, \alpha, \beta$ , are constants.

Often the sum of the components  $\alpha$  and  $\beta$ —the product elasticities with respect to labour and capital—is assumed to equal unity, which means that the function is homogeneous and that an increase of  $x$  per cent of each of the two factors will also increase the product by  $x$  per cent.

<sup>216</sup> Belshaw, *Population Growth and Levels of Consumption . . .* (1956), pp. 59-66.

<sup>217</sup> Coale and Hoover, *Population Growth and Economic Development . . .* (1958), pp. 324-327.

<sup>218</sup> United Nations, Economic Commission for Asia and the Far East, "Growth models for illustrating . . ." (1958).

<sup>219</sup> For a discussion of the several problems surrounding the estimation of the capital-output ratio and, in this connexion, capital, see United Nations, Economic Commission for Asia and the Far

(Continued on next page)

93. Probably partly as a result of these factors, estimates of capital-output ratios have varied widely.<sup>220</sup> According to Kuznets, the ratio of net capital stock to annual national income varied from about 3 to 1 to about 7 to 1.<sup>221</sup> The capital coefficients presented by Tinbergen varied from approximately 1.5 to 1 to nearly 6 to 1,<sup>222</sup> and the range of variation of the estimates of the incremental capital-output ratios presented by Higgins was even wider: 1 to 1 to about 7.5 to 1.<sup>223</sup> The problem whether the different capital-output ratios exhibit a convergence has been widely discussed. A number of writers suggest as an order of magnitude of the capital-output ratio a value of 4 to 1, which corresponds to a national income-wealth ratio of 0.25, but at the same time they recognize the tentative nature of such an estimate.<sup>224</sup>

94. Another question concerns the levels of the capital-output ratio in developed, as compared with developing countries. In general, it may be assumed that the average capital-output ratio is higher in the developed countries where capital is not scarce and capital accumulation has taken place over a long time.<sup>225</sup> More doubts exist concerning the marginal or incremental capital-output ratios in developed and developing countries. Some authors contend that in the earlier stages of development the capital needs of the developing countries are likely to be higher than at later stages,<sup>226</sup> but the majority of those writing on the subject are inclined towards the view that the marginal capital-output ratio in developing countries

is lower than in the developed countries.<sup>227</sup> Others argue, however, that it is very difficult to determine how the marginal capital-output ratios in these two groups of countries compare.<sup>228</sup> According to a number of authors, marginal capital-output ratios in industrialized countries may lie, as a rule, between 3 to 1 and 4 to 1.<sup>229</sup> Prebisch estimated a marginal capital-output ratio of 2.2 to 1 with respect to gross national product and of 2.4 to 1 for net national product in Latin America.<sup>230</sup> The average of incremental capital-output ratios for ten countries in Asia was found to be 2.5 to 1 for the period 1950-1959, but the range of variations was wide, although some low and high values of the ratio could be attributed at least in part to special circumstances.<sup>231</sup> Kuznets, on the basis of data for thirty-three countries, concluded that by and large the incremental capital-output ratios were much higher for the high income countries than for the low income countries, with a range from above 7 to 1 to between 2.5 and 3 to 1.<sup>232</sup>

95. The opinion that, as a result of the high rate of population growth in the developing countries, huge investments would be required if the growth of income were to substantially outpace the increase of population, and doubts as to the ability of these countries to attain such high rates of capital formation have frequently been expressed.<sup>233</sup> On the other hand, it has also been pointed

(Footnote 219 continued)

East, "Population trends and related problems . . ." (1959); Tinbergen, *The Design of Development* (1958), pp. 71-72; Bruton, "Contemporary theorizing on economic growth" (1960); Higgins, *Economic Development . . .* (1959), pp. 644-647; Spengler, "Capital requirements and population growth . . ." (1956); Bauer and Yamey, *The Economics of Under-developed Countries* (1957), pp. 130-131. The latter authors thought the conceptual and practical difficulties so important that they doubted whether such estimates would be useful in theory or practice.

<sup>220</sup> Some of the considerable number of estimates of capital-output ratios have been brought together, for example, in Belshaw, *Population Growth and Levels of Consumption . . .* (1956), pp. 92-96; Tabah, "Le problème population-investissement-niveau . . ." (1956); Higgins, *Economic Development . . .* (1959), pp. 22, 645, 647-649; Leibenstein, *Economic Backwardness . . .* (1957), p. 246; Oshima, "Capital-output ratios . . ." (1961); Clark, *The Conditions of Economic Progress* (1957), pp. 572-577; Tinbergen, *The Design of Development* (1958), p. 74.

<sup>221</sup> Kuznets, *Toward a Theory of Economic Growth . . .* (1965).

<sup>222</sup> Tinbergen, *The Design of Development* (1953), p. 74.

<sup>223</sup> Higgins, *Economic Development . . .* (1959), pp. 644-645.

<sup>224</sup> Clark, *The Conditions of Economic Progress* (1957), p. 570. Tabah noted that in the early 1950s a national rate of return of 0.25 or even lower was thought to be likely, but that in recent years much higher values were usually postulated. See his "Capital requirements of the developing countries . . ." (1967).

<sup>225</sup> Lewis, *The Theory of Economic Growth* (1963), p. 202, pointed out that given the average life of capital, the principal determinant of the capital-income ratio is the proportion of national income annually invested and that since the rate of accumulation is much smaller in developing countries, so would be the ratio of existing capital to income.

<sup>226</sup> Bruton, "Contemporary theorizing on economic growth" (1960); Oshima, "Capital-output-ratios . . ." (1961). These writers point in particular to the high outlays for social overhead capital needed in developing countries as the main reason for a higher incremental capital-output ratio. Other factors mentioned include: the shift towards non-agricultural activities, the increase in the size of producing units and also the process of urbanization.

<sup>227</sup> Rostow, *The Process of Economic Growth* (1960), p. 281. Some writers qualify their opinion, however: Tinbergen, *The Design of Development* (1958), pp. 13, 75-76; Hirschman, *The Strategy of Economic Development* (1958), p. 32. Most of these writers recognize the effect of the need for social overhead capital on the capital-output ratio, but suggest that a compensation operates through such factors as: the availability of natural resources, the backlog of known techniques, possibilities of using labour-intensive techniques, improved efficiency through better organization, the removal of obstacles and bottlenecks to growth and so forth.

<sup>228</sup> Lewis, *The Theory of Economic Growth* (1963), pp. 202-207. Among the arguments advanced for a higher marginal capital-output ratio in developing countries are: the inefficiency of industry; the greater waste of capital; the slower growth of technical progress. Arguments for the opposite point of view include: the availability of natural resources; the structural differences in the economy; more incentives to use less capital intensive methods of production; a more rapid growth of population. On this latter aspect see section D of this chapter.

<sup>229</sup> *Ibid.*, p. 201. However, in the period 1949 to 1959 when the countries of Europe experienced exceptionally high ratios of capital formation, the incremental capital-output ratios were in many cases above 4 to 1; United Nations, Economic Commission for Europe, *Some Factors in the Economic Growth . . .* (1964), chap. 2, p. 17.

<sup>230</sup> Prebisch, "The relationship between population growth, capital formation . . ." (1955). The Economic Commission for Latin America estimated the marginal net product-capital ratio to be between 0.40-44, similar to the estimate made by Prebisch, United Nations, Economic Commission for Latin America, *The Economic Development of Latin America . . .* (1963), pp. 17, 32-33; see also Urquidí, "Population growth and economic development in Latin America" (1967).

<sup>231</sup> United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1961* (1962), p. 24; United Nations, *Problems of Long-term Economic Projections* (1963), pp. 48-50.

<sup>232</sup> Kuznets, "Quantitative aspects of the economic growth of nations, V . . ." (1960).

<sup>233</sup> Belshaw, *Population Growth and Levels of Consumption . . .* (1956), p. 185; Bruton, "Contemporary theorizing on economic growth" (1960); Spengler, "Capital requirements and population

out that the savings capacity in the developing countries is not as low as was often assumed, and that investment opportunities may to some extent create the savings necessary to carry out such projects.<sup>234</sup> In addition, in many developing countries foreign saving has been an important factor in domestic capital formation. Although the flow of capital from the more developed to the less developed countries has remained below the estimates of the needs of the developing countries,<sup>235</sup> foreign capital has contributed significantly to capital formation in these countries.<sup>236</sup> It was found that in the period 1950-1959, thirty-one of thirty-seven developing countries had received foreign savings, and in about half of all the countries this increased the domestic supply of capital from about 1 to 3 per cent of the gross domestic product.<sup>237</sup> All of the above factors may have contributed to increasing the levels of investment in the developing areas. According to one study, their increase was substantial in the 1950s: of the twenty-seven countries studied, fourteen experienced a high rate of capital formation as a percentage of gross domestic product (8 per cent or more per year); six experienced a moderate growth in investment (5-7 per cent annually); five a low growth (2-4 per cent); and two showed a decline in gross capital formation as a percentage of gross domestic product.<sup>238</sup> It has been asserted, therefore, that the situation with respect to capital formation is not necessarily as serious as is sometimes proposed.<sup>239</sup>

96. Another, more basic, question concerns the role of capital formation for economic development. Although most writers agree on the importance of capital formation for economic growth, many of them have pointed to the fact that a number of other factors, together with capital, constitute the determinants of economic growth.<sup>240</sup> Some writers have even argued that in a number of developing countries the capacity to absorb capital productively is limited, in view of the insufficiency or lack of skilled labour and qualified manpower, markets, basic facilities in transportation, communications and power, and so

growth . . ." (1956). Lewis, apparently without considering the rate of population growth, asserts, on the basis of a comparison of developing and developed countries, that savings should increase from about 5 to 12 per cent. See his *The Theory of Economic Growth* (1963), pp. 225-226. Rostow, *The Process of Economic Growth* (1960), pp. 281-282, suggests that an increase from 5 to over 10 per cent is necessary. Such an investment, given the relatively low marginal capital-output ratio, would outstrip the likely population pressure and would yield a distinct rise in *per capita* income.

<sup>234</sup> See section A of this chapter.

<sup>235</sup> See the discussion earlier in this section on capital requirements from developed countries.

<sup>236</sup> United Nations, *World Economic Survey, 1960* (1961), p. 61.

<sup>237</sup> *Ibid.*, p. 61.

<sup>238</sup> United Nations, *World Economic Survey, 1959* (1960), pp. 63-64.

<sup>239</sup> Singer, *International Development: Growth and Change* (1964), pp. 26-28.

<sup>240</sup> Clark, *The Conditions of Economic Progress* (1957), p. 580; Cairncross, *Factors in Economic Development* (1962), pp. 89-97; Bauer and Yamey, *The Economics of Under-developed Countries* (1957), pp. 127-129; Tabah, "Capital requirements of the developing countries . . ." (1967).

forth.<sup>241</sup> Many other writers have noted that merely a stepping up of the rate of investment does not assure an accelerated economic growth unless some of the pre-conditions for growth are present.<sup>242</sup> In more specific terms, it is argued that a growth model based on capital only, using the capital-output ratios, does not take into account the role of other resources in economic growth and thus is of limited significance.<sup>243</sup> Even if, as has been frequently noted, capital and income have shown a tendency to increase at about the same rate and the average capital-output ratio, at least in the more developed countries, appears to have been relatively constant over long periods,<sup>244</sup> a number of concrete findings suggest, in fact, that capital accumulation does not exercise a predominant influence on economic growth<sup>245</sup> and that its association with the rate of economic growth is frequently relatively weak.<sup>246</sup>

97. The use of the capital-output ratio in the study of economic growth provides an over-simplistic picture of that process both in the sense that such an approach does not take into account explicitly the effect of other factors, and that the evidence as to the exact interrelation between growth of capital and growth of product is less than convincing. Nevertheless, even those who recognize these limitations usually agree that a given rate of capital accumulation, even though not a sufficient condition, is necessary for economic growth and that the higher the required investments, the higher the rate of population growth.

#### (b) Population growth and incentives to investment

98. Apart from its implications for the required level of capital formation, population growth is also thought to be one of the factors which determine the actual level of investment, particularly that of the so-called "autonomous" investment. A great deal of controversy surrounds the concept of "autonomous" investment and its counterpart "induced" investment, but in general it may be said that while the latter refers to investment stimulated by or functionally related to the economy's increase in output or income, and—according to some writers—also to such related factors as sales and profits, autonomous investment is interpreted as the investment determined by

<sup>241</sup> Bauer and Yamey, *The Economics of Under-developed Countries* (1957), p. 129; Lewis, *The Theory of Economic Growth* (1963), pp. 208-209; Millikan and Rostow, *A Proposal, Key to an Effective Foreign Policy* (1957).

<sup>242</sup> Coale, "Population and economic development" (1963).

<sup>243</sup> Belshaw, *Population Growth and Levels of Consumption . . .* (1956), p. 91; Leibenstein, *Economic Backwardness . . .* (1957), p. 177; Cairncross, *Factors in Economic Development* (1962), p. 99.

<sup>244</sup> Cairncross, *Factors in Economic Development* (1962), pp. 78-80, 85; Tinbergen, *The Design of Development* (1958), p. 13; Lewis, *The Theory of Economic Growth* (1963), p. 201.

<sup>245</sup> For instance, Cairncross, *Factors in Economic Development* (1962), pp. 75-78, estimated that investment had at most accounted for one fourth of the recorded rate of progress in the United Kingdom.

<sup>246</sup> Kuznets, "Quantitative aspects of the economic growth of nations, VI . . ." (1961); United Nations, Economic Commission for Europe, *Some Factors in the Economic Growth . . .* (1964). However, for different findings, see United Nations, *World Economic Survey, 1959* (1960), pp. 25-26.



factors other than income or related variables. These determinants of autonomous investments usually include, apart from technological change and the discovery and development of new resources, the growth of population.<sup>247</sup>

99. The effect of population growth on investments occupied an important place in Keynesian theory. The argument is that a large proportion of all investments in a country with a rapidly growing population goes to provide the additional capital and durable goods needed to satisfy the increasing demand for consumers' goods. Population growth would open new investment opportunities and compensate for an insufficient "effective demand". According to Keynes, it is particularly in wealthy countries, which he equates with countries with an incipient decline in population, that investments tend to be inadequate for two reasons: (a) because with higher income a smaller proportion of total income is consumed and thus a larger proportion left to be invested; and (b) because the larger capital stock in a country with higher income and lower population growth means that investment opportunities are more difficult to find.<sup>248</sup> A similar conclusion as to the negative effect of a slow or declining population growth was reached by Harrod. He developed his model distinguishing between a warranted rate of economic growth—this being the rate required for the full utilization of capital—and the natural rate of growth—defined as the rate made possible by the increase of population and technological progress. If the former exceeded the natural rate, economic growth as well as investment would slow down.<sup>249</sup>

100. Keynes's point of view as taken up and developed by some of his followers became known as the stagnation theory. The stagnation theory held that the stimulus to investment, which found its origin in the increasing needs of a growing population in the earlier stages of industrialization, had virtually disappeared in the first decades of this century owing to the low and declining levels of population growth prevailing in that period. The result was a tendency for income or employment to decline or at least to grow more slowly than before, which in turn provoked a further decline in investments.<sup>250</sup> Hansen

distinguished three constituent elements of economic progress, each of which would be capable of creating investment outlets and causing a rapid growth of capital: (a) inventions; (b) the discovery and development of new territories and resources, and (c) the growth of population. He differentiated, however, between technological progress which gave rise to intensive investment or a deepening of capital—in the sense of more capital used per unit of production—and the two other factors, which led to extensive investment or a widening of capital—capital growing *pari passu* with the increase in the output of goods. Although, in his opinion, economic expansion in much of the past had rested to a great extent on intensive investment, the nineteenth century was a unique era of extensive investment. Population growth and territorial expansion opened vast outlets for investments, but this process came to an end when population growth declined and the frontiers for new settlement disappeared. Extensive investment decreased rapidly and the opportunities for new investment were narrowing down to those created by new technology.<sup>251</sup>

101. Among the arguments used to support the stagnation thesis is the dependence of residential construction, as well as investment in overhead capital, on population growth. A fast growing population tends to bring about a shift in demand towards housing, which requires more investment than most other kinds of consumer demand. Hansen links the effect of declining population growth also to the aging of the population accompanying this process. A stationary population with a large number of old people will be characterized by a comparatively higher demand for personal services and goods which require relatively little capital.<sup>252</sup> The aging of population accompanying the decline of fertility and of population growth is thought to affect investments also negatively in a number of other ways, among them the distortion of patterns of consumption and saving in relation to investment; the decline in the efficiency of not only the workers, but also the capital equipment, since the need for renewal of the capital stock is comparatively lower; the negative effect of a declining population growth and aging on the state of mind of the *entrepreneur*; and finally, the greater danger of slumps.<sup>253</sup>

<sup>247</sup> For various interpretations and definitions of these two concepts, see Peterson, *Income, Employment and Economic Growth* (1962), pp. 119, 227-228; Higgins, *Economic Development* . . . (1959), pp. 125-126; Kurihara, *National Income and Economic Growth* (1961), p. 27; Dieterlen, *L'investissement* (1957), p. 51.

<sup>248</sup> Keynes, "Some economic consequences of a declining population" (1937); and his *The General Theory of Employment, Interest and Money* (1951), chap. 3. See also: Reddaway, *The Economics of a Declining Population* (1939), pp. 93, 105-106; Robinson, *Essays in the Theory of Employment* (1947), p. 95. For a discussion of Keynes's views, see also Hansen, *A Guide to Keynes* (1953), p. 28; Petersen, "John Maynard Keynes' theory of population . . ." (1955). Matthews discussed the stabilizing influence of population growth and technical progress in the course of the business cycle. See his *The Business Cycle* (1959), pp. 77-82, 233-237.

<sup>249</sup> Harrod, *Towards a Dynamic Economics* . . . (1948, 1963 ed.), pp. 82-87; Peterson, *Income, Employment and Economic Growth* (1962), pp. 491-501; Dieterlen, *L'investissement* (1957), pp. 160, 164.

<sup>250</sup> Hansen, "Economic progress and declining . . ." (1939); and his *Fiscal Policy and Business Cycles* (1941); Sweezy, "Declining investment opportunity" (1950); Hansen, *Economic Policy and Full Employment* (1947); and his "The general theory" (1950);

Higgins, "The doctrine of economic maturity" (1946); and his "The theory of increasing under-employment" (1950). For a review of the stagnation theory, see also Stassart, *Les avantages et les inconvénients économiques* . . . (1965), pp. 181-191; Higgins, *Economic Development* . . . (1959), pp. 167-168.

<sup>251</sup> Hansen, *Fiscal Policy and Business Cycles* (1941), pp. 42-45, 349-365.

<sup>252</sup> *Ibid.*, pp. 357-359. Reddaway, *The Economics of a Declining Population* (1939), pp. 96-97, noted, however, that in a stationary or declining population families would become smaller so that the number of families would continue to increase even after the population became stationary. Such an effect, however, would only be temporary.

<sup>253</sup> Reddaway, *The Economics of a Declining Population* (1939), pp. 116-119; 156-162; Daric, *Vieillesse de la population* . . . (1948), p. 32; Boverat, *Le vieillissement de la population* (1946), p. 119; Sauvy, "Social and economic consequences of the ageing . . ." (1948); Keynes, "Some economic consequences of a declining population" (1937); Higgins, "The theory of increasing underemployment" (1950), p. 273; Fisher, *The Clash of Progress and Security* (1935), p. 155.

102. The stagnation theory has been criticized by a number of writers.<sup>254</sup> Those holding a more optimistic view used various arguments; they stressed in particular the fact that expanding population was only one factor in the increase of effective demand; *per capita* income or purchasing power might be a more important factor.<sup>255</sup> Others expressed doubts as to the likelihood of a shift in demand towards goods and services that required little capital if population growth slowed down, while some stressed the importance of technological progress as a factor in inducing investment, noting that if capital should become cheaper it might replace labour, and industries with higher capital-labour ratios might expand faster.<sup>256</sup> The validity of the arguments of those supporting the stagnation thesis was also questioned on the basis of the actual experience in many developed countries. In that connexion it must be noted, however, that stagnation was not seen as inevitable even by Hansen, who observed the "nearly unbelievable" economic progress in recent periods.<sup>257</sup> Nor were Keynes or Hansen pro-natalist, they rather proposed a public policy of investment.<sup>258</sup> It might also be assumed that they recognized that any positive effect of population growth on investment would be conditioned by the availability of capital funds and that a high effective demand could not be the result of population growth when levels of living and income were very low.

103. Those who supported the stagnation thesis found evidence for it in past trends in investments. Keynes asserted that, over the period 1860 to 1913, something like half of all capital formation was required merely to maintain capital per head<sup>259</sup> and Hansen estimated percentages of 40 and 60 for Western Europe and the United States, respectively.<sup>260</sup> It was also thought that the recovery from depressions during the nineteenth century was seldom long delayed, largely because of the rapid rate of population growth and the consequent steady increase in basic needs for food and raw materials.<sup>261</sup> Kuznets's findings on the relation between capital

and population growth in the United States over a long period (1869-1955) were, however, less definite. He found that the retardation in the growth rate of capital was to some extent accounted for by a decline in the rate of growth of labour force, but also concluded that the direct contribution of the increase in numbers of workers to capital formation was quite moderate.<sup>262</sup> A study based on data for twelve developed countries over the period 1950-1958 even suggested a relationship contrary to that assumed by the stagnationists; the results suggested that, in order to attain a higher rate of economic growth, countries confronted by slow rates of expansion in the labour force could raise the share of output devoted to investment so as to compensate for the slow increase of the labour force.<sup>263</sup>

104. Despite the lack of specific evidence, the point of view is not infrequently found that a too slowly growing population, like one growing too fast, poses the problem of the lack of investment outlets and that among countries at a certain level of development, those with moderate growth of population may have a certain advantage.<sup>264</sup> Harrod was of the opinion that, in view of its importance in this context, too little attention has been given to population growth.<sup>265</sup>

#### 4. INTERNATIONAL MIGRATION AND INVESTMENT

105. To the extent that international migration affects population growth and composition, the implications for investment are similar to those discussed in tracing the effects of population growth and composition on investment in general. Nevertheless, the implications of international migration for capital formation have received special attention, not only in relation to the investment requirements springing from international movements, but especially as far as the mutual relationships between population and capital are concerned, which also gave rise to a theory of long-term cyclical movements in population and capital movements.

106. The demand for immigrants in immigrant-receiving countries is, in general, determined by the progress of settlement and the accessibility of cultivable land, by domestic natural increase, by the pace of urbanization and industrialization and by the availability of capital.<sup>266</sup> With the increase in workers due to immigration, the stock of capital would have to increase correspondingly if the amount of capital per man were to remain the same. The absorptive capacity of immigrants may also be limited by the capacity of the building industry or other overhead capital.<sup>267</sup> Although immigration may have the effect

<sup>254</sup> For a review of the discussion of the stagnation theory and criticism of it, see Ardant, "Les diables de Malthus" (1950); Brockie, "Population growth and the rate of investment" (1950); Higgins, "The theory of increasing underemployment" (1950); Sweezy, "Secular stagnation" (1943); Neisser, "The economics of a stationary population" (1944).

<sup>255</sup> Lafitte, "The economic effects ..." (1941); Schumpeter, *Capitalism, Socialism and Democracy* (1950), p. 113; and his *Business Cycles* ... (1939), pp. 10, 74, 1035-1036.

<sup>256</sup> For a review of these arguments see Reddaway, *The Economics of a Declining Population* (1939), pp. 93-96.

<sup>257</sup> Hansen, *The American Economy* (1957), p. 1.

<sup>258</sup> Petersen, "John Maynard Keynes' theory of population ..." (1955); Stassart, *Les avantages et les inconvénients économiques* ... (1965), pp. 183, 197.

<sup>259</sup> Keynes, "Some economic consequences of a declining population" (1937).

<sup>260</sup> Hansen, *Fiscal Policy and Business Cycles* (1941), pp. 355-359, cited also as evidence Keynes, "Some economic consequences of a declining population" (1937). See also Cassel, *On Quantitative Thinking in Economics* (1935), chap. 6; Snyder, "Capital supply and national well-being" (1936); Douglas, *The Theory of Wages* (1934).

<sup>261</sup> United Kingdom, Royal Commission on Population, *Report of the Economics Committee* ... (1950), vol. 3, p. 43; Robinson, *Introduction to the Theory of Unemployment* (1939), p. 31.

<sup>262</sup> Kuznets, *Capital in the American Economy* ... (1961), pp. 67-70.

<sup>263</sup> United Nations, *World Economic Survey, 1959* (1960), p. 56.

<sup>264</sup> Dieterlen, *L'investissement* (1957), p. 164; United Nations, *World Economic Survey, 1959* (1960), p. 22; Derwa, *Essai sur les rapports entre l'évolution démographique* ... (1956); Stassart, *Les avantages et les inconvénients économiques* ... (1965), p. 189; Coale, "Population change and demand ..." (1960).

<sup>265</sup> Harrod, "Les relations entre l'investissement ..." (1955).

<sup>266</sup> Spengler, "Effects produced in receiving countries ..." (1958).

<sup>267</sup> Isaac, *Economics of Migration* (1947), p. 198; Lewis, *The Theory of Economic Growth* (1963), p. 362.

of depressing wages and thus lead to some replacement of capital by labour, it is often argued that the relation between labour and capital is predominantly one of co-operation.<sup>268</sup> Despite the fact that the implications of an increase in labour force resulting from immigration depend, under given conditions, on a proportionate increase in capital, this does not exclude the possibility that the new labour supply may be the cause of increased investment activities. In fact, Isaac noted that, in the period of large-scale migration and the opening up of new continents, rapid population growth provided ample opportunities for capital-widening investments.<sup>269</sup>

107. International migration may in various ways be associated with international capital movements. Immigration is often thought to constitute a gain for the country of immigration, and a loss for that of emigration, because of the migrants representing a capital asset.<sup>270</sup> However, others have argued that this advantage is questionable: the immigrants' education may not be in line with requirements, there are problems of language, adaptation and so forth.<sup>271</sup> Another effect of international migrations for capital formation, discussed in the foregoing section,<sup>272</sup> are the capital transfers made by migrants. Immigrant transfers have the same unfavourable effect on economic growth and investment in immigrant countries as capital exports in general. The effect may be reduced, however, if, for instance, such remittances serve for financing the movement of other immigrants and thus benefit the immigration countries. Likewise, remittances increase foreign currency of emigration countries and thus the purchase of export goods of immigration countries. As far as the countries of emigration are concerned, these transfers contribute to the relief of population pressures.<sup>273</sup>

108. International movements of capital have been found to be intimately related to the international movements of population, especially in the case of new countries. Capital and labour movements, the intensity of which depend on the relative levels of their remuneration, interest and wages, are likely to adapt themselves in particular to international differences in natural resources. New countries are generally characterized by an abundant supply of natural resources and a relative scarcity of labour as well as capital owing to the low rate of savings.<sup>274</sup> The relationship between capital flows and population movements is mutual: immigration requires and stimulates the inflow of capital, and likewise foreign investments may call for and cause immigration.<sup>275</sup> Immigration is also important for capital movements from abroad in that in countries of recent settlement, a rapid growth of popula-

tion would be needed to make new investments in railways, public services and social overheads profitable.<sup>276</sup>

109. This causal relation between population and capital movements has been questioned and, in particular, it has been noted that international commodity movements may be a substitute for international migration and capital movements and may give rise to the same effects as perfect mobility of all factors of production, although this may be only true if the population of the labour-short economies has become sufficiently large and industrially differentiated.<sup>277</sup> Where either capital or labour moves alone, their movements may be in opposite directions. Under present conditions, capital by itself tends to move from countries with fully developed manufacturing industries to those in the early stages of growth; labour by itself would tend to move in the opposite direction. But, in the past, the transfer of capital and labour together has been the usual case.<sup>278</sup> Evidence of such an interrelationship between population and capital movements is said to be found in the long swings in international migrations and overseas investment in the case of the United Kingdom and the United States.<sup>279</sup>

## 5. INTERNAL MIGRATION AND INVESTMENT

110. Little is known about the implications of internal migration, as a demographic phenomenon, for capital formation. Although it may be thought that the effects of migration on investments in areas of in-migration or out-migration are not unlike those caused by an increase or a decline in population respectively, this is not necessarily true. Migration may tend to increase, on balance, investment requirements since, while in areas of in-migration it will have the effect of increasing the needs for investments in housing, transportation and communication facilities, public services and so forth, its lowering effect on capital formation needs in the areas of origin is limited, in so far as capital formation in the latter cannot fall below zero.<sup>280</sup> In addition, other factors are involved which make it impossible to compare the investment implications of internal migration with those of an over-all increase or decline in population; they include the sex and age selectivity of emigrants; the different patterns of participation in economic life characteristic for migrants; and, the different requirements for capital per head and per worker in areas of out-migration and of in-migration.<sup>281</sup>

111. The investment implications of internal migration are probably most important in the case of movements from rural to urban areas. In general, the literature has focused especially on the effects of urbanization on social

<sup>268</sup> On this point, see section D of this chapter.

<sup>269</sup> Isaac, *Economics of Migration* (1947), pp. 214-217.

<sup>270</sup> Davie, *World Immigration* ... (1947), pp. 248-249; Lewis, *The Theory of Economic Growth* (1963), pp. 359-360; Spengler, "Effects produced in receiving countries ..." (1958).

<sup>271</sup> Isaac, *Economics of Migration* (1947), pp. 228-230; Sauvy, *Malthus et les deux Marx* ... (1963), pp. 109-110.

<sup>272</sup> See section A.

<sup>273</sup> Isaac, *Economics of Migration* (1947), pp. 258-259.

<sup>274</sup> *Ibid.*, pp. 248-249, 263-266; Ohlin, *Interregional and International Trade* (1967), pp. 213, 224.

<sup>275</sup> Isaac, *Economics of Migration* (1947), p. 248; Spengler, "Effects produced in receiving countries ..." (1958).

<sup>276</sup> Isaac, *Economics of Migration* (1947), p. 249.

<sup>277</sup> Isaac, *Economics of Migration* (1947), pp. 266-267; Taft and Robbins, *International Migrations* ... (1955), p. 81; Spengler, "Effects produced in receiving countries ..." (1958).

<sup>278</sup> Ohlin, *Interregional and International Trade* (1967), pp. 218-220.

<sup>279</sup> See chapter VII, section B.

<sup>280</sup> Dewhurst *et al.*, *America's Needs and Resources* ... (1955), p. 415; Baker, "Significance of population trends ..." (1937); Henry, "Structure de la population ..." (1949); Kuznets, *Capital in the American Economy* ... (1961), pp. 322-323, 327-328.

<sup>281</sup> On selectivity in internal migration, see chapter VI, section B.

overhead capital or investments not directly productive, such as housing, transportation, education, public services and other facilities.<sup>282</sup> Although quantitative estimates of capital requirements due to urbanization are scarce, the needs originating from this process, even excluding the directly productive investments, may be very high. In addition, it has been noted that in practice there may be a bias favouring urban over rural investments, so that the former represent a very high and probably excessive proportion of total outlays.<sup>283</sup>

112. Only little evidence is available as to the effects of the urbanization process on investment. Abraham, discussing capital formation trends in Latin America, noted a reduction in the ratio of public saving and attributed this, at least in part, to the spread of urbanization, which made for higher costs in the public sector for education, public health, other social services and transfer type payments to households.<sup>284</sup>

#### 6. DEMOGRAPHIC AND NON-DEMOGRAPHIC DETERMINANTS OF INVESTMENTS

113. The foregoing comments have emphasized the role of demographic factors in setting levels, patterns and requirements of capital formation. It is, however, a much more complicated problem to evaluate the relative importance of these demographic factors as compared with the other determinants of investment.

114. In general, there can be little doubt that the most important influence of demographic factors is that exerted on the required levels of capital formation. Even when recognizing the limitations of a simple model of the Harrod-Domar type and the difficulties encountered in practice in estimating the capital-output ratio, it can be argued that rapid population growth will create requirements for capital formation which, if not making economic growth impossible, will certainly curtail the potential increases in levels of living which would have been possible without such population growth. On the other hand, there is no evidence that high population growth and the demographic characteristics accompanying it have been associated with low economic growth or stagnation. Significant economic growth has taken place in countries characterized by high population growth and comparative low capacities of capital formulation, suggesting thus that population growth and its implications for capital

formation have not been dominant factors, though such cases may not have been typical. More generally, it is also true that it has not been disproved that economic growth under such conditions can take place only at the cost of ignoring social overhead investments and the infrastructure, or of increasing levels of unemployment or underemployment.

115. The direct influence of demographic factors on capital formation is equally elusive. The main point that emerges from the foregoing discussion is that where sufficient investment funds are available, demographic factors such as population growth and age distribution may be a direct incentive for investment. It may be doubted, however, whether the predictions implicit in the "stagnation theory" would have held good in the more developed countries even if population growth had declined as consistently or had turned negative as foreseen by some of the writers concerned. Recent experience in the developed countries suggests that, even with relatively low rates of population growth, no lack of investment opportunities exists.

116. It may be concluded, then, that although there are many reasons to expect demographic factors to affect capital formation needs, levels and patterns, little evidence is available as to how these factors compare with other variables and what their relative importance is. On the other hand, the importance assigned to demographic factors in determining levels and patterns of investments depends to a great extent on the degree to which these forces of investment can be controlled. Investment requirements arising from population growth and other demographic factors play a significant role in determining actual investment patterns in the centrally planned economies.

#### C. Demographic aspects of employment

117. The influence of population factors and trends discussed so far in this chapter are those which affect the productive capacity of the economy through the supply of, and the demand for, capital. While there is a close relation between the level of investment and growth in output, the latter depends also on the degree to which the potential productive capacity of human, as well as material, resources is utilized. If, as may be the case, the labour force is not necessarily fully employed, the analysis must be extended in order to consider the role of demographic factors in setting the levels of employment.<sup>285</sup>

118. Employment and unemployment are complex phenomena, the definition and measurement of which give rise to a great number of problems. Some of these difficulties are related to the different concepts of employment, others to its measurement. The definition of employment in economic theory is often implied rather than explicitly stated and refers to the labour, expressed in some standard unit, taking part in the production

<sup>282</sup> United Nations, Economic Commission for Latin America, *Urbanization in Latin America* ... (1963), pp. 36-37. Oshima, "A strategy for Asian development" (1962), stressed the speculation in real estate in urban areas which absorbs investment funds which otherwise might be available for more useful purposes. Grossman, "Some current trends in Soviet capital formation" (1955), suggests a formula for estimating the investment requirements, excluding the directly productive investment, for an additional worker.

<sup>283</sup> United Nations, Economic Commission for Latin America, "Creation of employment opportunities ..." (1961). United Nations, *Report on the World Social Situation* ... (1957), p. 129, notes the heavier task of the developing countries, as compared with the now developed countries in their early stages of development, since the standards of urban overheads are much higher now than in the past.

<sup>284</sup> Abraham, "Saving patterns in Latin America" (1964), recognized that many of these expenditures were capital outlays, but added that they originated further current expenses for staffing, maintenance and so forth.

<sup>285</sup> The effects which demographic and other factors have on the supply of labour are discussed in chapter IX. Also included there is a discussion of the implications levels of employment may have on the supply of labour.

process; this definition offers many problems in its practical implications. Determining employment in this sense as an input raises the question of measuring labour in terms of time worked and homogeneous units as regards skills, aptitudes, application and so forth.<sup>286</sup> In general usage, the term employment has a broader meaning and is understood to refer to the number of persons employed out of the total labour force, i. e. including also the unemployed.<sup>287</sup>

119. It is in this context that the concept of full employment is used, meaning that every person who desires to work will actually find employment or, alternatively, as a situation in which no involuntary unemployment exists. The attainment of full employment in this absolute sense is possible only if both the economy and labour supply are in a stationary state, or the entire labour force is assured of work through a completely planned system of production. In the absence of these conditions of a stationary state, or perfect planning, a changing labour supply and economy will inevitably result in a certain amount of temporary unemployment and the existence of some "frictional unemployment", essential to provide some margin for change and adaptability of the labour force and the economy, is generally considered to be consistent with full employment.<sup>288</sup> Socialist authors contend that

unemployment is characteristic of the capitalist system, but that in the socialist countries, where the right to work has been established, unemployment has been eliminated.<sup>289</sup> Nevertheless even in these countries it has been recognized that the release and absorption of manpower may not coincide in time, place and number.<sup>290</sup> The level of frictional unemployment consistent with full employment depends upon such factors as the rate of technological change, the organization of the employment market, the occupational and spatial mobility of labour, but frequently predominant is the society's attitude towards employment which determines what level of frictional and other unemployment is thought to be acceptable.<sup>291</sup>

120. A distinction between different types of unemployment not only contributes to a better understanding of the employment problem, but is also important in the present context in so far as demographic factors may have different consequences for different types of unemployment. Apart from frictional unemployment, the following types were distinguished in an earlier chapter:<sup>292</sup> (a) seasonal unemployment, caused by more or less regular variations in the levels of activity of certain sectors or industries during given periods of the year; (b) cyclical

<sup>286</sup> International Labour Office, *Methods of Labour Productivity Statistics* ... (1951), pp. 30-42. On the need to measure labour input in terms of the time worked and the quality and effort of the labour force, see Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 27-32; Adelman, *Theories of Economic Growth and Development* (1961), pp. 10-12; Bruton, *Principles of Development Economics* (1965), pp. 15-16. Keynes, *The General Theory of Employment, Interest and Money* (1951), p. 41, measured the volume of employment by taking an hour's employment of ordinary labour as the basic unit and weighting an hour's special labour in proportion to its remuneration. Kendrick, *Productivity Trends in the United States* (1961); Denison, *The Sources of Economic Growth in the United States* ... (1962); and his *Why Growth Rates Differ* ... (1967), adjusted the labour force estimates in order to make allowance for differences in the quality of labour. For a combination of different concepts of labour at different stages of analysis, see United Nations, Economic Commission for Europe, *Some Factors in the Economic Growth* ... (1964).

<sup>287</sup> For a discussion of employment in this sense and problems of its measurement, see chapter IX. Steiner, "The productivity ratio ..." (1950), noted that the aggregate measure of man-hours, measuring employment in the economic sense, although closely associated, is not identical with the socio-economic concept of employment, which is the number of persons employed. See also Raj, *Employment Aspects of Planning* ... (1957), pp. 4-7.

<sup>288</sup> Pierson, *Full Employment* (1941), pp. 29-26; Beveridge, *Full Employment in a Free Society* (1945), pp. 19-20; International Labour Office, *Public Investment and Full Employment* (1946), p. 346; Robinson, *Essays in the Theory of Employment* (1947), pp. 21, 41-43; Lerner, *Economics of Employment* (1951), p. 17; Barrère, *Théorie économique et impulsion keynésienne* (1952), pp. 71-72; Casselman, *Economics of Employment and Unemployment* (1955), p. 10; Peterson, *Income, Employment and Economic Growth* (1962), pp. 94-95. Full employment has been defined as "a state of affairs in which a person available for and seeking work has a good expectation of finding in a short time, a job which, in the circumstances and by the standards customarily applied in the country concerned, would be considered suitable by a reasonable man". International Labour Office, *Employment and Economic Growth* (1964), p. 7. Other definitions of full employment, however, have been used. Beveridge defined full employment as a situation in which there are more vacant jobs than unemployed persons. Others have defined it as that level of employment at which a further addition to the demand for labour would result in inflationary tendencies or where aggregate

employment is inelastic in response to an increase in effective demand. See Keynes, *The General Theory of Employment, Interest and Money* (1951), pp. 15-16, 306; Lerner, *Economics of Employment* (1951), p. 23; United Nations, *National and International Measures for Full Employment* ... (1949), p. 13. See also Robinson, *Essays in the Theory of Employment* (1947), pp. 7-9. On the difficulties of defining full employment, see Rees, "The meaning and measurement of full employment" (1957).

<sup>289</sup> Academy of Sciences of the USSR, Institute of Economics, *Political Economy* (1957), pp. 566-588. Pierson, *Full Employment* (1941), p. 97. See also International Labour Office, *Employment Problems and Policies* (1960), p. 12.

<sup>290</sup> Orlov in *Nauchnye doklady Vysshei Shkoly: ekonomicheskie nauki*, No. 1 (1963). See also Kahan, "Labor turnover in the Soviet Union" (1962); and International Labour Office, *Employment and Economic Growth* (1964), pp. 18-19.

<sup>291</sup> In the socialist countries, anything above a very low rate of "labour turnover" would probably not be admissible. In most Western European countries, it is generally assumed that full employment is consistent with an unemployment rate of some 2 per cent or less, while for the United States the figure of 4 per cent is often quoted: Gordon, "Full employment as a policy goal" (1965); Phelps Brown, *The Economics of Labor* (1962), p. 116. In many cases a range of unemployment rather than a specific percentage is used. See International Labour Office, *Public Investment and Full Employment* (1946), p. 346; United Nations, *National and International Measures for Full Employment* ... (1949), p. 11; Casselman, *Economics of Employment and Unemployment* (1955), p. 11; Reboud, *Essai sur la notion de chômage structurel* ... (1964), p. 15. The levels of admissible unemployment, in addition, are not unchangeable; in an earlier study, for instance, unemployment rates varying from 3 to 8 per cent were thought to be acceptable. See Beveridge, *Full Employment in a Free Society* (1945), pp. 126-131. In many cases full employment is not specified, but rather expressions like "high and stable levels of employment" or "maximum employment" have been used. See Pierson, *Full Employment* (1941), p. 29; Casselman, *Economics of Employment and Unemployment* (1955), p. 10; International Labour Office, *Employment and Economic Growth* (1964), p. 46. Some authors have argued that, besides frictional unemployment, a certain amount of seasonal unemployment would be inevitable. Pierson, *Full Employment* (1941), p. 34; Hansen, *Economic Policy and Full Employment* (1947), pp. 19-20; United Nations, *National and International Measures for Full Employment* ... (1949), p. 13.

<sup>292</sup> See chapter IX, section E.

unemployment, which is the result of a falling off in demand of the economy due to variations in levels of activity during more extended periods; (c) structural unemployment, caused by lasting changes in the structure of the economy as a result of such factors as alterations in needs or wants, the discovery of new natural resources, or the exhaustion of existing ones, and technological progress; (d) unemployment which results from a chronic deficiency of the total demand for labour in relation to its supply.<sup>293</sup> With respect to the latter type of unemployment, basic differences exist in its underlying causes in the economically more advanced countries and those less advanced. Whereas in the former a chronic deficiency of the total demand for labour is liable to arise because of an insufficiency of the effective demand for the goods and services produced, in the less developed country this general unemployment is attributable to the shortage of capital and/or land in relation to labour, as further discussed below.

121. Emphasis on employment, not only in terms of the total number of persons employed, but also on taking into account productivity and income-producing aspects, is necessary to determine the extent to which human resources are used effectively in the production process. This latter aspect raises the problem of underemployment. The definition and measurement of underemployment again poses a number of difficulties.<sup>294</sup> Two major categories of underemployment have been distinguished: (a) visible underemployment, which involves shorter than normal periods of work and is characteristic of persons involuntarily working part-time; and (b) invisible underemployment, which is characteristic of persons whose working time is not abnormally reduced, but whose earnings are abnormally low or whose jobs do not permit full use of their capacities or skills (sometimes referred to as "disguised" unemployment) and persons who are employed in establishments or economic units whose productivity is abnormally low (sometimes called "potential" underemployment).<sup>295</sup>

# 1. POPULATION SIZE AND EMPLOYMENT

122. Since man is both a consumer and a producer, a larger population means that the demand for labour, as well as its supply, is greater than in a smaller population. The effects of the population size on employment depend mainly on the relation between population, and more specifically labour force, on the one hand, and resources and their utilization on the other.

<sup>293</sup> The terminology and classification of different types of unemployment, however, is far from uniform. For other classifications of unemployment see, among others, Reddaway, *The Economics of a Declining Population* (1939), pp. 48-53; United Nations, *Measures for the Economic Development ...* (1951), pp. 5-9; Casselman, *Economics of Employment and Unemployment* (1955), pp. 115-118; International Labour Office, *Employment Problems and Policies* (1960), pp. 4-6; Reboud, *Essai sur la notion de chômage structurel ...* (1964), pp. 17-35; International Labour Office, *Employment and Economic Growth* (1964).

<sup>294</sup> See the discussion in chapter IX, section E.

<sup>295</sup> Hsieh, "Underemployment in Asia" (1952). International Labour Office, Governing Body, *Report of the Meeting of Experts on Measurement of Underemployment ...* (1964); International Labour Office, *Employment Problems and Policies* (1960), p. 6; ———, *Employment and Economic Growth* (1964), p. 25.

## (a) Population size and cyclical unemployment

123. Any effects of the size of population, by itself, on employment appears to be the consequence of limitations due to the extent of the market, the division of labour, the lack of diversification and the dependence on international trade of the economy in so far as it is associated with population size. For instance, a low degree of diversification of economic activities may supposedly result in pronounced variations in seasonal activities and unemployment. Various writers have discussed in this connexion the argument that small populations may be characterized by a high degree of instability and a pronounced sensitivity to cyclical variations in levels of activity and employment for two reasons. With a high degree of specialization likely to be found in smaller nations, there is only a small chance of offsetting movements in other sectors and, more importantly, with a higher dependence on international trade, small nations are more likely to be affected by instability originating in other countries. However, on the whole they consider these arguments inconclusive: with few industries and a more simple economic structure, small nations are in a better position to formulate policy measures for overcoming cyclical fluctuations; in a larger economy with its more complex interrelations, a dislocation in one sector may spread through the whole economy. Statistical data for a number of developed countries suggest, in fact, that the greatest instability was found in the larger economies.<sup>296</sup>

## (b) Population size, natural resources and employment

124. A factor of considerable importance in relation to employment and underemployment is not the size of the population itself, but rather its relation to natural resources. The less than full employment of labour prevalent in economically less developed countries is, according to many authors, the result of a fundamental imbalance between population or its working contingent and the economy's natural resources, particularly land. Terms like overpopulation, or agricultural or rural overpopulation, are often used to indicate such conditions and population density, or some other variable measuring the relation between population and natural resources, is considered one of the main factors relevant to such a situation. The problem of "rural overpopulation", it is argued, is widely encountered in developing countries and particularly in densely populated peasant economies and its main manifestation is a chronic and large-scale underemployment in agriculture.<sup>297</sup> The term "disguised unemployment" in agriculture which is sometimes used to indicate this type of underemployment, concerns mainly family workers and the self-employed rather than wage labour. The typical case of such underemployment has

<sup>296</sup> Tarshis, "The size of the economy ..." (1960); Leduc and Weiler, "The size of the economy ..." (1960); Triffin, "The size of the nation and its vulnerability ..." (1960).

<sup>297</sup> Duesenberry, "Some aspects of the theory of economic development" (1950); Nurkse, *Problems of Capital Formation ...* (1953), chap. 2; International Labour Office, *The World Employment Situation* (1958); United Nations, *Report on the World Social Situation* (1957); Leibenstein, *Economic Backwardness ...* (1957), chap. 6; Ardant, *Le monde en friche* (1959), pp. 56-59.



been described as that of a number of family members working on small farms or peasant plots, contributing virtually nothing to output, but subsisting on a share of their family's income.<sup>298</sup> Underemployment, it is recognized, exists in most countries and is not limited to the agricultural sector, but it is thought to be a characteristic feature of, and to present itself on a massive scale especially in, the over-populated peasant economies where, owing to social, economic and demographic conditions, no alternative employment opportunities exist.<sup>299</sup>

125. A basic characteristic of underemployment, as noted before, is its low productivity. Many writers have gone further and identified "rural overpopulation" with a zero marginal productivity of labour, meaning that with unchanged techniques, a part of the agricultural population could be removed without reducing agricultural output significantly, if at all, or, stated in an alternative way, the same production could be obtained with a smaller labour force.<sup>300</sup> The identification of rural underemployment with a zero marginal productivity of labour led Nurkse to the formulation of his well-known proposal for the use of the excess labour in the construction of capital works. Pointing out that rural underemployment could not be absorbed by means of an expansion of monetary demand, he argued that a solution could be found by taking the labour surplus away from the land and setting it to work on capital projects such as irrigation, drainage, roads and so forth. This surplus labour, its marginal productivity being zero, could be shifted to these other capital-creating activities without affecting agricultural output and the workers could continue to be supported by their relatives. In this sense, according

to Nurkse, there exists in agricultural underemployment a hidden source of saving available for economic development.<sup>301</sup>

126. The concept of agricultural underemployment and Nurkse's proposal for using the surplus labour have been widely discussed. According to a number of writers, what is referred to as agricultural underemployment is frequently nothing else than seasonal unemployment, and the withdrawal of labour from the land without any significant changes in techniques would reduce agricultural production substantially instead of not at all or only slightly.<sup>302</sup> Nurkse, however, had already recognized that part of the disguised unemployment on the land could be seasonal, but even then, he argued, the possibility of making productive use of this labour outside the seasons of highest activity still existed. In addition, he thought that in many cases considerable unemployment existed throughout the year.<sup>303</sup> A similar view was held by Leibenstein, who distinguished between disguised unemployment that was due to the seasonal nature of agriculture, and that which would permit the removal of part of the labour force without reducing yields, that is to say where the marginal productivity of labour was zero.<sup>304</sup>

127. Other writers, critical of the theories of agricultural underemployment, have questioned the view that the marginal productivity of labour could be zero and consequently that the transfer of part of the agricultural labour force to other projects would not reduce agricultural production significantly.<sup>305</sup> It has been argued in this regard that the concept of disguised unemployment does not make allowance for the substitution of factors of production, whereas in actuality the production techniques used will tend to adapt to the relative plenty or scarcity of land and labour. Although the theory of underemployment assumes other conditions being given, Nurkse himself conceded that in order to make it possible for the surplus labour to be transferred without agricultural production being much affected, it would be necessary to introduce at least some reorganization in agri-

<sup>298</sup> Nurkse, *Problems of Capital Formation* ... (1953), p. 33.

<sup>299</sup> Nurkse, *Problems of Capital Formation* ... (1953); Spengler, "Demographic patterns" (1954); Bauer and Yamey, *The Economics of Under-developed Countries* (1957), p. 74; Ardant, *Le monde en friche* (1959), p. 56. On the existence of underemployment in the non-agricultural and urban sectors, see United Nations, *Measures for the Economic Development* ... (1951), pp. 7-8; International Labour Office, *Employment Problems and Policies* (1960), pp. 17-20; Ardant, *Le monde en friche* (1959), pp. 59-63; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), pp. 186-187; Sovani, "Underemployment—micro and macro—and development planning" (1955). On agricultural underemployment in more developed countries, see Ducoff and Hagood, "The meaning and measurement of partial and disguised unemployment" (1957); Phelps Brown, *The Economics of Labor* (1962), p. 108.

<sup>300</sup> United Nations, *Measures for the Economic Development* ... (1951), p. 41; Navarrete and Navarrete, "La subocupación en las economías poco desarrolladas" (1951); Nurkse, *Problems of Capital Formation* ... (1953), p. 32; Lewis, "Economic development with unlimited supplies of labour" (1954); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 44-45; Leibenstein, *Economic Backwardness* ... (1957), pp. 59-60; Rosenstein-Rodan, "Disguised unemployment and underemployment in agriculture" (1957); Phelps Brown, *The Economics of Labor* (1962), p. 108; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), p. 178; Coale, "Population and economic development" (1963); Myint, *The Economics of the Developing Countries* (1965), p. 86. This viewpoint can also be found in earlier writing, such as, for instance, Cleland, *The Population Problem in Egypt* ... (1936); Warriner, *The Economics of Peasant Farming* (1939); Mandelbaum, *The Industrialization of Backward Areas* (1945), pp. 1-2. Though they do not necessarily agree, some of the authors cited note that it has been argued that the marginal productivity of labour due to overcrowding might even become negative.

<sup>301</sup> Nurkse, *Problems of Capital Formation* ... (1953), pp. 36-47.

<sup>302</sup> Singer, "Population and economic development" (1955); Viner, "Some reflections on the concept of disguised unemployment" (1957); Oshima, "Underemployment in backward economies ..." (1958); Higgins, *Economic Development* ... (1959), pp. 353-354; Clark, "Future sources of food supply ..." (1962); Phelps Brown, *The Economics of Labor* (1962), p. 107; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), p. 178; Schultz, *Transforming Traditional Agriculture* ... (1964), pp. 53-54; Boserup, *The Conditions of Agricultural Growth* ... (1965), pp. 49-50. Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 139-147.

<sup>303</sup> Nurkse, *Problems of Capital Formation* ... (1953), pp. 35-36.

<sup>304</sup> Leibenstein, *Economic Backwardness* ... (1957), pp. 59-61. He also pointed out that the simultaneous existence of surplus labour and a positive income in agricultural small holdings could be theoretically explained by attributing the income to rent.

<sup>305</sup> Viner, "Some reflections on the concept of disguised unemployment" (1957); Schultz, "The role of government in promoting ..." (1956); and his *Transforming Traditional Agriculture* ... (1964), pp. 60-62; Oshima, "Underemployment in backward economies ..." (1958).



culture.<sup>306</sup> Another condition, as pointed out by Nurkse himself, for making it possible to transfer the surplus labour out of agriculture is that the population remaining behind in agriculture would not increase its consumption.

128. After the excess labour is released to work on investment projects, since production remains the same, the agricultural population will have a food surplus which, however, cannot be used for its own consumption, but is needed for feeding the labour engaged in capital formation. As Nurkse noted, there is no automatic release of the food supplies previously consumed by the underemployed and one of the main problems is to stop the peasant and his family who would remain on the land from increasing their consumption.<sup>307</sup> This is more difficult, it has been argued, because those who remain behind must work harder so that the same amount of labour can be applied.<sup>308</sup> Other problems arising from a programme for diverting excess agricultural labour to the production of capital goods relate to providing these workers with sufficient working capital, such as tools and other implements.<sup>309</sup> The diversion of this labour also involves, according to other writers, necessarily higher costs, especially so if this labour has to be employed in a locality other than its own. Under these conditions provisions for housing and transportation have to be made and incentives, in the form of additional consumer goods, are needed to make the workers leave their former work and homes.<sup>310</sup> While there is some agreement that theoretically it would be possible to use the excess agricultural labour for creating certain capital goods, these practical problems limit its application, according to a number of writers.<sup>311</sup>

<sup>306</sup> Nurkse, *Problems of Capital Formation* ... (1953), p. 33. While in this study he apparently thought such changes to be not so important, later he stated that they are "a major undertaking and cannot be lightly taken for granted". Nurkse, "Epilogue: the quest for a stabilization policy ..." (1958). See also Kao, Anshel and Eicher, "Disguised unemployment in agriculture ..." (1964); Raj, *Employment Aspects of Planning* ... (1957), p. 5; Sovani, "Underemployment, removable surplus and the saving fund" (1959); Sen, *Choice of Techniques* ... (1960), p. 5; Hsieh, "Underemployment in Asia" (1952). Sovani, "Underemployment—micro and macro—and development planning" (1955).

<sup>307</sup> Nurkse, *Problems of Capital Formation* ... (1953), pp. 36-43, noted also that the consumption of the transferred workers would remain the same. See also Vakili and Brahmananda, *Planning for an Expanding Economy* ... (1956); Sovani, "Underemployment, removable surplus and the saving fund" (1959); Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), pp. 192-197; Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 56.

<sup>308</sup> Myint, *The Economics of the Developing Countries* (1965), pp. 86-88.

<sup>309</sup> Nurkse thought that this factor would be only of minor importance. See his *Problems of Capital Formation* ... (1953), pp. 44-46.

<sup>310</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 56; Lewis, *The Theory of Economic Growth* (1963), pp. 218-220; Raj, *Employment Aspects of Planning* ... (1957), p. 20; Patterson, "Impact of deficit financing ..." (1957); Clark, "Future sources of food supply ..." (1962).

<sup>311</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 56-57; Lewis, *The Theory of Economic Growth* (1963), pp. 218-220; Raj, *Employment Aspects of Planning* ... (1957), pp. 18 ff.; Balogh, "Agricultural and economic development ..." (1961), pp. 27-42; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), pp. 178-179.

129. A more general criticism of the theory of agricultural overpopulation concerns the assumed relation between, on the one hand, population density and, on the other, rural overpopulation or agricultural underemployment.<sup>312</sup> Population pressure or overpopulation, it is argued, cannot be measured simply by computing the number of people per unit of land. It will depend on such additional factors as climate, quality of land, water supply, the existence of mineral resources, as well as the level of technology and productivity and the available capital. The organization of agriculture and systems of land tenure are thought to be other important factors.<sup>313</sup> Some of those questioning the relation between population density and underemployment have pointed out that since this theory assumes that rural underemployment would emerge at high levels of population density, one should also expect to find high levels of employment in sparsely populated regions. However, theoretical considerations as well as empirical observations suggest that this is not necessarily so; countries not suffering from overpopulation in this sense may nevertheless have significant underemployment in agriculture.<sup>314</sup> The fact that underemployment existed in sparsely settled regions was, however, not denied by Nurkse, but he argued that while there was little disguised unemployment in the sense that, without changes in methods, a substantial part of the manpower could be diverted from food production without affecting the volume of agricultural output, underemployment existed in the sense of there being low productivity in some occupations as compared with others. The cause of such underemployment could be found mainly in differences in the supply of capital in different sectors, especially agriculture as compared to non-agriculture.<sup>315</sup>

130. Not only the theory, but also the existence and the extent of disguised unemployment has been a matter of discussion. Some of the problems involved concern the measurement of underemployment. While visible underemployment could be measured, even though incompletely, through labour force surveys, the estimation of invisible underemployment must rely on some standard of efficiency; and the most appropriate standard is difficult to determine.<sup>316</sup> Nevertheless, a considerable number of

<sup>312</sup> Clark, "What constitutes rural overpopulation?" (1955); Coale, "Population and economic development" (1963); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 256-259.

<sup>313</sup> Myint, "An interpretation of economic backwardness" (1954), and his *The Economics of the Developing Countries* (1965), p. 31; International Labour Office, *Employment and Economic Growth* (1964), pp. 126-127.

<sup>314</sup> Boserup, *The Conditions of Agricultural Growth* ... (1965), pp. 44-45; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), p. 187. Myint, "An interpretation of economic backwardness" (1954), noted in more general terms that if overpopulation were a cause of economic backwardness, the question still remained why other countries not characterized by manifest overpopulation should also be backward.

<sup>315</sup> Nurkse, *Problems of Capital Formation* ... (1953), pp. 50-51.

<sup>316</sup> International Labour Office, Governing Body, *Report of the Meeting of Experts on Measurement of Underemployment* ... (1964); International Labour Office, *Employment and Economic Growth* (1964), pp. 25-28. Moore, *Economic Demography of Eastern and Southern Europe* (1945), was one of the first to use the method of a standard of productivity for measuring underemployment, but

(Continued on next page)

estimates of agricultural underemployment, though often based on criteria which were not well defined, have been made in the course of time. According to Nurkse, the problem of rural overpopulation, which was a characteristic feature of the densely populated peasant economies that stretch all the way from South-eastern Europe to South-East Asia, might be associated with disguised unemployment varying between some 15 to 30 per cent of the agricultural population.<sup>317</sup> Among the first specific estimates were those for eastern and southern European countries in the pre-war period, where estimates of the surplus from population varied from about one quarter to one third.<sup>318</sup> Higher estimates, up to 50 per cent, were given for the case of Egypt.<sup>319</sup> Available estimates for more recent periods tend to confirm the existence of high levels of underemployment in the agricultural sector of many of the densely populated countries in Asia.<sup>320</sup> Data for countries and areas in this region, including Ceylon, India, Pakistan, the Philippines, Java and Madura, and others, suggest underemployment in rural areas varying from one fifth to one third of the agricultural population.<sup>321</sup> Others contend, however, that the evidence as to the prevalence of disguised unemployment is less than convincing.<sup>322</sup> Some of the findings to the contrary were indirect, based on the relation between rural density and the development of agricultural productivity, while others were more direct. On the basis of data for more than twenty countries, Barter concluded that although rural density tended to be higher in less developed

than in more developed economies, this was not only caused by a shortage of land, but also by systems of land tenure, lack of capital and machinery etc.<sup>323</sup> Clark, on the basis of data for twenty-six countries on the number of persons engaged per square kilometre of land and the value of agricultural production per person engaged, found little relation, if any, between density and average agricultural product per head.<sup>324</sup>

131. Schultz discussed some cases in Latin America where the withdrawal of labour from agriculture reportedly resulted in a drop of agricultural production.<sup>325</sup> In a later study he analysed the effects of the influenza epidemic in India in 1918-1919 on agricultural production and concluded that the deaths caused by it, which reduced the labour force in agriculture by an estimated 8 per cent, caused a considerable decline in the acreage sown in crops and a decline in agricultural production of 3.3 per cent in the following year. He concluded from these findings that the assumption of a zero marginal productivity of labour cannot be maintained.<sup>326</sup> Kao, Anschel and Eicher, reviewing findings on disguised unemployment from five studies, concluded that there was "little reliable empirical evidence to support the existence of more than token (around 5 per cent) disguised unemployment as defined by a zero marginal product of labour and the condition of *ceteris paribus*".<sup>327</sup>

(Footnote 316 continued)

this method has been criticized by a number of writers. See Warriner, "Land reform and economic development" (1964). On the difficulties of determining the labour force which, in principle, could be removed from the land, see Sovani, "Underemployment—micro and macro—and development planning" (1955); Mathur, "The anatomy of disguised unemployment" (1964).

<sup>317</sup> Nurkse, *Problems of Capital Formation* ... (1953), pp. 32-35.

<sup>318</sup> Rosenstein-Rodan, "Problems of industrialization ..." (1943); Mandelbaum, *The Industrialization of Backward Areas* (1945); Warriner, *The Economics of Peasant Farming* (1939). For more recent estimates of underemployment in southern Europe, see for instance, United Nations, *Economic Survey of Europe in 1953* (1954), pp. 77-79; International Labour Office, *Employment Problems and Policies* (1960), p. 19; Dumont, *Economie agricole dans le monde* (1954), pp. 240, 247, 377; Ardant, *Le monde en friche* (1959), pp. 81-84. Marczewski, *Planification et croissance économique des démocraties populaires, vol. I* ... (1956), pp. 11-27. See also chapter IX, section E.

<sup>319</sup> Cleland, *The Population Problem in Egypt* ... (1936); Warriner, *Land and Poverty in the Middle East* (1948), p. 33; Issawi, *Egypt: an Economic and Social Analysis* (1947), p. 195; and his *Egypt in Mid-Century* (1954), p. 258. However, see also Warriner, "Land reform and economic development" (1964).

<sup>320</sup> Buck, *Chinese Farm Economy* (1930). This was one of the first studies which provided estimates of surplus labour in an area of China.

<sup>321</sup> Lewis, *The Theory of Economic Growth* (1963), p. 327; International Labour Office, *Employment and Economic Growth* (1964), pp. 28-29; ———, *Employment Problems and Policies* (1960), pp. 17-18; United Nations, *Report on the World Social Situation* ... (1957), p. 102; International Labour Office, *The World Employment Situation* (1958); Ardant, *Le monde en friche* (1959), pp. 73-76; Sovani, "Underemployment—micro and macro—and development planning" (1955).

<sup>322</sup> Sovani, "Underemployment, removable surplus and the saving fund" (1959); Viner, "Some reflections on the concept of disguised unemployment" (1957); Myint, *The Economics of the Developing Countries* (1965), pp. 86-88.

## 2. AGE DISTRIBUTION AND EMPLOYMENT

132. Given the different propensities to work of persons at different ages, the amount of labour forthcoming from a given population depends to a considerable extent on its age distribution. Assuming that other factors of production and levels of technology remain unchanged, the age distribution may, through its effect on labour supply, exert an influence on the levels of employment. An increase in the share of adults in the total population will, *ceteris paribus*, tend to increase labour supply more than demand, whereas an increase in the relative share of the population in inactive ages will tend to have the opposite effect.<sup>328</sup> Apart from this indirect effect which the age distribution may have on employment through the supply of labour, age has been found to be an important factor in the incidence of unemployment and significant differentials in employment levels and types of unemployment exist for different age groups, affecting in particular the younger and older workers.

<sup>323</sup> Barter, "Fundamental factors affecting the stage and status ..." (1955).

<sup>324</sup> Clark, "Population growth and living standards" (1953).

<sup>325</sup> Schultz, "The role of government in promoting ..." (1956).

<sup>326</sup> Schultz, *Transforming Traditional Agriculture* ... (1964), pp. 63-70.

<sup>327</sup> Kao, Anschel and Eicher, "Disguised unemployment in agriculture ..." (1964).

<sup>328</sup> Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche* ... (1960), p. 357.

(a) *The age distribution and frictional unemployment*

133. A nearly universal characteristic of employment conditions are the comparatively high unemployment rates found among young workers. Factors such as lack of experience, skills, knowledge of employment opportunities and seniority are to a great extent responsible for this phenomenon.<sup>329</sup> However, much of the higher unemployment in these ages is only frictional. Among the reasons advanced why frictional unemployment may be higher among the young is the fact that these workers are mainly new entrants into the labour force. After entering into the working population some time may elapse before the young worker finds employment and while he often accepts the first available job, he is likely to later change positions, reporting brief periods of unemployment, until he finds the job he prefers. The higher mobility characteristic of the young workers is thus likely to be associated with higher frictional unemployment.<sup>330</sup>

(b) *The age distribution and structural unemployment*

134. Much of the discussion on the effects of age and the age distribution on employment has centred on the problem of the mobility of labour and its adaptability to structural changes taking place in the economy.<sup>331</sup> The view is generally found that younger workers have higher occupational and geographical mobility; older workers are less adaptable, less able to change occupations and more reluctant to move to other places, as compared with young workers.<sup>332</sup> Older workers having acquired specialized skills and experience often lack sufficient incentives to change occupations or cannot easily be retrained for other jobs requiring different qualifications.<sup>333</sup> Structural

<sup>329</sup> Reddaway, *The Economics of a Declining Population* (1939), p. 52; Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche ...* (1960), pp. 387-389; Bloch and Praderie, *La population active dans les pays développés* (1966), p. 193. The latter authors noted that these factors might explain the higher unemployment of young workers in periods of depression.

<sup>330</sup> Casselman, *Economics of Employment and Unemployment* (1955), p. 127; Hauser, "Differential unemployment and characteristics of the unemployed ..." (1957); Bancroft, *The American Labor Force ...* (1958), pp. 8-9. It has been noted also that many young people who continue studying often look for work for short periods, or on a part-time basis—a circumstance which, because of repeated entries and withdrawals from the labour force, tends to be associated with high levels of frictional unemployment. See, for example, Bloch and Praderie, *La population active dans les pays développés* (1966), p. 193.

<sup>331</sup> See also chapter VIII, section D.

<sup>332</sup> Reddaway, *The Economics of a Declining Population* (1939), p. 61; Boverat, "Vieillessement de la population ..." (1948); Letinier, "Vue d'ensemble des conséquences ..." (1948); Notestein et al., *The Future Population of Europe and the Soviet Union* (1944), pp. 130-131; Spengler, "Some effects of changes in the age composition of the labor force" (1941); Löscher, "Die Vergrößerung wirtschaftlich gesehen" (1936); Beveridge, *Full Employment in a Free Society* (1945), p. 25; United Kingdom, Royal Commission on Population, *Report ...* (1949), p. 118; Sauvy, *De Malthus à Mao-Tsé-Toung ...* (1958), pp. 116-117; Kaufmann, *Die Überalterung: Ursachen, Verlauf, wirtschaftliche ...* (1960), p. 301; Phelps Brown, *The Economics of Labor* (1962), pp. 98, 111-112; Stassart, *Les avantages et les inconvénients économiques ...* (1965), p. 171.

<sup>333</sup> Myrdal, *Population: a Problem for Democracy* (1940), p. 140; Moore, "The aged in industrial societies" (1950); Phelps Brown, *The Economics of Labor* (1962), p. 98.

changes in the economy, which would require such occupational transfers, tend, furthermore, to be more favourable to younger workers, in so far as the mechanization of industry implies a larger emphasis on youth and speed than on skill and experience.<sup>334</sup> Studies of the industrial mobility of the labour force suggest that young workers entering the labour force make a greater contribution to the readjustment of labour between industries than that which results from the transfer of adults and aged workers.<sup>335</sup> The available evidence also suggests that younger people are more likely to migrate from one area to another than older people.<sup>336</sup> This being the case, the geographic readjustment to structural changes is probably more easily achieved when the labour force is composed of a relatively large proportion of young workers. It has been found in studies of labour migration that for a given economic incentive young people respond more frequently and more quickly than older persons.<sup>337</sup>

135. It has also been noted, however, that the argument of the lack of mobility of older workers can be easily exaggerated.<sup>338</sup> Moreover, under certain conditions, such as in the case of contracting industries, a high proportion of aged workers may reduce unemployment, since an outflow of retiring workers may automatically reduce the number of workers engaged in the industry, without need for dismissals such as would have been the case with a younger work force. Other views attribute the higher unemployment found among older workers not so much to a lack of mobility, but to biological factors involved in aging, or to discriminatory practices on the part of employers.<sup>339</sup> It has also been argued that the higher incidence of unemployment in these ages is not so much the result of the higher risk of becoming unemployed, but of the fact that once workers lose their jobs, they face much more difficulty in finding other employment.<sup>340</sup>

<sup>334</sup> Casselman, *Economics of Employment and Unemployment* (1955), p. 41. Durand, *The Labor Force in the United States, 1890-1960* (1948), p. 113, argues that because of the introduction of labour-saving machinery, the decrease in the demand for older workers contributed also to their comparatively high unemployment rates in periods of depression.

<sup>335</sup> Makower, Marschak and Robinson, "Studies in the mobility of labour, part 2" (1940); Ezekiel, "Population and unemployment" (1936).

<sup>336</sup> See chapter VI, section B.

<sup>337</sup> Daniel, "Labour migration and age composition" (1939).

<sup>338</sup> United Kingdom, Royal Commission on Population, *Report ...* (1949), p. 119; Lewis, *The Theory of Economic Growth* (1963); Stassart, *Les avantages et les inconvénients économiques ...* (1965), pp. 173-179. Robinson, "Economic consequences of a decline in the population ..." (1951), noted, in addition, that immobility of labour becomes a factor in unemployment only if unfilled vacancies appear.

<sup>339</sup> Lauzier, "Age biologique et âge chronologique" (1955); Sadie, "Discrimination against older workers in perspective" (1955); Spengler, "The economic effects of changes ..." (1956); Douse, "Discrimination against older workers" (1961); Canada, Department of Labour, "The problem of the older worker" (1947); Durand, *The Labor Force in the United States, 1890-1960* (1948), p. 114; Hauser, "Differential unemployment and characteristics of the unemployed ..." (1957).

<sup>340</sup> Beveridge, "An analysis of unemployment" (1937); Fourastié, "Le vieillissement de la population et la viscosité ..." (1948); Dublin and Lotka, *The Money Value of a Man* (1946), pp. 66-67; Beveridge, *Full Employment in a Free Society* (1945), pp. 69-72; Reddaway, *The Economics of a Declining Population* (1939), p. 143;

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unemployment. The general view is that the risks of structural maladjustments are likely to be greater under conditions of a stationary or declining population than when the population is growing rapidly. Various reasons have been advanced why this is so. In the first place, it is asserted, a slowly growing population, as compared to one increasing more rapidly, will make the economy less flexible, especially in so far as an adaptation to structural changes, characteristic of virtually every economy, are concerned. A low rate of population growth signifies a smaller number of new entrants into the labour market, who are the most mobile and most adaptable to industrial and occupational shifts. It is more difficult to induce necessary redistributions of workers if it involves changes in occupation of people who have already been trained and are working with certain skills.<sup>357</sup> In the second place, it is argued that the possibility of over-development of certain industries is greater when a population is stationary or near stationary than when population is growing rapidly. As long as population grows rapidly, over-production in any line of economic activity is likely to be overcome in a relatively short period, since, in addition to normal depreciation and increase of income, population growth can correct errors in investment. With a stationary or diminishing population, however, over-expansion is not easily remedied and, under such conditions, a dislocation in the market and unemployment are likely to occur.<sup>358</sup>

143. Some authors have argued, in addition, that shifts in demand requiring changes in the structure in production may take place more frequently in a stationary or declining population. The reasoning is that such a population will consume a relatively large proportion of luxury and semi-luxury goods, the demand for which is relatively unstable and variable.<sup>359</sup> On the other hand, the importance of a slowly growing, stationary or declining population as a determinant of structural unemployment should not be exaggerated. Although population growth may be important in this respect, the experience of most developed countries has shown that a slow rate of population growth and a continuous process of change in the economic structure can be associated with high levels of employment.<sup>360</sup>

<sup>357</sup> Ezekiel, "Population and unemployment" (1936); United Kingdom, Royal Commission on Population, *Report ...* (1949), pp. 118-119; Notestein *et al.*, *The Future Population of Europe and the Soviet Union* (1944), p. 131; Moore, "Persistent problems of labor force analysis" (1951); Robinson, "Economic consequences of a decline in the population ..." (1951); Stassart, *Les avantages et les inconvénients économiques ...* (1965), pp. 171-172; Sauvy, *Malthus et les deux Marx ...* (1963), pp. 175-176.

<sup>358</sup> Myrdal, *Population: a Problem for Democracy* (1940), p. 154; Keynes, "Some economic consequences of a declining population" (1937); Boverat, *Le vieillissement de la population* (1946), pp. 120-122; Myrdal, *Nation and Family ...* (1945), p. 86; Lafitte, "The economic effects ..." (1941); Lewis, *The Theory of Economic Growth* (1963), p. 300; Stassart, *Les avantages et les inconvénients économiques ...* (1965), p. 194.

<sup>359</sup> Reddaway, *The Economics of a Declining Population* (1939), pp. 60-61; Spengler, "Population movements and economic equilibrium ..." (1940); Harrod, "Modern population trends" (1939); League of Nations, Delegation on Economic Depressions, *Economic Stability in the Post-War World ...* (1945), p. 27.

<sup>360</sup> See, for instance, Lewis, *The Theory of Economic Growth* (1963), p. 300; Stassart, *Les avantages et les inconvénients économiques ...* (1965), pp. 173-179.

### (c) Population growth and chronic unemployment in less developed countries

144. A great deal of attention has been devoted in the existing literature to the effects population growth may have on the long-term chronic or general unemployment which results from a persistent failure of the demand for labour to absorb the existing supply. In the writings on this subject, a distinction is customarily made between the effects population trends may have on the unemployment of this type in the economically more advanced countries and those less advanced. In the former, where, as a rule, population is increasing relatively slowly, widespread unemployment, according to the stagnation thesis, can arise as a consequence of an insufficient effective demand for goods and services emanating precisely from a near stationary or declining population. Thus, whereas in the developed countries low or declining population growth is thought to affect unemployment through its negative effects on the demand side,<sup>361</sup> in the less developed countries high population and labour force growth are thought to be conducive to higher unemployment. In these countries, where a deficiency of demand is generally not considered a major influence in causing unemployment,<sup>362</sup> the characteristically rapid population and labour force growth may be important factors in causing a further deterioration in the often already critical imbalance between the supply of labour and that of the other factors of production.<sup>363</sup>

145. Growth in population, it is argued, implies an increase in the labour force and thus in productive capacity and potential employment, but it does not follow that, in practice, output and employment would increase proportionately to the increase in the labour force. Labour being only one factor of production, with the given technology, unemployment or underemployment would result unless the other factors of production increased *pari passu* with the labour force. In many developing countries where population and labour force are increasing rapidly, unemployment and underemployment are affecting an increasing portion of the population because of the lack of capital and land.<sup>364</sup>

<sup>361</sup> See the following subsection.

<sup>362</sup> For a different view see, however, Baran, "On the political economy of backwardness" (1952); Mellor, "The use and productivity of farm labor ..." (1963). See also Kao, Anschel and Eicher, "Disguised unemployment in agriculture ..." (1964).

<sup>363</sup> Eckaus, "The factor-proportions problem in underdeveloped areas" (1955); Navarrete and Navarrete, "La subocupación en las economías poco desarrolladas" (1951); Casselman, *Economics of Employment and Unemployment* (1955), p. 118; Leibenstein, *Economic Backwardness ...* (1957), p. 56; Ardant, *Le monde en friche* (1959), pp. 65-66; Power, "The economic framework of a theory of growth" (1958); Raj, *Employment Aspects of Planning ...* (1957), p. 18; International Labour Office, *Employment Problems and Policies* (1960), p. 6. Peterson, *Income, Employment and Economic Growth* (1962), pp. 468-469, notes that the modern economic growth theory has developed in two directions: one for the less developed countries where, apart from institutional factors, the main problem is one of a shortage of capacity, and one for the developed countries where the problem is principally one of ensuring sufficiently high levels of demand so that the production potential is fully utilized.

<sup>364</sup> United Nations, *Measures for the Economic Development ...* (1951), pp. 8, 46-47; Eckaus, "The factor proportions problem in underdeveloped areas" (1955); Bauer and Yamey, *The Economics* (Continued on next page)

146. The implications for employment of a scarcity of land have been discussed mainly in the context of a static situation of agricultural over-population in peasant economies. A labour surplus, manifesting itself in underemployment, is thought to be characteristic of many of these economies.<sup>365</sup> Further population growth under conditions of population pressure on the land will tend to increase the existing levels of underemployment through such factors as the decrease in land per worker, the need to take recourse to land of inferior quality, and the increase of fragmented or overcrowded holdings.<sup>366</sup> In the absence of a sufficiently rapid expansion of employment opportunities outside agriculture, disguised unemployment may reach a saturation point and open unemployment might appear and increase rapidly. Such a point of saturation and the spread of open unemployment under conditions of increasing population pressure on land will be reached much earlier in an agricultural economy operated by wage labour.<sup>367</sup> Where wage labour is predominant in agriculture, only as many workers as are needed for cultivation will find employment or, in more general terms, with given resources and technology, employment will be at a maximum when the level of wages, as determined by the marginal product, is equal to the minimum subsistence level. A working population beyond that number will remain unemployed or have to look for work outside agriculture.<sup>368</sup> The deterioration of employment conditions in agriculture due to an increasing pressure of population on the land is also one of the most important "push" factors in rural-urban migration. In the absence of sufficient employment opportunities in the cities, these migrations will imply the transfer of underemployment from rural to urban areas or the increase of open unemployment in the cities.<sup>369</sup>

(Footnote 364 continued)

of Underdeveloped Countries (1957), p. 74; United Nations, *Report on the World Social Situation* ... (1957), p. 102; Barre, *Economie politique*, vol. 1 ... (1961), p. 104; Reboud, *Essai sur la notion de chômage structurel* ... (1964), pp. 19-20; Coale, "Population and economic development" (1963); Meade, *A Neo-Classical Theory of Economic Growth* (1964), p. 47; Sadie, "Demographic aspects of labour supply ..." (1966).

<sup>365</sup> See the discussion above. United Nations, *Report on the World Social Situation* ... (1957), p. 103, noted that existing underemployment evidently emerged as a result of the failure in the past to create sufficient employment opportunities for an increasing population.

<sup>366</sup> Mandelbaum, *The Industrialization of Backward Areas* (1945), pp. 1-2; Ardant, *Le monde en friche* (1959), p. 58; International Labour Office, *Employment and Economic Growth* (1964), p. 126; Mathur, "The anatomy of disguised unemployment" (1964).

<sup>367</sup> Myint, *The Economics of the Developing Countries* (1965), pp. 34-35, noted that although the saturation point of population in a subsistence economy is higher than in a wage economy, the former is faced with the additional handicap of having to create employment for the larger number of the underemployed, in addition to the problems caused by the natural increase of population.

<sup>368</sup> United Nations, *Measures for the Economic Development* ... (1951), p. 7; Lewis, *The Theory of Economic Growth* (1963), pp. 326-327; Leibenstein, *Economic Backwardness* ... (1957), pp. 61-62; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), p. 181; Raj, *Employment Aspects of Planning* ... (1957), pp. 8-9; Myint, *The Economics of the Developing Countries* (1965), pp. 34, 140-141. To the extent that the demand for wage labour in agriculture fluctuates in the different seasons, some of this unemployment may be mainly seasonal.

<sup>369</sup> Navarrete and Navarrete, "La subocupación en las economías poco desarrolladas" (1951); Lewis, *The Theory of Economic Growth*

147. Apart from its effects on the man-land ratio, the generally high rates of labour force growth in the less developed economies tend to worsen the existing imbalance between labour and capital resources. In the view of many writers, insufficient capital formation is the crucial obstacle to creating sufficient employment opportunities.<sup>370</sup> A number of methods have been used for estimating the investment requirements to employ an increasing labour force. A simple method, discussed above,<sup>371</sup> is based on the stock of capital required per worker, the so-called capital-labour ratio. Given this ratio and the rate of growth of the labour force, total investment requirements can be estimated.<sup>372</sup> Another method is based on the Cobb-Douglas production function, which incorporates both labour and capital as factors determining the level of output.<sup>373</sup> The relations between labour force growth and investment requirements have also been considered in a number of models. Coale and Hoover used the Cobb-Douglas production function

(1963), pp. 326-327, 338; United Nations, *Report on the World Social Situation* ... (1957), p. 129; International Labour Office, *Why Labour Leaves the Land* ... (1960), p. 210; Ardant, *Le monde en friche* (1959), pp. 59-63; Myint, *The Economics of the Developing Countries* (1965), p. 89. For a general discussion of factors underlying rural-urban migrations, see chapter VI, section C.

<sup>370</sup> Capital formation is thought to be essential not only in the over-populated agricultural economy, where it is needed to create employment outside agriculture, but also in those countries where land is not scarce. In the latter, it is argued, capital formation is a basic requisite for realizing the potential development and employment opportunities existing in these areas. See Nurkse, *Problems of Capital Formation* ... (1953), pp. 50-51; Loufty, *La planification de l'économie* ... (1963), pp. 357-358, 365-366. In addition to capital needs in this connexion, the inequality in the distribution of land ownership found in many of the less densely settled countries has been stressed. International Labour Office, *Employment and Economic Growth* (1964), pp. 126-127. Coale, "Population and economic development" (1963) cites as a possible exception to the usual reasoning on investment requirements the case of a "frontier society" where labour settles on empty land and provides its own capital by clearing land, constructing roads, building houses, schools etc. In general, however, little is known about the need for capital in densely settled agricultural areas as compared with sparsely settled ones, although several writers contend that the pressure to form capital is probably less and the capacity to do so probably higher in the latter. See Spengler, "Capital requirements and population growth ..." (1956); Belshaw, *Population Growth and Levels of Consumption* ... (1956), p. 62. Anderson, "Population growth and capital requirements ..." (1955), mentions, among many factors affecting the ability to generate capital, the richness or paucity of natural resources.

<sup>371</sup> See section B of this chapter.

<sup>372</sup> Tinbergen, *The Design of Development* (1958), pp. 12-13, 71-72; Spengler, "Capital requirements and population growth ..." (1956); Cotta, *Analyse quantitative de la croissance des pays sous-développés* (1967), pp. 111-114; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* (1960), pp. 83-84; United Nations "Use of models in programming" (1961); Caire, *La planification* (1967), pp. 242-243. Denoting capital by  $C$  and employment by  $L$ , the capital-labour ratio is defined as  $C/L$ . Assuming the marginal capital-labour ratio to equal the average ratio, investment ( $I$ ) needed to employ a labour force increase ( $\Delta L$ ) is:

$$I = \frac{C}{L} \Delta L.$$

<sup>373</sup> Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 58-66; Coale and Hoover, *Population Growth and Economic Development* ... (1958), pp. 324-327. See also section B of this chapter.

demand would cause unemployment to increase.<sup>386</sup> This argument is not basically affected, as a number of writers have pointed out, if it is admitted that, in practice, wages are often higher than the marginal product of labour. A number of reasons have been offered for this phenomenon—including such factors as the resistance of labour unions and imperfections in the labour markets. However, some writers have suggested that the levels of employment may be higher than could be expected on purely economic grounds. Lewis thinks there are traditions and a code of behaviour according to which it is good form to offer as much employment as possible.<sup>387</sup> Leibenstein and others have argued that below a certain level of wages, the efficiency of labour depends upon the wage level itself, especially through the effect the latter has on nutrition, health and the energy of the worker, and the wages offered might thus be higher than the subsistence level. Consequently, and despite the depressing influence of the surplus labour on actual wages paid, workers may be employed beyond the point where the marginal productivity of labour equals the wage level.<sup>388</sup> On balance, it appears that under conditions of a rapidly growing population and labour force the wage level, however determined, would not be flexible enough to allow for the employment of all additional workers.

151. Considerable differences of opinion exist about the feasibility and desirability of using more labour intensive techniques as opposed to more capital-intensive techniques as a means of absorbing a labour surplus.<sup>389</sup> The general argument in favour of the use of more labour-intensive methods is that the factors of production should be combined according to the relative quantities available. The level of capital formation being low in many of the developing countries, whereas labour, especially of the unskilled type, is abundant, suggests that these economies should adopt those methods of production which have a low capital and a high labour intensity.<sup>390</sup> A similar reasoning holds also, it may be noted, where land is

concerned; a scarcity of land, it is argued, calls for land-saving improvements, such as better seeds, the use of fertilizers etc. rather than for mechanization and the extensive use of land.<sup>391</sup> In general, those proposing the use of more labour-intensive methods of production thus reason that technical efficiency should not be confused with economic efficiency in a broader sense.

152. In practice, however, the room for using more labour-intensive methods of production is circumscribed by the existing technical possibilities of combining labour and the other factors of production in different manners. The lack of such possibilities is often cited as one of the major obstacles to the introduction of more labour-intensive methods of production, the more so since existing techniques having been developed primarily in the economically more advanced countries, where more often than not labour and not capital is the scarce factor, are therefore not adapted to the factor proportions typical for the less developed countries.<sup>392</sup> A more fundamental question concerning the choice of techniques is that there can be a conflict between increasing employment and income. Labour-intensive techniques, it is affirmed, involving higher labour costs, imply a lower return per unit of capital and by creating more employment result in a rise of the levels of consumption, since wages are spent nearly exclusively for consumption. More capital-intensive techniques, in contrast, may give higher returns on capital and, by yielding a higher surplus over the wage bill which can be invested, will accelerate subsequent economic growth. In sum, labour-intensive methods of production, though having the immediate effect of raising employment, may not do so in the long run, since the rate of economic growth and ultimately the expansion of employment depend to a large extent on the proportion of income invested, and the latter will be higher, as noted, the more capital-intensive the methods of production.<sup>393</sup> Various other considerations have been advanced in favour of the use of more capital-intensive methods of production, including their role in breaking with tradi-

<sup>386</sup> Bauer and Yamey, *The Economics of Under-Developed Countries* (1957), pp. 76-79; Raj, *Employment Aspects of Planning* ... (1957), p. 10; Dandekar, "Economic theory and agrarian reform" (1962); Mathur, "The anatomy of disguised unemployment" (1964); Kao, Ansel and Eicher, "Disguised unemployment in agriculture ..." (1964); Bruton, *Principles of Development Economics* (1965), pp. 100-101.

<sup>387</sup> Lewis, "Economic development with unlimited supplies of labour" (1954). See also Mathur, "The anatomy of disguised unemployment" (1964); Kao, Ansel and Eicher, "Disguised unemployment in agriculture ..." (1964).

<sup>388</sup> Leibenstein, "The theory of underemployment in backward economies" (1957); and his *Economic Backwardness* ... (1957), pp. 58-76; Majumdar, "The marginal productivity theory of wages ..." (1959); Wonacott, "Disguised and overt unemployment in underdeveloped countries" (1962); Dandekar, "Economic theory and agrarian reform" (1962).

<sup>389</sup> The more general question of the possible effects of demographic factors on the use of more labour-intensive or more capital-intensive technology is discussed in section D of this chapter.

<sup>390</sup> Kahn, "Investment criteria in development programs" (1951); Chenery, "The application of investment criteria" (1953); Bauer and Yamey, *The Economics of Under-Developed Countries* (1957), pp. 117-118; Bhatt, "Employment and capital intensity" (1954); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 64-65; Lewis, *The Theory of Economic Growth* (1963), p. 207; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), pp. 150 ff.

<sup>391</sup> United Nations, *Measures for the Economic Development* ... (1951), p. 7; Robinson, "Population and development" (1960).

<sup>392</sup> Bhatt, "Employment and capital intensity" (1954); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 64-65; Eckaus, "The factor-proportions problem in underdeveloped areas" (1955); Biswas and Mueller, "Population growth and economic development in India" (1955); Galenson and Leibenstein, "Investment criteria, productivity and economic development" (1955); Leibenstein, *Economic Backwardness* ... (1957), p. 259; Bauer and Yamey, *The Economics of Under-Developed Countries* (1957), pp. 123-125; Myint, *The Economics of the Developing Countries* (1965), pp. 137-138; Kao, Ansel and Eicher, "Disguised unemployment in agriculture ..." (1964); Kindleberger, *Economic Development* (1965), p. 263; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962).

<sup>393</sup> Eckaus, "The factor-proportions problem in underdeveloped areas" (1955); Galenson and Leibenstein, "Investment criteria, productivity and economic development" (1955); Higgins, *Economic Development* ... (1959), pp. 330-333; Myint, *The Economics of the Developing Countries* (1965), pp. 136-142; Kindleberger, *Economic Development* (1965), p. 259. On the problems of controlling consumer demand when previously unemployed persons are put to work, see: Lewis, *The Theory of Economic Growth* (1963), pp. 221-222; Duesenberry, "Some aspects of the theory of economic development" (1950); Ardant, *Le monde en friche* (1959), pp. 111-113; International Labour Office, *Employment Problems and Policies* (1960), pp. 24-25.



tional patterns and opening new horizons.<sup>394</sup> Arguments against the use of more labour-intensive techniques have mentioned that while labour may be cheap, it is also inefficient.<sup>395</sup> Nevertheless, it has been pointed out that the choice between labour-intensive or capital-intensive techniques is not absolute, but reflects, rather, the alternative between present higher consumption and employment and a future more rapid economic development and thus constitutes essentially a policy choice.<sup>396</sup>

153. On the whole, it may be said that whereas a population and labour force increasing at a high rate will require substantially larger capital outlays and other resources for creating additional employment opportunities, such a population has no intrinsic advantages for achieving higher investment. On the contrary, rapid population growth and the characteristics associated with it, particularly its age distribution, may tend to have rather the opposite effect. If, in addition, wages are at the subsistence level or, for any other reason, inelastic, and if the possibilities for the use of more labour-intensive techniques are limited, population growth is likely to be associated with deteriorating employment conditions.

(d) *Population growth and chronic unemployment in the more developed countries*

154. Unlike the situation in the less developed countries, high levels of population growth and a scarcity of co-operant factors of production are not typical of the economically more advanced countries and thus not a factor in employment problems. On the contrary, according to the stagnation thesis, the risk of chronic unemployment in these countries may increase as a result of a slow or declining population growth. This theory starts from the assumption that for an economy to operate at a high level of income and employment, savings and investment must be in equilibrium or, in other words, the rate of investment must not be too low, nor that of savings too high. If in the light of prospective earnings, *entrepreneurs* are not prepared to invest an amount equal to that which individuals desire to save, the levels of income and employment would contract through the process described earlier in this chapter.<sup>397</sup> According to Keynes, and especially those of his followers who formulated the stagnation thesis, a declining population, through a deficiency of effective demand, tends to exert a depressive effect on investment and a possible upward pressure on the propensity to save. A declining population or a lowering of its rate of growth, it was asserted, would discourage investment, since the expectations of future earnings on the part of the *entrepreneurs*, as determined by the marginal efficiency of capital, would become more pessimistic. In addition, savings might increase as a result

of the decline in the average size of the family, or at least not adapt themselves to the lower levels of investment.<sup>398</sup> As a result of the growing discrepancy between savings and investment, the process of contraction would set in, leading to a stagnation of income and the emergence of chronic unemployment.<sup>399</sup>

155. A number of arguments questioning the supposed effects of a declining population on chronic unemployment have been advanced. Most of these concern the underlying hypothesis of declining investment opportunities and increased savings and are discussed earlier in this chapter.<sup>400</sup> The importance of factors other than demographic ones in determining employment is generally acknowledged.<sup>401</sup> Even if a slow population growth might, through the mechanism described, in principle have the effect envisaged by the stagnationist writers, any such effect could be easily counteracted by the various means at the disposal of policy-makers, thus assuring full employment under conditions of economic growth.<sup>402</sup>

#### 4. INTERNATIONAL MIGRATION AND EMPLOYMENT

156. The interrelations between international migration and employment are close, but complex. On the part of the individuals who choose to migrate, that is, excluding refugees, displaced persons and others in similar categories, the predominant motivation is the expectation of better opportunities for themselves or their descendants in which employment considerations play an important role.<sup>403</sup> The actual effects of international migration on the levels of employment in both countries of destination and origin depend on a large number of factors. The fundamental question is how the demand for labour responds to the changes in supply resulting from immigration or emigration. In addition, however, immigrants and emigrants are consumers as well as producers and, potentially, immigration tends to increase the demand for consumer goods, housing and so forth

<sup>398</sup> For a more detailed discussion of the effects of declining population growth on savings and investment, see sections A and B above.

<sup>399</sup> Keynes, "Some economic consequences of a declining population" (1937); Hansen, "Economic progress and declining ..." (1939); Hansen, *Fiscal Policy and Business Cycles* (1941), pp. 42 ff.; Hansen, *Economic Policy and Full Employment* (1947); Sweezy, "Declining investment opportunity" (1950); Higgins, "The doctrine of economic maturity" (1946); and his "The theory of increasing under-employment" (1950). For a general discussion of these views see also Spengler, "Demographic patterns" (1954); Stassart, *Les avantages et les inconvénients économiques ...* (1965), pp. 181-186. Fromont, *Démographie économique ...* (1947), p. 138, argued that whereas the decrease in fertility would not cause unemployment because of a deficient demand, it might do so because of the change in the nature of demand, particularly through the demand for essential goods, the volume of which depends primarily on the number of people.

<sup>400</sup> See sections A and B.

<sup>401</sup> Hansen himself acknowledged, as noted before, the rapid economic progress in recent periods. See his *The American Economy* (1957), p. 1.

<sup>402</sup> Robinson, "Economic consequences of a decline in the population ..." (1951); Stassart, *Les avantages et les inconvénients économiques ...* (1965), p. 199; International Labour Office, *Employment and Economic Growth* (1964).

<sup>403</sup> See chapter VII.

<sup>394</sup> Galenson and Leibenstein, "Investment criteria, productivity and economic development" (1955); Gerschenkron, *Economic Backwardness in Historical Perspective* (1962); Hirschman, "Investment policies and 'dualism' in underdeveloped countries" (1957).

<sup>395</sup> Kindleberger, *Economic Development* (1965), pp. 254-255.

<sup>396</sup> Sen, *Choice of Techniques ...* (1960), especially chaps. 2 and 5; Myint, *The Economics of the Developing Countries* (1965), p. 142. See also chapter XVI, section B.

<sup>397</sup> See the introduction of this chapter.



## 5. INTERNAL MIGRATION AND EMPLOYMENT

and, hence, the volume of investment and the demand for labour, while emigration has the opposite result. Unless the international migrants have sufficient financial resources of their own, this potential demand will become effective only if they are gainfully employed. The implications of international migration for employment may roughly be considered under two headings: first, the effects on the demand for labour of the over-all changes in supply brought about by the migration and, second, those due to the specific demographic and, especially, economic characteristics of the international migrants.

157. The consequences of international migration for employment are complicated not only by the particular characteristics of the migrants as regards their sex-age structure, but also by their distribution according to occupation, industry and other economic characteristics. Immigrants of working ages seeking employment offer services which are either competitive with or complementary to those of the non-migrant labour force.<sup>404</sup> Usually since international movements imply a change of employment, they may be expected to be associated with some frictional unemployment. It has also been argued that seasonal unemployment may be reduced by means of short-term migratory movements.<sup>405</sup> More important are the consequences of international migration for cyclical unemployment.<sup>406</sup>

158. As far as structural unemployment is concerned, immigration which consists in a large part of young adults may make the labour force in the country of immigration more flexible and enable it to adapt more easily to structural changes in the economy. This may be especially true in the case of countries characterized by a slow population growth.<sup>407</sup> The most immediate effect of international migration on employment, however, is the impact of immigration in countries where there exists a shortage of labour with respect to the other means of production and that of emigration from countries with a chronic excess of labour supply in relation to land or capital resources. Historically, the major migratory movements have originated in countries where in relative terms overpopulation existed and have been to countries with a scarcity of labour, thus relieving the employment problems in the countries of origin and responding to an effective demand for labour in the countries of destination. While emigration from the less developed countries might, under present conditions, have the same effect and reduce the pressure on employment, the practical feasibility of emigration from these countries on a scale sufficient to offset population growth and the deterioration in employment conditions, taking into account the volume of movement which would be required and the absorptive capacity of the countries of immigration, has been discarded by most writers.<sup>408</sup>

159. As in the case of international migration, economic motivations and employment opportunities furnish the major incentives to internal migration. The close association between internal migration and employment aspects are discussed in an earlier chapter in so far as the latter is a factor in inducing or discouraging the spatial mobility of the population within the frontiers of a nation.<sup>409</sup> Although, in the present context, the main emphasis is on the effect of migratory movements on levels of employment, this aspect cannot be considered independently of the factors which determine the migrations. Unequal economic and population growth in various parts of a country are the rule rather than the exception, and migration is the major factor in bringing about an adjustment between different regions. A certain minimum degree of mobility, therefore, is necessary for the maintenance of high levels of employment in a dynamic society.<sup>410</sup> Under ideal conditions, where the over-all demand for and the supply of labour are in equilibrium, internal migrations, in so far as they respond to employment opportunities, re-establish the geographical balance of supply and demand in different regions or areas of a country. If the mobility of labour under these conditions is less than perfect and the flow of internal migration either too small or too large, unemployment or underemployment would appear in certain areas while labour shortages would exist elsewhere.<sup>411</sup> Among the many factors determining changes in the geographic patterns of economic activities and employment, the major one is the process of industrialization. Among the most important forms of internal migration are the rural-to-urban movements which occur in response to the expansion of employment opportunities in urban areas consequent upon the geographical concentration of economic activities associated with the industrialization process. Nevertheless, there is no compelling reason for rural-urban migration to adapt itself to the existing and emerging employment opportunities, especially when there is a shortage of the over-all demand for labour in relation to its supply.

160. One of the characteristics of internal migration which has a direct repercussion on its employment implications is its age selectivity; the influence in this respect has been noted especially with respect to the high migration rate of young workers. Rural-urban migration, in particular, results, on the one hand, in a high proportion of young workers in urban populations while, on the other hand, the high degree of age selectivity implies a considerable movement of young workers

<sup>409</sup> See chapter VI.

<sup>410</sup> Beveridge, *Full Employment in a Free Society* (1945), p. 125; Goodrich *et al.*, *Migration and Economic Opportunity* (1936); Bogue, "Internal migration" (1959); Kuznets and Thomas, "Internal migration and economic growth" (1958).

<sup>411</sup> Migration may reduce unemployment not only by improving the distribution of labour but also by increasing the total demand for labour through the need for investment in housing, public services and transportation in the area of in-migration. Although migration also reduces investment needs in areas of out-migration, the effect is likely to be positive since investment cannot fall below zero. Baker, "Significance of population trends..." (1937); Henry, "Structure de la population..." (1949).

<sup>404</sup> For a discussion of this aspect, see chapter VII, section D.

<sup>405</sup> Spengler, "The economic effects of migration..." (1958).

<sup>406</sup> See chapter VII, section D.

<sup>407</sup> Isaac, *Economics of Migration* (1947), pp. 223-224; Spengler, "The economic effects of migration..." (1958).

<sup>408</sup> International Labour Office, *International Migration, 1945-1957* (1959), pp. 231, 263; Spengler, "The economic effects of migration..." (1958).

out of agriculture.<sup>412</sup> While urban employment opportunities thus have to expand proportionately more rapidly than the total volume of migrants to the cities, the predominance of young workers, with their greater flexibility and adaptability, makes it comparatively easier to absorb the larger supply of labour.

161. In both developed and developing countries, lower incomes and more limited employment opportunities in agriculture are important causes of migration, but in the former, the expansion of the demand for labour in the non-agricultural sector is the major explanation for the rural-urban migration. These migrations have been important in many countries as a means of preventing structural unemployment, reducing the labour surpluses in agriculture and satisfying the expanding demand for labour in the secondary and tertiary sectors of the economy. Even so, a number of writers have pointed out that in many instances in the economically more advanced countries the amount of internal migration in absolute terms was not large enough to bring about the needed adjustment between labour supply and demand.<sup>413</sup>

162. In the economically less advanced countries, where economic development requires profound changes in the structure of the economy, internal and especially rural-urban migrations are essential to increase the supply of the non-agricultural labour force required by the industrialization process. Nevertheless, in most developing countries, the employment problems created by rural-to-urban movements reflect not so much structural factors as a chronic deficiency of the demand for labour. Low levels of incomes and productive employment in agriculture, associated with high density or high rates of population growth, are among the main determinants of the out-migration from rural areas. To the extent that these movements to the cities respond more to "push" factors existing in agriculture than to "pull" factors operating in the non-agricultural sectors, rural-urban migration in many developing countries constitutes a transfer of underemployment in agriculture to open unemployment or underemployment in the cities.<sup>414</sup> Over-urbanization in the sense that people move to cities even though economic opportunities there are quite limited is considered to be characteristic of many of these countries.<sup>415</sup>

<sup>412</sup> Duncan, "The theory and consequences of mobility of farm population" (1940, 1956 ed.); Hathaway, "Migration from agriculture . . ." (1960); Myrdal, *Economic Theory and the Underdeveloped Regions* (1957), pp. 27 ff. See also chapter VI, section B.

<sup>413</sup> Hill and Lubin, *The British Attack on Unemployment* (1934); Taylor and Taeuber, "Constructive rural-farm population changes" (1938); Jaffe and Wolfbein, "Internal migration and full employment . . ." (1945); Hoover, *The Location of Economic Activity* (1948, 1963 ed.), pp. 9, 69, 107 ff.; Kuznets and Thomas, "Internal migration and economic growth" (1958).

<sup>414</sup> International Labour Office, *Why Labour Leaves the Land . . .* (1960), pp. 7, 246; Bogue, "Internal migration, with special reference . . ." (1966).

<sup>415</sup> United Nations, *Report on the World Social Situation . . .* (1957), pp. 124, 129; Hoselitz, "Urbanization and economic growth in Asia" (1957); Kuznets and Thomas, "Internal migration and economic growth" (1958); Ardant, *Le monde en friche* (1959), pp. 54, 62.

## 6. DEMOGRAPHIC AND NON-DEMOGRAPHIC DETERMINANTS OF EMPLOYMENT

163. The role of demographic as compared with other factors in setting levels of employment cannot be stated in simple terms. The degree of employment of the existing labour force is ultimately the result of the influences of the numerous factors underlying labour supply and demand. A separate evaluation of the different factors involved in determining the supply of and the demand for labour as well as their interactions, provides a basis for some tentative conclusions.

164. Within the given socio-economic framework of a nation, demographic factors are among the main determinants of the volume, structure and growth of the labour supply and thus of that level of the demand for labour which would be required to ensure full employment. Nevertheless, although population and labour force size are interdependent, the relation between the two is not invariable. This means, in the first place, that population and the potential supply of labour do not necessarily expand or contract at the same rate. Through the interdependence between the components of demographic change and the population structure, changes in population size and growth induced by the former may affect the population structure, especially the age composition, and the resulting supply of labour. In the second place, the lack of an invariable relation between population and labour force supply reflects the influence of other than demographic factors which manifest themselves through the patterns of sex-age specific participation rates and their changes.

165. As far as the demand side is concerned, in those cases where the full utilization of human resources is a basic goal of economic policy, as it is held to be in the socialist countries, demographic factors through their influence on the supply of labour are an important factor in determining levels of employment. If, however, the level of utilization of labour force is left to the mechanism of the market, employment will depend primarily on the relative abundance or scarcity of the other factors of production. A relative scarcity of natural resources or of capital with respect to labour will, under given techniques, be associated with underemployment or open unemployment. Whereas various courses of action have been proposed to remedy the disproportion between labour and other factors of production under these circumstances, including the use of the surplus agricultural labour in the construction of capital and of more labour-intensive methods of production, the feasibility or adequacy of such measures has been widely questioned.

166. Although population size, growth and characteristics are also thought to affect frictional, cyclical and structural unemployment, and a scarcity of labour compared with other factors of production is considered to induce unemployment through a lack of effective demand, the discussion on the effects of demographic factors on employment has centred mainly on the problem of the high levels of underemployment and unemployment caused by the basic disproportion between the supply of labour and that of other factors of production in the developing countries and the deteriorating effect of con-

tinued high population growth on employment conditions. The solution to these problems through reducing the pressure of population, both in a static and dynamic sense, and through increasing the capacity of the economy to absorb the supply of labour cannot, however, be considered only from the restricted perspective of employment. Involved in it is the whole problem of economic progress and development of the economically less advanced countries.

#### D. Demographic aspects of productivity

167. The preceding sections of this chapter have considered the role of demographic factors in determining the required and actual levels of capital formation and the degree of utilization of the labour force, assuming in most cases that productivity and, in more general terms, the performance of the economy as a whole are as given. The purpose of this section is to discuss the influence, direct or indirect, of demographic factors on productivity and the level of development and progress of the economy, taking into account the other determinants of economic change discussed in earlier sections.

168. The concept of productivity may have different meanings. In its broadest sense, it is an index of the efficiency of the economy as a whole or of any of its segments and thus reflects all factors affecting the working of the economy and its parts. Definitions of productivity usually focus, however, on the relation between what the economy produces and what is needed to obtain this production in terms of the factors entering into the production process. Productivity in general is defined as the ratio between output or production, on the one hand, and the input or resources used in achieving this production, on the other.<sup>416</sup> In addition, to this over-all measure, ratios of output to particular inputs, sometimes referred to as partial productivity, can be calculated. In principle, these ratios could be obtained for each of the inputs, but the one which is most widely used, and which has come to be considered as a general measure of the efficiency of the economy, is labour productivity.<sup>417</sup> The use of the output-labour ratio, in its various forms, as a measure of such productivity, while widespread, has also been criticized for a number of reasons. The labour productivity ratio, it is asserted, suggests implicitly that production can be wholly attributed to labour, while in fact the ratio reflects everything that affects the level of

output and the volume of employment. Moreover, since the composition of inputs and outputs can vary, changes in the output-labour ratio could occur—if, for instance, labour is substituted for capital or vice versa, or if the production of goods with differing factor combinations would expand at different rates—in the absence of improvements in efficiency.<sup>418</sup>

169. However, a number of factors plead in favour of the use of the labour-productivity concept as a measure of productivity. Even some of those writers who argue that productive power, as the result of the combined use of all factors that co-operate in production, should be related to the combined input of them, concede the great difficulties inherent in determining and measuring all these factors.<sup>419</sup> In addition, if any factor is to be singled out, labour appears to be most appropriate, considering the relative ease with which it can be measured, the central position of labour in the production process and its nearly universal use in the production of goods and services.<sup>420</sup> Provided, it is argued, that labour productivity is not interpreted as reflecting the intrinsic efficiency of labour, but rather the effectiveness with which labour is used in conjunction with other factors, it is an adequate, if not completely satisfactory, measure of productivity. Labour productivity is thought to be significant for another reason. A number of writers have argued that productivity in general, as an index of the efficiency with which resources are converted into goods and services, can be considered as a measure of economic progress.<sup>421</sup> In the case of labour productivity, these two aspects are intimately related, since man is both means and end in production, and output per worker and *per capita* income, as an indicator of levels of living, are very closely associated.<sup>422</sup>

<sup>418</sup> Zobel, "On the measurement of ..." (1950); Steiner, "The productivity ratio ..." (1950); Davis, "The meaning and measurement of productivity" (1951); Mehta, *Measurement of Industrial Productivity* (1955), pp. 13, 15; Siegel, "Considérations sur la mesure de la productivité ..." (1955); Kendrick, *Productivity Trends in the United States* (1961), p. 7; Stigler, "Economic problems in measuring ..." (1961); Fabricant, *Basic Facts on Productivity Change* (1959).

<sup>419</sup> Davis, "The meaning and measurement of productivity" (1951); Siegel, "Considérations sur la mesure de la productivité ..." (1955); Rostas, "Les différents concepts de la productivité" (1955); Mehta, *Measurement of Industrial Productivity* (1955), pp. 17-19; Fabricant, *Basic Facts on Productivity Change* (1959), p. 6.

<sup>420</sup> Rostas, "Les différents concepts de la productivité" (1955); Mehta, *Measurement of Industrial Productivity* (1955), p. 12; Fabricant, *Basic Facts on Productivity Change* (1959), p. 6; Kendrick, *Productivity Trends in the United States* (1961), p. 7; Stigler, "Economic problems in measuring ..." (1961); International Labour Office, *Measuring Labour Productivity* (1969), pp. 12-13. Holding that the value of a commodity is the social labour embodied in it, Marxist writers consider only labour productivity, defined as the amount of product created in a given unit of labour-time, as pertinent. See, for instance, Academy of Sciences of the USSR, Institute of Economics, *Political Economy* (1957), pp. 71-76.

<sup>421</sup> Clark, *The Conditions of Economic Progress* (1957); Bell, *Productivity, Wages and National Income* (1940); Davis, *The Industrial Study of Economic Progress* (1947); Steiner, "The productivity ratio ..." (1950).

<sup>422</sup> Rostas, "Les différents concepts de la productivité" (1955). Boulding, "Difficulties in the concept of an economic unit" (1963), noted that if a constant ratio between labour input and population existed, labour productivity and *per capita* income would vary in exactly the same proportion.

<sup>416</sup> Young, "The productivity of labour in manufacturing" (1947); International Labour Office, *Methods of Labour Productivity Statistics* ... (1951), p. 6; Davis, "The meaning and measurement of productivity" (1951); Siegel, *Concepts and Measurements of Production and Productivity* (1952); and his "Considérations sur la mesure de la productivité ..." (1955); Kendrick, *Productivity Trends in the United States* (1961), p. 6; Fabricant, *Basic Facts on Productivity Change* (1959), p. 6; International Labour Office, *Measuring Labour Productivity* (1969), p. 11.

<sup>417</sup> Young, "The productivity of labor in manufacturing" (1947); Steiner "The productivity ratio ..." (1950); Mehta, *Measurement of Industrial Productivity* (1955); Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* ... (1949), pp. 16-21; Fabricant, *Basic Facts on Productivity Change* (1959), p. 6; Kendrick, *Productivity Trends in the United States* (1961), p. 6; International Labour Office, *Measuring Labour Productivity* (1969), p. 12.

170. The actual measurement of labour productivity is not without its problems. The labour productivity ratio can be determined in a number of ways, but the basic distinction is that between physical and value measurements. In the former, output is expressed in terms of homogeneous physical units of product, such as weight, volume etc. Such measures can evidently be obtained only for one product or group of similar products, and productivity in the sense of the performance of the economy as a whole, which is the most relevant in the present context, has to be based on the value of the output. In this case output can be evaluated either by using price series or by multiplying physical quantities by a series of value weights, both of which have certain drawbacks. Likewise, in the determination of the labour input a number of problems arise—such as that of the heterogeneity of labour—to which as yet no completely satisfactory answer has been found.<sup>423</sup>

171. Labour productivity, as a general measure of productivity, even though reflecting economic efficiency and progress, does not explain or specify the factors and components of productivity change. Since, as noted before, the latter is influenced by any factor apart from labour which affects output and employment, its underlying determinants are numerous and elude a simple classification.<sup>424</sup> As far as the more immediate determinants are concerned, and excluding the effects of changes in the composition of input or output, productive efficiency is thought to be affected especially by technological innovation, changes in the scale of output, changes in the rate of utilization of capacity and changes in the input of “intangible capital” designed to increase the quality of the input of tangible factors.<sup>425</sup> Among these factors, the role of technological progress has received special attention. Few economists doubt that technological progress in the sense of the application of empirical science and knowledge to the production of goods and services, assuming thus also the necessary attitudes and incentives, has been and continues to be the central factor in economic growth and progress.

172. Demographic factors may influence productivity in a number of ways, although, partly due to the complex nature of the productivity concept itself, these effects appear to be more elusive and less known than in the case of capital formation or employment. Nevertheless, the increased interest in recent years in economic progress and productivity, in the context of the progressive emphasis on economic development and growth and the importance of their non-tangible determinants, has also contributed to a further exploration of the implications

of demographic factors for productivity. Among the aspects which have been considered in this relation are the effects of population size, trends and characteristics on factor-proportions and the methods of production, on the composition and structure of the economy and its output, on specialization and economies of scale, as well as on the adaptability to changes of the economy, and on innovations and technological progress.

# 1. POPULATION SIZE AND PRODUCTIVITY

173. The importance of the size of the population for productivity has been discussed by many authors, but no unanimity exists as to its actual significance. In part, this is due to the fact that while the size of the population itself has certain implications for productivity, other factors—such as the geographical size of the country or its income—thought to be closely, but not necessarily, associated with the size of the population, tend also to be interrelated with the productivity of the economy. The complexity of the problem derives to a great extent from these interrelations between the size of the population and other indices of the size of the country, but also reflects the various ways in which population size may affect productivity. Population size may be said to influence productivity mainly through the diversification and specialization of the economy, the size of the market, the importance of foreign trade and, in relative terms, the ratio of the population to natural resources. Since neither the effects of the one, nor of the other of these factors have as yet been completely identified and ascertained, their combined influence on productivity still remains to be determined.

## (a) Population size and economies of scale

174. There is no unanimity as to the nature and importance of economies of scale. In general, they are related to the question of the relative advantages or disadvantages which can result from the scale of production and operation of the economy as a whole or of any of its segments. More specifically, economies of scale are concerned with the effects of an increase in output consequent on the increase of inputs or, alternatively stated, economies of scale exist when a proportionate increase in inputs generates a greater than proportionate increase in output. In the discussion of the effects of the scale of production, a distinction is frequently made between internal and external economies. Internal economies may be described as those secured within the firm or plant, whereas external economies are defined as those which benefit the firm through the general development of the industry or the economy.<sup>426</sup> Nevertheless, the difference between the two is not always clear. What are internal economies in one firm may be external in another, and vice versa.<sup>427</sup>

<sup>423</sup> International Labour Office, *Methods of Labour Productivity Statistics* ... (1951), pp. 6-15, 30-42; ———, *Measuring Labour Productivity* (1969), pp. 15-36; Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* ... (1949), pp. 16-21; and his *La productivité* (1957).

<sup>424</sup> For a list of factors determining productivity, see International Labour Office, *Methods of Labour Productivity Statistics* ... (1951), p. 18; ———, *Measuring Labour Productivity* (1969), pp. 13-14. Some 37 factors classified as general, organization and technical factors and human factors are given. For another list, see also Zobel, “On the measurement of ...” (1950).

<sup>425</sup> See, for instance, Kendrick, *Productivity Trends in the United States* (1961), p. 11; Denison, *Why Growth Rates Differ* ... (1967), pp. 9-10.

<sup>426</sup> Marshall, *Principles of Economics* (1890, 1961 ed.), pp. 266, 314; Stigler, *Production and Distribution Theories* (1941), p. 69; Marcy, “How far can foreign trade and customs agreements ...?” (1960); Leibenstein, *Economic Backwardness* ... (1957), p. 106; Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 67 ff.

<sup>427</sup> Marshall, *Principles of Economics* (1890, 1961 ed.), p. 318; Knight, *The Ethics of Competition* (1935).

175. The basic argument concerning internal economies is that firms have to be above a certain size in order to be efficient. These economies have been attributed to the indivisibility of certain productive resources and processes, the fuller use of factors of production in larger firms, the specialization and division of labour which is contingent on a certain level of output, the possibilities of research and development and so forth. More specifically, the factors involved are the use of large and specialized machinery; the economy of raw materials and by-products; the specialization of labour and management; economy in purchase, sale, freight costs, and finances. Among these the optimum use of every machine; the better division of labour and the economy of skills and research and development of new products and production processes are probably the most important.<sup>428</sup> The argument in favour of large size is that all technical advantages available to the small firms are available to larger firms and, in addition, there are some which cannot be attained by small firms.

176. The concept of external economies is much more complicated and more elusive than that of internal economies. In a broad sense, external economies have been defined as those economies which take place when, as an industry expands, costs for all firms within the industry are reduced independent of their own individual outputs.<sup>429</sup> No simple classification of external economies, as the concept has evolved, seems possible, but among the most important effects of scale are those emanating from the indivisibilities in the supply of overhead capital and from the interdependence between production units and firms. As far as the former are concerned, a number of writers have stressed the capital lumpiness of public utilities such as roads, railways, harbours, electric power installations and so forth.<sup>430</sup> An increase in scale will make it economically feasible to create such facilities, the existence of which evidently benefits firms and industries in a number of ways, or leads to their fuller utilization, with a consequent reduction in the costs of these services rendered to industry. Several authors have even

argued that large countries have similar advantages with respect to public administration, defence and so forth.<sup>431</sup> The other type of external economies reflects the interdependence or complementarities between individual plants and firms, as well as those existing in the economy as a whole.<sup>432</sup> The complementarities between individual firms, for example, could take the form of services provided free, without compensation, by one producer to another or of a reduction in the cost of the average firm. A distinction is sometimes made in this connexion between horizontal external economies which reflect the interdependence of production functions at the same stage of development (such as, for instance, the economies which the development of one consumer good through increased purchasing power and consumer spending transmits to another) and vertical external economies which accrue to a firm or industry because of the expansion of other industries higher up or lower down in the production structure.<sup>433</sup> Another distinction is that between technical external economies among industries technically dependent upon each other (of which an example is the benefits of labour markets for special skills created by other firms), and pecuniary external economies which are transmitted through the price systems (such as, for instance, when lower prices in one industry are passed on to industries which use products of the first as inputs).<sup>434</sup>

177. The external economies depending on the interdependence of all firms and industries have acquired special significance because of the implications they are supposed to have for the development of the economically less advanced countries. The view that there is a need for different segments of the economy to remain in step was first proposed by Rosenstein-Rodan. He argued that economic development required an increase of the market size not only to obtain the external economies of large-scale production, but also and, especially, those which arise from simultaneously developing a large number of industries. He argued that the complementarity of different industries provides the most important of arguments in favour of a large-scale planned industrialization.<sup>435</sup> This complementarity, manifesting itself through de-

<sup>428</sup> Marshall, *Principles of Economics* (1890, 1961 ed.), pp. 278-285; Stigler, *Production and Distribution Theories* (1941), pp. 77-83; Lewis, *The Theory of Economic Growth* (1963), pp. 76-78; Mehta, *Measurement of Industrial Productivity* (1955), p. 40; Belshaw, *Population Growth and Levels of Consumption* (1956), pp. 67-68; Leibenstein, *Economic Backwardness . . .* (1957), p. 106; Vakil and Brahmananda, "The problems of developing countries" (1960); Marcy, "How far can foreign trade and customs agreements . . ." (1960).

<sup>429</sup> Marshall, *Principles of Economics* (1890, 1961 ed.), pp. 284, 317, 615, 808, introduced the concept of external economies. He held that these were continually growing in importance relative to internal economies. He distinguished economies in the use of skills and machinery due to volume of production in general through increased knowledge and technical progress and its concentration in certain localities; economies of division of labour due to geographical concentration and the economies due to the development of mutually dependent branches.

<sup>430</sup> Lewis, *The Theory of Economic Growth* (1963), pp. 72-73, 264-265, 324; Belshaw, *Population Growth and Levels of Consumption . . .* (1956), pp. 68-69; Robinson, "Population and development" (1960); Stigler, "Economic problems in measuring . . ." (1961); Rosenstein-Rodan, "Notes on the theory . . ." (1961). Myint, *The Economics of the Developing Countries* (1965), pp. 115-117, also argued, however, that large social overhead capital can be timed and phased, giving considerable flexibility.

<sup>431</sup> Lecarpentier, "Variations des dépenses publiques . . ." (1947); Sauvy, *Théorie générale de la population*, vol. 1 . . . (1956), pp. 274-276; Lewis, *The Theory of Economic Growth* (1963), pp. 72-73; Belshaw, *Population Growth and Levels of Consumption . . .* (1956), pp. 79-80; Robinson, "Introduction" (1960); Vakil and Brahmananda, "The problems of developing countries" (1960). Leduc and Weiler, "The size of the economy . . ." (1960), argued, however, that in a small country general government action might be easier and more effective than in large countries.

<sup>432</sup> Stigler, *Production and Distribution Theories* (1941), pp. 73-76; Scitovsky, "Two concepts of external economies" (1954); Belshaw, *Population Growth and Levels of Consumption . . .* (1956), pp. 68-70; Rosenstein-Rodan, "Notes on the theory . . ." (1961).

<sup>433</sup> Stigler, "The division of labour is limited . . ." (1951); Fleming, "External economies and the doctrine of balanced growth" (1955); Bardhan, "External economies, economic development . . ." (1964).

<sup>434</sup> Scitovsky, "Two concepts of external economies" (1954); Rosenstein-Rodan, "Notes on the theory . . ." (1961); Myint, *The Economics of the Developing Countries* (1965), pp. 118-119.

<sup>435</sup> Rosenstein-Rodan, "Problems of industrialization . . ." (1943); and his "Notes on the theory . . ." (1961). He cited the example of a new shoe factory which would employ a certain number of additional workers. These workers, he noted, will evidently not

(Continued on next page)

mand,<sup>436</sup> will reduce the risk of not finding markets, increase the incentives to invest and thus make it possible to overcome the indivisibilities in the production functions. This approach, implying a shift of emphasis from the effects economies of scale have in reducing cost to those of stimulating investment, has led to the notion and advocacy of the "big push" and "balanced growth". If there were no indivisibilities, balanced growth could be achieved with any level of investment, but since indivisibilities are considerable, balanced growth requires large investments or a "big push".<sup>437</sup> The theory of balanced growth has been criticized in particular by Hirschman, who argued that it failed as a theory of development in so far as it implies that a whole new, self-contained, modern industrial economy would be superimposed on the stagnant, subsistence economy. Instead, he argued that the process of economic development should be seen as a series of disequilibria which create a pattern of inducements and pressures making for further growth.<sup>438</sup>

178. The existence and importance of economies of scale have been questioned by a number of writers. Arguments in this connexion concern mainly the size of the firm. The available evidence, it is asserted, suggests that the average size of the plant in different countries tends to be very much alike and that no long-term trend towards an increase—or decrease—of this average appears to exist, it being implied that if such economies existed the size would be larger or increasing.<sup>439</sup> Another argument is that, apart from some exceptional industries, technical economies are exhausted by firms of rather moderate size and even that these may in fact have the best efficiency. Several reasons have been brought forward why this might be so: small firms have greater

(Footnote 435 continued)

spend all their wages on shoes, implying thus a shortage of demand for shoes if nothing else changed in the economy. However, if instead a large number of unemployed or underemployed were put to work in a whole range of industries, since the new producers are each other's customers, this would create sufficient demand for all goods. See also Nurkse, *Problems of Capital Formation* . . . (1953), pp. 14-15; and his "Some international aspects of the problem . . ." (1952).

<sup>436</sup> The idea that there should be a balance in supply in the sense that the different sectors of the economy have to grow together without any one getting too far out of line has also been proposed by several other writers. Scitovsky, "Two concepts of external economies" (1954); Lewis, *The Theory of Economic Growth* (1963), pp. 274-283. For a critical discussion of balance in demand and in supply see Hirschman, *The Strategy of Economic Development* (1958), chaps. 3 and 4.

<sup>437</sup> Rosenstein-Rodan, "Problems of industrialization . . ." (1943); and his "Notes on the theory . . ." (1961); Leibenstein, *Economic Backwardness* . . . (1957), p. 107; Singer, "Balanced growth in economic development . . ." (1964); Myint, *The Economics of the Developing Countries* (1965), pp. 103, 110, 117-118; Hagen, *On the Theory of Social Change* . . . (1962), pp. 44-47.

<sup>438</sup> Hirschman, *The Strategy of Economic Development* (1958), chap. 4.

<sup>439</sup> Jewkes, "The size of the factory" (1952); and his "Are the economies of scale unlimited?" (1960). He noted that there was no clear evidence for a long-term trend towards an increase or decrease of the average size of the firm in different countries. However, the proportion of employees found in factories employing 2,000 or more increased in Great Britain from 18.4 per cent in 1950 to 20.6 per cent in 1955 and in the United States factories employing 2,500 or more employees increased their proportion from 17.7 per cent in 1947 to 20.0 per cent in 1952.

flexibility to adjust to changes in demand; diseconomies in large firms may arise from increased administration and management problems; some costs may be independent of the size of output; technological innovations may tend to benefit in particular the small firm.<sup>440</sup> Even many of those writers who think that, in general, economies of scale may be important agree that even relatively poor and small countries can usually have at least one firm of optimum scale in many industries.<sup>441</sup>

179. Those who contend that economies of scale exist point to the relation between the size of the firm, in terms of output, and its efficiency, as measured by output per worker. A number of investigations have suggested that such correlations exist especially when localized industries are excluded. The results of several of these studies indicate that the correlations between total output and output per worker is of the order of +0.5 to +0.7.<sup>442</sup> Another argument is that even if large-scale factories are not the rule, for certain products the minimum and optimum size of the plant or firm is very large. Industries usually included in this category are aircraft, automobile and truck, heavy railroad equipment, heavy machine tool and heavy electrical equipment manufacturing.<sup>443</sup> With regard to the economies external to the firm, a number of writers have asserted that even though the individual firm need not be large to be efficient, because of the extent to which industries depend upon each other as far as resources materials, components, services or intermediate outputs or by-products are concerned, the advantages of specialization cannot be fully secured in the absence of other industries or markets of a certain size. In a large economy, advantages of this type will become available to young or infant industries sooner than in a small economy.<sup>444</sup> Several additional advantages are thought to be associated with large-scale production. It has been argued that despite the relative ease with which the minimum size

<sup>440</sup> Jewkes, "Are the economies of scale unlimited?" (1960); Mehta, *Measurement of Industrial Productivity* (1955), pp. 45-46; Edwards, "Size of markets, scale of firms . . ." (1960). Some of these writers assert that smaller firms may even have certain advantages such as greater flexibility; lesser management problems etc. Blair, "Does large-scale enterprise result in lower cost? Technology and size" (1948), thought that for many kinds of enterprises, technological innovations had tended to shift towards a smaller size the point at which internal economies of scale cease and diminishing returns to scale set in. On this discussion, see also Stigler, "The division of labor is limited . . ." (1951); Belshaw, *Population Growth and Levels of Consumption* . . . (1956), p. 74.

<sup>441</sup> Rosenstein-Rodan, "Notes on the theory . . ." (1961); Leibenstein, *Economic Backwardness* . . . (1957), p. 106; Robinson, "Introduction" (1960).

<sup>442</sup> Rostas, *Comparative Productivity in British* . . . (1948); Frankel, *British and American Manufacturing Productivity* . . . (1957). See also Stigler, "Economic problems in measuring . . ." (1961). For a study comparing different countries, see Kuznets, "Quantitative aspects of the economic growth of nations, I . . ." (1956). Fabricant, "Study of the size and efficiency of the American economy" (1960), concludes tentatively that although the results obtained may exaggerate the correlation between size of industry and its efficiency, some correlation between the two is likely.

<sup>443</sup> Robinson, "Introduction" (1960); Jewkes, "Are the economies of scale unlimited?" (1960); Kuznets, "Economic growth of small nations" (1960).

<sup>444</sup> Lewis, *The Theory of Economic Growth* (1963), pp. 77, 324; Robinson, "Introduction" (1960); Fabricant, "Study of the size and efficiency of the American economy" (1960).



of the firm can be attained even in smaller countries, in such countries a decrease of competition and the creation of monopolies may develop more easily, and may have various drawbacks including the possibility of lessened efficiency.<sup>445</sup> Another advantage of a large-scale economy, it has been asserted, is that in such an economy the risks associated with the establishment of a new firm are much less, since even a slow rate of growth of the economy might justify such an addition.<sup>446</sup>

180. There exists considerable controversy as to the possible effects of population size on the economies of scale which can be attained. In the chain of reasoning according to which the larger the size of the firm the lower the cost per unit of product; the larger the market the larger the size of the firm; and the larger the size of the country the larger the market; the most difficult link to establish is that between the size of the market and the size of the country.<sup>447</sup> Clark thought that probably the majority of industries, working under increasing returns, are benefited by a larger population.<sup>448</sup> Various other writers concluded that there are economies of scale in a larger population, although qualifying their views.<sup>449</sup> Different views are based on the argument that the realization of economies of scale depends essentially on the size of the market as such, rather than on the size of population.<sup>450</sup>

181. One problem of interpreting findings as to the relation between economies of scale and the size of population is that of the lack of a clear dividing line between large and small nations. Kuznets considered as small nations those with a population of ten million or less.<sup>451</sup> Robinson suggested a dividing line of between 10 and 15 million inhabitants, but noted that differences in the degree of diversification appeared to occur on a continuous basis.<sup>452</sup> Jewkes estimated that a population of 20 million would be large enough to permit the realization of the

full economies of large-scale production.<sup>453</sup> Whelpton asserted that a population of 100 to 135 million would be sufficient to maximize output per head in the United States.<sup>454</sup> An analysis based on data for a large number of countries led Chenery to conclude that an increase in the population from 2 to 50 million causes manufacturing output *per capita* to nearly double and that in the sectors where economies of scale may exist the figure would triple. Although he inferred that beyond some point market size would have a lesser effect in countries with an income of some 300 dollars or more, economies of scale in these industries would be probably significant up to a population of 100 million or more.<sup>455</sup> Pearson concluded that while economies derived from economic integration of countries with 10 to 15 million inhabitants might be substantial, the economies of scale by integrating countries with populations of the order of 50 million might be questionable.<sup>456</sup>

182. The problem of the size of population and economies of scale in developing countries is more complicated. In many developing countries a diversified expansion of productive facilities is made difficult or impossible because of the high investment requirements and low savings capacity, as well as by reason of an insufficient demand to justify optimum capacity.<sup>457</sup> Deficiencies in social overhead capital caused by diseconomies on capital account in developing countries may more than outweigh any economies of scale.<sup>458</sup> In addition, account must be taken of the fact that in the economically less developed countries the majority of the population still depends on agriculture, which is much more likely to be subject to diminishing returns than to increasing returns. Density rather than size of population might be the crucial factor under these circumstances. In addition, it has been argued that small countries not having the benefit of economies of scale may overcome such a situation through external trade.

#### (b) *Population size, specialization and economies of scale*

183. The degree of specialization of an economy, in the sense of the range of goods and services it produces, is held to depend to a great extent on the size of its population. Nations with a smaller number of inhabitants, it is

<sup>445</sup> Lewis, *The Theory of Economic Growth* (1963), p. 96; Robinson, "Introduction" (1960); Edwards, "Size of markets, scale of firms..." (1960).

<sup>446</sup> Robinson, "Introduction" (1960); Jewkes, "Are the economies of scale unlimited?" (1960).

<sup>447</sup> Vakil and Brahmananda, "The problems of developing countries" (1960).

<sup>448</sup> Clark, "Population growth and living standards" (1953). On this point, see also Belshaw, *Population Growth and Levels of Consumption*... (1956), pp. 72-73.

<sup>449</sup> Kuznets, "Economic growth of small nations" (1960); Marcy, "How far can foreign trade and customs agreements...?" (1960). Lewis, *The Theory of Economic Growth* (1963), p. 72, noted that the size of the market depends upon population size, but that several other factors are involved. Fabricant, "Study of the size and efficiency of the American economy" (1960), pointed out that the lack of conclusive knowledge as to whether technical advances are of the kind favouring large-scale production limits the possibility to say whether size increases efficiency.

<sup>450</sup> Vakil and Brahmananda, "The problems of developing countries" (1960); Robinson, "Population and development" (1960).

<sup>451</sup> Kuznets, "Economic growth of small nations" (1960); but he added that this classification is based on the distribution of nations by size, as at present. For earlier times, the limit should be progressively lowered.

<sup>452</sup> Robinson, "Introduction" (1960). He noted that differences in the degree of diversification between countries of 10 to 15 million and of 50 million may be as important as differences between the latter and countries with a population of about 200 million.

<sup>453</sup> Jewkes, "The population scare" (1939). See also Spengler, "Demographic patterns" (1954), who asserted that the United States and the larger European countries had passed the optimum. See his "Population and *per capita* income" (1945).

<sup>454</sup> Whelpton, *Forecasts of the Population of the United States, 1945-1975* (1947), pp. 64-66. See also Spengler, "Demographic patterns" (1954).

<sup>455</sup> Chenery, "Patterns of industrial growth" (1960). See also Chenery and Taylor, "Development patterns: among countries and over time" (1968).

<sup>456</sup> Pearson, "Income distribution and the size of nations" (1965).

<sup>457</sup> Scitovsky, "Croissance balancée ou non-balancée" (1959); Leibenstein, *Economic Backwardness*... (1957), pp. 106-107. Vakil and Brahmananda, "The problems of developing countries" (1960), asserted that only in the context of a proportionate availability of other factors, population size might be an important factor.

<sup>458</sup> Rosenstein-Rodan, "Notes on the theory..." (1961). Myint, *The Economics of the Developing Countries* (1965), pp. 116-117, commented, however, that various developing countries already possess considerable social overhead capital.



asserted, are as a rule characterized by a less diversified economy and a greater concentration on a limited range of products or, conversely, the bigger the population, the greater the opportunities for the efficient production of all kinds of goods and services. This tendency towards a higher degree of diversification as population size increases reflects primarily the existence of economies of scale but may be re-enforced in so far as the size of the population is positively associated with the size of the territory. Since the variety of mineral and other natural resources found in a country depends largely on the size of its territory, a smaller population and territory would tend to be more specialized because its natural resources would be less diverse. In addition, having relatively more resources per head of a certain type might give rise to economies of scale in their exploitation or their use in manufacturing, thus making for a higher degree of specialization.<sup>459</sup>

184. Closely related to the lesser degree of diversification of small countries is their dependence on foreign trade. This greater importance of trade in the economy of the smaller countries may be basically explained by the same factors which determine their higher degree of specialization.<sup>460</sup> In more general terms, it may be argued that, given the greater concentration on a limited range of products, foreign trade must be more important for smaller nations than for larger ones. A number of findings have confirmed that the smaller the population, the higher the ratio of imports and exports to national product or income, and that the extent to which countries depend on international trade is to a considerable degree predictable on the basis of the size of their populations. Kuznets found on the basis of data for fifty-three countries in the years 1938-1939 a rank correlation coefficient of  $-0.44$  between population size on the one hand, and the export ratio or the relation between exports and national income on the other hand; the corresponding coefficient for the import ratio was  $-0.56$ .<sup>461</sup> In a later study, based on data for sixty-two countries, he confirmed these results, finding a systematic association between the trade proportion—being the sum of imports and exports divided by gross national product—and the size of the population.<sup>462</sup> Using data for 1955 from seventy-three countries, it was found in another study that population size accounted for more than 60 per cent of the variation

in the ratio of foreign trade to gross national product.<sup>463</sup> An analysis of imports and exports of a number of important products of manufacturing industries in thirty-two countries confirmed the hypothesis that smaller countries appear to experience a comparative disadvantage in most of the main manufacturing industries.<sup>464</sup>

185. The importance of population size for determining the foreign trade ratio has been confirmed both for the economically more developed and the economically less developed countries. Ranking thirty higher income countries according to size in classes of five countries each, Kuznets found that the ratio of foreign trade *per capita* to income *per capita* for the year 1949 increased from somewhat less than 22 per cent in the five largest countries to nearly 84 per cent in the five smallest. Comparable data for thirty lower income countries revealed an increase from less than 38 per cent to over 64 per cent. Noting the more pronounced increase of the ratio in the group of more developed countries, Kuznets attributed it to the higher variety of demand at more advanced stages of the development and the consequent reliance of these countries on ties with the larger economies.<sup>465</sup> Similar conclusions were reached by Adams, who found that the foreign trade ratio of large countries is likely to decline with higher levels of development, but that this is not so in the case of smaller countries. In the latter, in view of the proportionate increase in the demand for capital goods, an increase would be more probable. On the basis of cross-section analysis, he concluded that in the less developed countries the share of capital goods in imports decrease with a decrease in population, this share being 31 per cent in countries of 25 million inhabitants and 25 per cent in countries with less than 10 million inhabitants. In the developed countries, however, the reverse was true. In countries of 40 million or more inhabitants the share of capital goods in imports was 15 per cent, as compared with 31 per cent in countries with a population of less than 20 million, a difference which he attributed to the economies of scale.<sup>466</sup>

186. The common basis for trade is that countries can exchange their own products for goods which they would find it comparatively disadvantageous to produce. Through the specialization implied in it, trade offers countries which are smaller in population the possibility

<sup>459</sup> Kuznets, "Economic growth of small nations" (1960); and his "Quantitative aspects of the economic growth of nations, IX..." (1964). Keesing, "Population and industrial development..." (1968), finding a negative correlation between population size and density, as an index of *per capita* national resources, suggested that smaller countries had a comparative advantage in natural resources and a comparative disadvantage in manufactures, as the reverse of the former.

<sup>460</sup> Kindleberger, *Foreign Trade and the National Economy* (1962), pp. 32-36. Kuznets added to the earlier mentioned factors the circumstance that in smaller countries with a smaller area, transportation costs from boundaries may be lower than in larger countries. See his "Economic growth of small nations" (1960); and his "Quantitative aspects of the economic growth of nations, IX..." (1964).

<sup>461</sup> Kuznets, "Economic growth of small nations" (1960). He also noted that the correlations between *per capita* income and import and export ratios were low.

<sup>462</sup> Kuznets, "Quantitative aspects of the economic growth of nations, IX..." (1964).

<sup>463</sup> Deutsch, Bliss and Eckstein, "Population, sovereignty and the share of foreign trade" (1962), also concluded that foreign trade ratio tends to decline only moderately—from about 50 to 35 per cent—when population increased from 1 to 10 million, but accelerated when population further increased. With a population of 150 million it would drop to about 10 per cent.

<sup>464</sup> Keesing, "Population and industrial development..." (1968).

<sup>465</sup> Kuznets, "Economic growth of small nations" (1960). The increase in the percentages was, however, not continuous. In the case of the more developed countries there was one exception, and among the less developed countries the highest percentage was found in the group of countries which ranked fourth. See also his "Quantitative aspects of the economic growth of nations, I..." (1956).

<sup>466</sup> Adams, "Import structure and economic growth..." (1967). The findings discussed here were based on cross-section analysis; in the case of time-series the evidence, however, was less conclusive.

of obtaining most of the benefits of a wide market.<sup>467</sup> Nevertheless, there are certain advantages associated with having a larger population. In so far as it implies a larger area, having a larger population permits a greater diversification because of a broader range of natural resources.<sup>468</sup> Likewise, for both technological and social reasons, the international division of labour through trade falls far short of the optimum. Construction and housing, bulky products, internal transport and many personal services cannot be supplied by foreign trade. In addition, mainly for political reasons, a number of activities, for instance those related to defence, must be kept within the country, thus limiting the dependence on international trade.<sup>469</sup> Finally, larger nations, being more dominant in international markets and being less dependent upon them, are much less subject to the vagaries of foreign trade. In this connexion, it has often been argued that the more specialized a country the greater is the risk of instability. The smaller countries, for which trade is more important, are more vulnerable to fluctuations in international trade because a small percentage change in over-all trade represents a large amount in absolute value for a small country, including a large balance of payment deficit.<sup>470</sup> Nevertheless, some findings suggest that countries most active in trading are more stable than larger nations and that smaller countries adjust more easily to unfavourable changes in the world market, but apart from population many other factors are involved and the effect of population size is difficult to determine.<sup>471</sup>

187. An association between the size of a nation, on the one hand, and the diversification of the economy and economies of scale, on the other, may also have implications for the need for, and the possibility of obtaining foreign capital funds. If it can be assumed that, because of their size, smaller nations have more limited capital markets than larger ones, in order to diversify their economy over a wide range of products, they have to rely also to a larger extent on foreign capital for financing such activities.<sup>472</sup> However, the foreign investments which flow into a country, it has been argued, depend not only on how productive they are by themselves but also upon the efficiency of all other industries in the economy.<sup>473</sup> Since the latter is determined at least in part by economies or diseconomies of scale, smaller countries might not only be more dependent on foreign investment, but in addition, because they are in a less favourable position as far as the existence of economies of scale is concerned, might

encounter more difficulties than larger nations in securing the foreign capital they need.

### (c) *Population density and diminishing returns*

188. The interactions between population size and natural resources may affect productivity in a number of ways. As has been noted above, if it can be accepted that a positive relation exists between the size of the population and the size of the territory, a more numerous population may have the benefit of a larger and more diversified resource base which permits a higher degree of diversification of the economy. More important, however, are the implications for productivity of the ratio of population to natural, and, particularly, to agricultural resources or the density of population, to the extent that the latter is representative of the ratio of population to resources.<sup>474</sup>

189. The argument linking population density to productivity is based on the theory of diminishing returns in agriculture, which was the corner-stone of Malthusian and classical economic theory. Decreasing returns in agriculture are attributed to two factors which, it was thought, characterized production based on natural resources. First, the supply of such resources is fixed both in quantity and quality; second, it is asserted, the possibilities of a far-reaching division of labour and of technological progress in agriculture were limited. The reasoning was then that, because of these constraints, once a certain level of density and utilization of the cultivable land had been reached, further increases in production could occur only through the cultivation of land of inferior quality or through the application of more labour to land already under intensive cultivation.<sup>475</sup> Although at low levels of density agricultural production might be subject to increasing returns, once a certain level of density had been reached decreasing returns would set in. The high agricultural population density in many of the developing countries is, therefore, thought to be one of the main causes of the low productivity found in agriculture.

190. The implications of the man-land ratio for productivity are intimately related to employment aspects and have been discussed especially in connexion with the widespread underemployment found in the peasant, subsistence agriculture in the developing countries with a rural "over-population".<sup>476</sup> This chronic underemployment is usually identified with very low levels of productivity. In fact, according to many writers, in the overpopulated peasant economies the productivity of labour is negligible, zero or even negative over a wide range, so that, even with unchanged techniques, a part of the labour force could be removed from agriculture without significantly reducing agricultural production. In more specific terms, productivity will be low under these conditions because of the average worker having

<sup>467</sup> Lewis, *The Theory of Economic Growth* (1963), p. 323; Jöhr and Kneschaurek, "Study of the efficiency of a small nation—Switzerland" (1960); Robinson, "Introduction" (1960).

<sup>468</sup> Robinson, "Population and development" (1960).

<sup>469</sup> Lewis, *The Theory of Economic Growth* (1963), p. 323; Kuznets, "Economic growth of small nations" (1960).

<sup>470</sup> Jewkes, "Are the economies of scale unlimited?" (1960); Marcy, "How far can foreign trade and customs agreements . . . ?" (1960); Robinson, "Introduction" (1960); Leduc and Weiler, "The size of the economy . . ." (1960).

<sup>471</sup> Tarshis, "The size of the economy . . ." (1960); Kuznets, "Economic growth of small nations" (1960).

<sup>472</sup> Kuznets, "International differences in capital formation and financing" (1955); and his "Economic growth of small nations" (1960).

<sup>473</sup> Lewis, *The Theory of Economic Growth* (1963), p. 249.

<sup>474</sup> The limitations of either over-all, agricultural or rural density as an indicator of the relation between population and resources and the difficulties of designing a more appropriate indicator have been mentioned in section C. It is here assumed, as is often the case in demographic literature, that in principle some measure of density exists which would fulfil these conditions.

<sup>475</sup> See chapter III, sections C and D.

<sup>476</sup> See section C above.

insufficient land at his disposal, and extreme reduction in the size of holdings is inevitable, thus reducing the worker's production to only a fraction of his productive capacity.<sup>477</sup>

191. Even though the concept of disguised unemployment, in a strict sense, abstracts from technological change,<sup>478</sup> the pressure of population on agricultural resources is unlikely to leave techniques and methods of production unchanged; and various arguments have been advanced as to why it might contribute to holding back technological progress. In the first place, low incomes at or near the subsistence level will considerably reduce willingness to take the risks frequently involved in the application of new techniques and thus deter technological innovation.<sup>479</sup> The ability to introduce new techniques is further restricted by the circumstance that while, on the one hand, low incomes make the capital that is available for investment very scarce, on the other hand, technological progress requires nearly universally substantial increases in capital.<sup>480</sup> This is the more so since in densely settled agricultural areas land is used very intensively and requires proportionately higher capital outlays for such improvements as irrigation, land reclamation and so forth.<sup>481</sup> In addition, the small holdings typical of these economies offer little scope for mechanization and capital intensification or make them less productive.<sup>482</sup> Whereas the relative scarcity of land and capital in the overpopulated peasant economies severely limits technological progress, the other factor of production—labour—is free within the family and will thus be used until its marginal product is zero. On this ground there are no incentives to introduce labour-saving techniques which would only reinforce the existing underemployment.<sup>483</sup> Because of these factors, it is often held that substantial technological progress and the introduction of new methods of production are not possible without a reduction in the number of agricultural workers.<sup>484</sup>

<sup>477</sup> Several writers have asserted that the problem of unemployment is not so much that there is too much labour applied but that there is a surplus of labourers who work only for a limited time. Myint, *The Economics of the Developing Countries* (1965), p. 86; Sen, *Choice of Techniques* . . . (1960), pp. 3-5.

<sup>478</sup> Nurkse, *Problems of Capital Formation* . . . (1953), p. 34.

<sup>479</sup> Mellor, *The Economics of Agricultural Development* (1966), p. 29.

<sup>480</sup> Lewis, "Economic development with unlimited supplies of labour" (1954); Higgins, *Economic Development* . . . (1959), p. 329; Mellor, *The Economics of Agricultural Development* (1966), p. 31.

<sup>481</sup> Chenery, "The role of industrialization in development programmes" (1955).

<sup>482</sup> *Ibid.*; Belshaw, *Population Growth and Levels of Consumption* . . . (1956), p. 75; Lewis, *The Theory of Economic Growth* (1963), pp. 129-130.

<sup>483</sup> United Nations, *Measures for the Economic Development* . . . (1951), p. 59; Higgins, *Economic Development* . . . (1959), p. 329; Myint, *The Economics of the Developing Countries* (1965), pp. 139-140.

<sup>484</sup> United Nations, *Measures for the Economic Development* . . . (1951), pp. 9, 59; Nurkse, *Problems of Capital Formation* . . . (1953), pp. 34, 52-53; United Nations, *Processes and Problems of Industrialization* . . . (1955), pp. 3-4; Hoselitz, "Agriculture in industrial development" (1962). Sen, *The Strategy for Agricultural Development* . . . (1962), p. 29, noted that while mechanization of farms considerably improved the yield per unit of labour, it does not necessarily raise that per unit of land. Therefore, in countries with

192. Overpopulation under forms of production other than the peasant subsistence economy is likewise thought to have a negative effect on productivity. Where agriculture is mainly operated by paid labour, the abundant supply of labour tends to keep wages low in relation to other factors of production. The combination of surplus labour and low wages provides little or no incentive for the introduction of more efficient methods of cultivation and technological progress.<sup>485</sup> The same is likely to hold where tenant farmers are concerned. Because the scarcity of land makes for intense competition, average holdings will be small, creating conditions not unlike those in the peasant subsistence sector, and in addition rents will be high and the tenant's share low, all factors tending to reduce the incentive and possibilities of introducing more efficient methods of cultivation.<sup>486</sup>

193. Various aspects of the theory of productivity and underemployment in the overpopulated agricultural economy have been criticized. The assertion that labour could be removed from the land without a noticeable decline in production, or, in other words, the assumption that the marginal productivity of labour would be zero, have been questioned by several writers, as indicated in section C above. The argument that high population density would virtually exclude the possibilities of technological progress has been discounted by others. In general, it has been suggested that methods of production are flexible enough to make it possible to increase production when labour is added while other factors of production remain constant,<sup>487</sup> and that techniques of production adapt themselves to the relative plenty of labour and the relative scarcity of land and capital.<sup>488</sup> More specifically it has been argued that there are considerable opportunities in densely settled developing countries for raising agricultural output by such relatively cheap means as improved seeds, better rotation, better tools etc.<sup>489</sup> Socialist writers, in particular, have argued that underemployment and excess population in capitalist countries are the result of the introduction and spread of capitalist

a high man-land ratio in agriculture, the scope for mechanization would be very limited until the ratio could be reduced substantially by means of the transfer of labour out of agriculture.

<sup>485</sup> Taeuber, "Utilization of human resources in agriculture" (1950); Lewis, "Economic development with unlimited supplies of labour" (1954); Raj, *Employment Aspects of Planning* . . . (1957), p. 37; Myint, *The Economics of the Developing Countries* (1965), pp. 56-57.

<sup>486</sup> Clark, "Future sources of food supply . . ." (1962), drew attention to the fact that high population density and high rents may cause a regression in production methods and techniques.

<sup>487</sup> Viner, "Some reflections on the concept of disguised unemployment" (1957). Mellor, *The Economics of Agricultural Development* (1966), chap. 9, also thought that production could be increased through the increase of labour input, but noted that incentives might not be strong enough to induce the additional effort.

<sup>488</sup> Phelps Brown, *The Economics of Labor* (1962), p. 108.

<sup>489</sup> Singer, "The mechanics of economic development . . ." (1952). Belshaw, *Population Growth and Levels of Consumption* . . . (1956), pp. 75 and 105, noted, however, that once these improvements have taken place, further increases in labour would lead to diminishing returns.

methods of production and the mechanization of agriculture.<sup>490</sup>

194. The case of the sparsely populated agricultural countries poses problems different from those in the more densely populated areas. Where there are large resources of cultivable land which cannot be utilized because of factors related to the size of the population—such as the lack of labour supply, the distance to markets, or the inadequacy of transportation facilities—higher population density might increase productivity. Since land is relatively plentiful under these circumstances, conditions for progress in agricultural techniques are favourable and increases in output per worker, it has been argued, may be possible without heavy capital outlays. Improved knowledge of seed selection, crop rotation, soil conservation and the use of fertilizers and livestock feeding are among the factors which might increase productivity.<sup>491</sup> However, according to others, considerable investments in overhead capital such as transportation facilities and communications may be necessary to make effective the potential higher productivity in these areas.

195. A negative relation between rural or agricultural density and productivity in agriculture has been generally suggested. In the densely settled agricultural areas, the high levels of underemployment might by themselves be considered an indication of low efficiency in so far as this underemployment is assumed to have as one of its main characteristics a low productivity. Nevertheless, as has been noted before, the prevalence of large-scale underemployment in this sense has been questioned by a number of writers. The results of a number of studies have shown in general that the higher the density, the lower the production per agricultural worker.<sup>492</sup> Clark found production per farm worker to vary inversely with the square root of male workers per thousand hectares of farm land.<sup>493</sup> The evidence as to the relationship is, however, not conclusive; even where an inverse relation between density and productivity exists, it does not imply a causal relation, and factors other than density are operative. In more general terms, the degree of overpopulation is not only a function of the relation between size of population and the quantity of resources but also of the level of technology and especially of economic development.<sup>494</sup> Some findings seem to confirm this:

<sup>490</sup> Academy of Sciences of the USSR, Institute of Economics, *Political Economy* (1957). Falkowski, *Les problèmes de la croissance du tiers monde . . .* (1968), pp. 75-77, notes that in socialist literature the problem of property and its deformed structure are seen as the main causes of agricultural stagnation.

<sup>491</sup> Nurkse, *Problems of Capital Formation . . .* (1953), p. 52; Kuznets, "Economic growth of small nations" (1960). Myint, *The Economics of the Developing Countries* (1965), pp. 56-57, noted, however, that in the colonial period under the plantation system even in sparsely settled areas productivity remained at a low level owing to the policy of keeping wages low, which led to the extensive use of cheap labour at low levels of productivity.

<sup>492</sup> Black, "Agricultural wage relationships . . ." (1936); Johnson, "Contribution of price policy to the income . . ." (1944); and his *Forward Prices in Agriculture* (1947); Moore, *Economic Demography of Eastern and Southern Europe* (1945), pp. 35, 195 ff.; Daniel, "Regional differences of productivity . . ." (1944).

<sup>493</sup> Clark, *The Economics of 1960* (1942), pp. 34-36; See also Spengler, "Economic factors in the development . . ." (1951).

<sup>494</sup> Myint, "An interpretation of economic backwardness" (1954); Kuznets, "Population and economic growth" (1967).

an analysis based on data for seventy countries showed that virtually no relation existed between national income per head and density of population.<sup>495</sup>

196. Despite the lack of conclusive evidence on the direct relation between population density and productivity, diminishing returns to scale are generally assumed to be characteristic of agriculture.<sup>496</sup> Since increasing returns are assumed to be typical of manufacturing, the relationship between population and output per head is a question of the advantages of specialization and the economies of large-scale production mainly found in manufacturing, on the one hand, and the diseconomies of more intensive and extensive use of natural resources, on the other.<sup>497</sup> Given the predominance of economies of scale in industry and diseconomies of scale in agriculture, it follows that the population which a country can support without diminishing returns is likely to set in much earlier in the predominantly agricultural developing countries, where the ratio of farming to secondary activities is high, than in the more developed, industrialized countries.<sup>498</sup>

## 2. THE AGE DISTRIBUTION AND PRODUCTIVITY

197. The age factor may be of importance from the point of view of productivity for two reasons. First, the productivity and flexibility of workers is thought not to be independent of their age, and a different age distribution of the labour force may thus affect its productive capacity. In the second place, age is a factor which determines different needs, which in turn may imply different capital requirements; hence the age distribution may influence the structure of investment, particularly the not-directly productive as against the directly productive investments, and thus their productivity.

### (a) Age distribution of the labour force and productivity

198. The age composition of the labour force may determine the specific productivity of labour in so far as age is associated with the productivity of the worker, as well as with his capacity and willingness to adapt to changing production techniques or employment opportunities. Just as the capacities of different workers may vary, there may also exist variations in the capacity of the same individual at different stages of his lifetime.<sup>499</sup> It is generally assumed that the productivity of the worker decreases after a certain age because physical and mental capacities, as well as skills and energy, tend to decline with age; in addition, the individual's entrepreneurship and willingness to take risks weakens as he becomes older. A number of writers are, therefore, of the opinion that

<sup>495</sup> Pearson, "Income distribution and the size of nations" (1965).

<sup>496</sup> The existence of diseconomies of scale in agriculture was already noted by Marshall, *Principles of Economics* (1890, 1961 ed.), p. 285. See also Lewis, *The Theory of Economic Growth* (1963), p. 72.

<sup>497</sup> Lewis, *The Theory of Economic Growth* (1963), p. 323.

<sup>498</sup> *Ibid.*, p. 324; Belshaw, *Population Growth and Levels of Consumption . . .* (1956), pp. 81-82; Jöhr and Kneschaurek, "Study of the efficiency of a small nation—Switzerland" (1960); Myint, *The Economics of the Developing Countries* (1965), p. 94.

<sup>499</sup> Kendrick, *Productivity Trends in the United States* (1961), p. 33.

and equipment by the time they enter the labour force, as well as for their education and professional training. An increase in the number of adults or workers implies added investments to supply the additional workers with capital goods. The effects of these changes on the capital-output ratio depends on the manner in which the workers are absorbed into the production process.<sup>509</sup>

### 3. POPULATION GROWTH AND PRODUCTIVITY

202. The possible implications of population growth for productivity are of special significance. On the one hand, since productivity defined in a broad sense can be interpreted as a measure of economic progress and the level of development,<sup>510</sup> the effect population growth or decline can have on it is part of the central issue of whether demographic change stimulates or retards economic progress. On the other hand, knowledge of the over-all or net effect of population on economic growth is still far from complete. This is partly so because much of the literature on demographic aspects of economic growth, regarded as a function of a nation's resources and the efficiency with which they are combined,<sup>511</sup> has been concerned mainly with the relationships between population and resources. Much less attention has been paid to, and much less is known about, the more complex question of the implications of population change for the less tangible determinants of productivity and economic growth.

#### (a) *Population growth, the factor proportions problem, dualism and productivity*

203. The discussion of the interrelations between population and co-operant factors of production and their consequences for productivity and economic growth was for a long time dominated by the problem of limited natural resources and land.<sup>512</sup> The fundamental proposition, which is still nearly universally accepted as far as the developing countries are concerned, was that because land was limited, population growth would cause diminishing returns to set in. The reasoning, used especially with respect to the more densely populated agricultural countries, is that, the quantity and quality of land being more or less fixed, after a certain point further population growth will give rise to a shortage of cultivable land and, as the rates of capital accumulation and technological progress in agriculture become low, returns to labour will decrease, causing the marginal productivity to decline to a very low level or even to zero.<sup>513</sup>

<sup>509</sup> Sauvy, "Investissements démographiques..." (1959).

<sup>510</sup> As mentioned above, in so far as productivity reflects the efficiency with which resources are converted into goods and services, it can be seen as a measure of economic progress. In addition, in a more formal sense, labour productivity or product per worker is, of course, closely associated with *per capita* income or product per person, in view of the relation between the total and working population.

<sup>511</sup> See the introduction to this chapter.

<sup>512</sup> For a review of some of the literature on this subject, see chapter III, sections C and D.

<sup>513</sup> Mandelbaum, *The Industrialization of Backward Areas* (1945), pp. 1-2; Robinson, "Economic consequences of a decline in the population..." (1951); Belshaw, *Population Growth and Levels of Consumption*... (1956), pp. 71-72, 75; Raj, *Employment Aspects*

204. This does not mean, however, that diminishing returns would always be found in agriculture when population was increasing. A number of writers, for instance, have commented on the fact that in sparsely settled areas population growth may under certain circumstances be a factor in increasing productivity. In such areas where there are plentiful resources, a growing population could, as noted before, open possibilities for a more efficient exploitation of the land, the reduction of transportation costs, the establishment of local markets and so forth.<sup>514</sup> Even so, once these areas became populated their problems would be similar to those of the already densely settled areas. More important, however, the experience of the presently developed countries has shown that technological progress and the increased use of capital, among other factors, have meant increased productivity and sustained expansion in agriculture, even when the country's population increased at a fairly rapid rate. Nevertheless, as has been pointed out, where such increases in productivity have taken place, they have in no way been dependent upon an increase in the agricultural labour force; on the contrary, they were in fact accompanied as a rule by the transfer of population out of agriculture to other activities.<sup>515</sup> In many densely settled agricultural areas of the developing countries, such a transfer is, in the view of many authors, essential for increasing productivity<sup>516</sup> and rapid population growth would make this process of structural change even more difficult, not in the least because of the additional capital which it requires.

205. Because of the preoccupation with economic development, and in view of the large investment needs of the development process, literature in more recent times has given increasing attention to the investment aspect and as far as the implications of population growth for economic development are concerned, to the interaction between population change and capital formation. In general terms, it may be said that if the existing stock of capital is fully utilized and technology remains unchanged, population and labour force increase are associated with a decline in the capital-labour ratio and output per worker unless capital expands at least as fast

of *Planning*... (1957), p. 4; Ardant, *Le monde en friche* (1959), p. 58; Sauvy, "Croissance de la population et productivité" (1963); International Labour Office, *Employment and Economic Growth* (1964), p. 126; Mathur, "The anatomy of disguised unemployment" (1964); Papi, "The place of agriculture in balanced growth" (1965); Kuznets, "Population and economic growth" (1967).

<sup>514</sup> United Nations, *Measures for the Economic Development*... (1951), p. 47; Nurkse, *Problems of Capital Formation*... (1953); Bonné, *Studies in Economic Development*... (1957), p. 123. However, in the view of several writers, the development of sparsely settled areas by these means would require large capital outlays in the form of investments in infrastructure. See Nurkse, *Problems of Capital Formation*... (1953), p. 52; Loufty, *La planification de l'économie*... (1963), pp. 357-358.

<sup>515</sup> Belshaw, *Population Growth and Levels of Consumption*... (1956), p. 75.

<sup>516</sup> United Nations, *Measures for the Economic Development*... (1951), pp. 9, 59; Nurkse, *Problems of Capital Formation*... (1953), pp. 34, 52-53; United Nations, *Processes and Problems of Industrialization*... (1955), pp. 3-4; Hoselitz, "Agriculture in industrial development" (1962); Sen, *The Strategy for Agricultural Development*... (1962), p. 29.

as the working population. Alternatively stated, as discussed in section B, for output to increase at the same rate as the total and working population, assuming that the latter two grow at the same rate, and thus for *per capita* income and product per worker to remain constant, the stock of capital should grow also at the same rate. Population growth, while tending to depress the rate of capital formation,<sup>517</sup> on the one hand, will involve, on the other, a cost in the form of demographic investments which reduces the potential higher productivity that would have been possible if population growth were absent or smaller.<sup>518</sup>

206. Taking into account the fixed quantity of land and the capital factor, the implications of the relation between population growth and physical resources for economic growth has been described in the following terms. An increase in population, other conditions being given, means an increase in the labour force which, assuming that the latter grows at the same rate as the total population, will be able to produce as much or more per worker, hence per head, if it is equipped with the same or a greater amount of capital per worker and if, making allowance for the increased pressure of population upon limited irreproducible resources, the reproducible capital-labour ratio remains the same.<sup>519</sup> If these conditions are not fulfilled, output per worker and per head would tend to decline.

207. The lack of proportion between labour and other factors of production is frequently considered to be one of the fundamental reasons for the low levels of income and productivity in many developing countries. Rapid population growth, by increasing this imbalance, is thought to create an additional obstacle to economic development.<sup>520</sup> Even though in the developing countries low productivity and chronic unemployment and underemployment are associated with the existence of a labour surplus compared to other factors of production, it has been argued that economic growth would still be possible if alternative techniques of production would make possible the substitution of labour for other factors, or if a market mechanism would exist by which factor prices and their supply and demand would be balanced. It has been asserted that structural disequilibrium at the factor level arises because of the imperfections in the price and market mechanism and because of limitations in

existing technology. This broader problem of the relationships among factors of production, the range of available techniques and the efficiency of the market mechanism has been analysed by Eckaus, who referred to it as the "factor proportions" problem,<sup>521</sup> and it is in turn closely connected with the problem of "dualism" thought to be characteristic of the majority of the developing countries.

208. The role of the market mechanism in ensuring that the prices of the factors of production adapt themselves to the equilibrium level where demand absorbs the existing supply was stressed in traditional theory. According to this theory, in the case of labour, wages would tend towards the equilibrium subsistence level. Since as long as wages remained above such a level population would increase and cause an excess supply of labour, it would reduce wages to the subsistence level; whereas when wages were below that level population would decline and the consequent scarcity of labour would raise wages and restore them to the equilibrium level.<sup>522</sup> Both the population theory as well as the assumed effectiveness of the market mechanism in bringing the supply of labour in line with the demand for it are no longer generally accepted. As far as the operation of the market is concerned, either because the price of labour is already at or near the subsistence level, or because for social, institutional or other reasons wages do not adapt themselves to a level where they would reflect the marginal productivity of labour,<sup>523</sup> the market mechanism is not considered efficient in bringing about the assumed equilibrium. More important is the fact that since modern thinking has discarded the hypothesis that population growth is a function of the level of wages or the wage bill<sup>524</sup> and in so far as mere population growth does not lead to further capital accumulation or new resource discoveries, a growing population will signify the appearance or increase of surplus labour accompanied by growing unemployment and falling *per capita* income, unless alternative production techniques, permitting factor combinations which reflect and adapt themselves to actual factor endowments and their changes, are available.<sup>525</sup>

209. As far as such technological choices are concerned, Eckaus asserted that only a limited number of production processes exist in large sectors of the economy and that these processes are, on the whole, relatively capital-intensive. Distinguishing two factors of production—labour and capital—he showed that where only one

<sup>517</sup> See section A of this chapter.

<sup>518</sup> Spengler, "Population movements, employment and income" (1938); Meier, "The problem of limited economic development" (1953); Biswas and Mueller, "Population growth and economic development in India" (1955); Belshaw, *Population Growth and Levels of Consumption* . . . (1956), pp. 64-65; Myint, "The 'classical theory' of international trade . . ." (1958); Higgins, *Economic Development* . . . (1959), p. 349; Sauvy, "Croissance de la population et de la productivité" (1963); Coale, "Population and economic development" (1963).

<sup>519</sup> Kuznets, "Population growth and aggregate output" (1960).

<sup>520</sup> United Nations, *Measures for the Economic Development* . . . (1951), pp. 45-48; Nurkse, *Problems of Capital Formation* . . . (1953), p. 1; Meier, "The problem of limited economic development" (1953); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 47-48, 53-54; Leibenstein, *Economic Backwardness* . . . (1957), chap. 5; Higgins, *Economic Development* . . . (1959), pp. 341-344; Coale, "Population and economic development" (1963).

<sup>521</sup> Eckaus, "The factor-proportions problem in underdeveloped areas" (1955); see also Kindleberger and Despres, "The mechanism for adjustment in international payments" (1952); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 41 ff.; Higgins, *Economic Development* . . . (1959), pp. 330-334; Abraham-Frois, *Essai sur les problèmes d'investissement* . . . (1962), pp. 261-274; Bruton, *Principles of Development Economics* (1965), chap. 3; Das Gupta, "Underemployment and dualism—a note" (1964).

<sup>522</sup> See chapter III, sections C and D.

<sup>523</sup> See section C of this chapter. Also Eckaus, "The factor-proportions problem in underdeveloped areas" (1955); Meier, "The problem of limited economic development" (1953); Bruton, *Principles of Development Economics* (1965), pp. 99-100.

<sup>524</sup> See chapter III. Also Higgins, *Economic Development* . . . (1959), pp. 207-208; Myint, *The Economics of the Developing Countries* (1965), p. 34.

<sup>525</sup> Singer, "Population and economic development" (1955).



technological process exists the two factors can be combined in only one way and, therefore, must be available in the required proportion if both are to be fully employed. The existence of more than one process, each with different factor combinations, increases considerably the total number of combinations, since the different production processes can be combined in a number of ways. Nevertheless, the number of alternative techniques is limited and if the proportions in which the factors are available falls outside the boundaries set by the available technological processes, unemployment of either labour or capital would ensue. Arguing that the use of advanced techniques in developing countries is not necessarily an irrational imitation of the more developed countries, Eckaus holds that technology and factor endowments characteristic of many developing countries are such that situations in which labour is redundant are often found.<sup>526</sup>

210. Closely associated with the existence of surplus labour and a shortage of co-operant factors of production in the less developed countries is the problem of "dualism". Among the first to introduce the concept of "dualism" was Boeke who, noting that a society is not necessarily dominated by a single social system, defined "dual" societies as those in which two or more social styles coexist, whereas in the normal historical evolution they would be separated from each other by transitional forms. Social dualism, which is the clashing of an imported system, which is capitalistic, with an indigenous system of another social style—predominantly non-capitalistic or pre-capitalistic—implied, according to Boeke, the need for a new dualistic heterogeneous theory which would combine those theories of each of these systems with that of the interaction between them.<sup>527</sup>

211. The existence of dualism in developing countries has become widely accepted. According to literature, a "dual" economy is characterized by two more or less clearly defined sectors: one, variously referred to as pre-capitalistic, backward, traditional or subsistent, consists mainly of agriculture, but may also include handicrafts, small industries and other associated activities where levels of productivity and income are usually low and stagnant; and the other is a capitalistic, advanced, modern or industrial sector in which techniques are advanced and levels of income and productivity are comparatively high.<sup>528</sup> The chief factor in this "dualism", it has been

noted, is the interrelationship between factor endowments and techniques of production.<sup>529</sup> The dual economy with its two distinct sectors emerges as a result of the introduction of modern techniques which require factor combinations not adapted to the resources available in these countries where capital and, in densely populated areas, land is scarce relative to population. The modern sector, using advanced technology, absorbs the existing capital, but since it employs only part of the labour force, the surplus manpower has to seek employment in agriculture and other low-productivity subsistence sectors.

212. One of the first writers to formulate a theory of the dual economy and its development was Lewis.<sup>530</sup> He assumed, in the classical tradition, the existence of an unlimited supply of labour in the sense that with the price of labour being at the subsistence level, the supply of labour exceeded the demand. With the supply of labour being unlimited and that of capital scarce, the latter would not be spread evenly over all labour but, applied in such a manner that the marginal productivity of labour equalled its current wage, employment would be determined accordingly. The capitalist sector, defined as the one which used capital, would thus only absorb part of the available supply of labour and the remainder would have to be absorbed in the subsistence sector, and earn what it could. Such an economy will expand, according to Lewis, if the profits of the capitalist sector are invested, and if wages in this sector are, as usually is the case, higher than in the subsistence sector.<sup>531</sup> Under these circumstances employment opportunities in the industrial sector expand and this increased demand for labour will be satisfied by workers from the subsistence sector attracted by the higher wages in the capitalist sector. As long as the supply of labour remains unlimited, the capital-

<sup>526</sup> Eckaus, "The factor-proportions problem in underdeveloped areas" (1955). See also Dorfman, "Mathematical or 'linear' programming . . ." (1953); Higgins, *Economic Development* . . . (1959), p. 340; Abraham-Frois, *Essai sur les problèmes d'investissement* . . . (1962), pp. 263-264; Bruton, *Principles of Development Economics* (1965), chap. 3.

<sup>527</sup> Boeke, *Economics and Economic Policy of Dual Societies* . . . (1953). For a critical analysis see Higgins, "The 'dualistic theory' of underdeveloped areas" (1956); and his *Economic Development* . . . (1959), pp. 275-293. On the need for a new theory of the development of the dual economy, see Jorgenson, "Testing alternative theories of the development of a dual economy" (1966); and Fei and Ranis, "Agrarianism, dualism and economic development" (1966).

<sup>528</sup> Boeke, *Economics and Economic Policy of Dual Societies* . . . (1953), pp. 12-20; Higgins, "The 'dualistic theory' of underdeveloped areas" (1956); and his *Economic Development* . . . (1959), p. 281; Jorgenson, "The development of a dual economy" (1961); and his "Surplus agricultural labour and the development of a dual economy"

(1967); Fei and Ranis, "A theory of economic development" (1961); and their *Development of the Labour Surplus Economy* . . . (1964), pp. 3, 7; Cairncross, *Factors in Economic Development* (1962), p. 21; Cotta, *Analyse quantitative de la croissance des pays sous-développés* (1967), p. 17. Fei and Ranis, "Agrarianism, dualism and economic development" (1966), made a distinction between agrarianism characterized by the overwhelming preponderance of agricultural pursuits, with other activities of relatively little importance; and dualism with as a central feature the coexistence of a large agricultural sector with an active and dynamic industrial sector.

<sup>529</sup> Higgins, "The 'dualistic' theory of underdeveloped areas" (1956); Das Gupta, "Underemployment and dualism—a note" (1964); Kindleberger, *Economic Development* (1965), p. 258; Jorgenson, "Surplus agricultural labour and the development of a dual economy" (1967).

<sup>530</sup> Lewis, "Economic development with unlimited supplies of labour" (1954). See also Higgins, *Economic Development* . . . (1959), pp. 353-357; Barber, "Disguised unemployment in underdeveloped economies" (1961); Enke, "Economic development with unlimited and limited supplies of labour" (1962); Jorgenson, "Surplus agricultural labour and the development of a dual economy" (1967).

<sup>531</sup> Lewis, "Economic development with unlimited supplies of labour" (1954), argued that in the capitalist sector wages would be higher due to conventional or institutional factors. On the existence of two distinct wage levels in the dual economy, see also Hirschman, "Investment policies and 'dualism' . . ." (1957); Higgins, *Economic Development* . . . (1959). Others have pointed out, however, that since labour is abundant wages in the capitalist sector would remain comparatively low: Boeke, *Economics and Economic Policy of Dual Societies* . . . (1953), pp. 142-144; Myint, *The Economics of the Developing Countries* (1965).



ist sector will continue to increase and the process will come to a halt only when capital accumulation has caught up with population and labour supply.

213. Eckaus, in his earlier mentioned study,<sup>532</sup> also analyses the case of under-developed and overpopulated economies in which two sectors can be distinguished: one where the relation between capital and labour is fixed, as might be typical for modern industrial activities, and one where a wide range of combinations of capital and labour are possible. On the basis of this model, he demonstrates that if the demand for output was such that a large part of the available capital is drawn into the fixed-coefficient, capital-intensive sector, which provides only limited employment opportunities, the remaining part of the abundant labour supply is pushed into the low productivity sector, with a high labour-capital ratio, but where at a certain stage unemployment is certain to appear.

214. The development of the dual economy with particular reference to the external sector was developed by Myint.<sup>533</sup> A country, according to Myint, starts a period of expansion when it is opened to economic relations with the outside world. At such a time the country may have a relatively sparse population in relation to natural resources. The development of the latter will be dominated by the production of primary goods for export and disequalizing factors start to operate between these advanced activities and groups and the traditional sector, thus giving rise to the emergence of economic and social dualism.

215. Most writers discussing "dualism" and the development of the "dual" economy have given only little attention to demographic considerations.<sup>534</sup> Lewis did not discuss in a systematic fashion the role of population growth in the development of the dual economy, but noted that population growth might be a source of additional labour supply which contributed to the unlimited supply of labour and that the growth of population would be relevant if it responded to economic development. He considered such a possibility likely, especially in the early stages of development, when mortality might decline without a simultaneous decrease of fertility. He also concluded that the surplus labour would eventually be

limited if the capitalist surplus would be growing more rapidly than population.<sup>535</sup> Eckaus showed that productivity might further decline and unemployment increase if the rate of population growth would exceed that of capital formation in the labour-intensive sector.<sup>536</sup> Myint noted that, whereas in the more developed countries, a time came when manpower became scarce, making it profitable for farmers to use more capital-intensive methods, in the less developed countries population growth brought about by the development of the modern sector meant that the supply of labour remained adequate, and instead of becoming scarce, labour later became in fact superabundant.<sup>537</sup> Other writers have also commented on the role of population in the development of an economy with unlimited supplies of labour. Minami noted that in those cases where labour force is growing rapidly and technological progress is limited, economic development is possible only if either the rate of growth of the labour force slows down or technological progress which is land-saving occurs.<sup>538</sup> Fei and Ranis underlined the fact that the faster the rate of population growth, the longer will be the take-off period and the more likely that the take off becomes impossible.<sup>539</sup> The importance of population in the development of the surplus-labour dual economy was, however, brought out, especially by Reynolds. Arguing that the kind of situation and models under consideration should be termed "high population growth" rather than "labour surplus" models, he stressed the fact that if the problem were merely one of absorbing a given initial labour surplus, the task might not be too difficult. The real difficulty, he asserted, is that that surplus is being continuously replenished by rapid population growth. Considering that most of the population increase accrues in the countryside, the important question in his view is whether labour-using inventions can be introduced rapidly enough in agriculture to hold back the decline in productivity and the increase in underemployment and its spread to the cities.<sup>540</sup>

<sup>532</sup> Eckaus, "The factor-proportions problem in underdeveloped areas" (1955). See also Higgins, *Economic Development* . . . (1959), pp. 325-330.

<sup>533</sup> Myint, "An interpretation of economic backwardness" (1954); and his *The Economics of the Developing Countries* (1965), chaps. 3-5. The case of an "open" dual economy has also been discussed by Barber, "Disguised underemployment in underdeveloped economies" (1961).

<sup>534</sup> Various other models of the development of the dual economy have been formulated, among them Jorgenson, "The development of a dual economy" (1961); and his "Surplus agricultural labour and the development of a dual economy" (1967); Fei and Ranis, "A theory of economic development" (1961); their *Development of the Labor Surplus Economy* . . . (1964); and their "Agrarianism, dualism and economic development" (1966); Sen, "Peasants and dualism, with or without surplus labor" (1966). For dualism viewed in regional terms see Hirschman, "Investment policies and 'dualism' . . ." (1957); and for the application of the development with unlimited supplies of labour to developed economies, see Kindleberger, *Europe's Postwar Growth* (1967).

<sup>535</sup> Lewis, "Economic development with unlimited supplies of labour" (1954). Higgins, *Economic Development* . . . (1959), p. 354, noted that even if economic development would not accelerate population growth, unlimited supplies of labour still would prevail if investment was not absolutely large relative to population growth, the industrial sector was small and population was growing rapidly. Jorgenson, "Surplus agricultural labour and the development of a dual economy" (1967), pointed out that Lewis's discussion on population was not integrated into his theory of economic development and that a sufficient condition for Lewis was the existence of an unlimited supply of labour.

<sup>536</sup> Eckaus, "The factor-proportions problem in underdeveloped areas" (1955).

<sup>537</sup> Myint, "An interpretation of economic backwardness" (1954).

<sup>538</sup> Minami, "Economic growth and labour supply" (1964).

<sup>539</sup> Fei and Ranis, "A theory of economic development" (1961).

<sup>540</sup> Reynolds, "Economic development with surplus labour . . ." (1969). Guha, "Accumulation, innovation and growth under conditions . . ." (1969), discussed the importance of population growth in holding down wages, as is assumed in the theory of development of the dual economy. The wage level, he asserted, can be held constant only if the absolute size of the agricultural population increases continuously. If not, capitalist expansion attracting workers from the land, would raise agricultural productivity, income and wages, raising also the wages in the capitalist sector and reducing profits, and thus the incentives for further accumulation.

216. The emergence and subsequent evolution of the "dual" economy with special reference to the population factor has been discussed by Higgins.<sup>541</sup> According to Higgins, at the beginning of the expansion process no factor of production is relatively abundant or scarce, but once the "population explosion" which accompanies the initiation of the industrialization process occurs, labour becomes redundant. This is so because the industrial investments which take place increase proportionately slower than population and, the technical coefficients in the modern sectors being relatively fixed, do not create sufficient employment opportunities for the entire population increase. Part of the larger population thus has to seek a livelihood in the traditional sector where, in the case of agriculture, the initial response to population growth is to bring additional land under cultivation. However, since both the amount of land and the capital which could be used in its exploitation are limited,<sup>542</sup> such possibilities are soon exhausted. Since the technical coefficients in the backward sectors are variable, as population increases further, the ratio of land and capital to labour will decline steadily; techniques will become increasingly labour-intensive and, as a result, marginal productivity will decline and disguised unemployment increase. Under these conditions, there will be no incentives for capital investments in the backward sectors, for labour-saving inventions or for higher effort on the part of labour. Thus, methods of production remain labour-intensive and the levels of techniques, productivity and income low.

217. In the case of the "dual" economy, the classical problem of the pressure of population on land, it has been noted, is considered in conjunction with the problem of the transfer of labour from the agricultural to the industrialized sectors of the economy. Development under these conditions requires a continuous shift towards industry and a rapid rate of labour absorption in these sectors.<sup>543</sup> Such a process requires, in the first place, large amounts of capital investments, but it raises, in addition, the question of the choice between alternative techniques of production and the possibilities of substitution between the factors of production and, especially, that of labour for capital.<sup>544</sup>

218. It is generally recognized that although in some cases factors of production are completely complementary, in the sense that they have to be used in fixed proportions, in most cases factor proportions can be varied. The extent to which factors of production can be and are substituted for each other depends both on technology and on the relative cost of the factors concerned.<sup>545</sup> As

noted before, it is often assumed that the possibilities of replacing capital by labour, especially in the modern sector, are limited,<sup>546</sup> but different opinions may be found on this question.

219. Findings as to the possibilities of substitution between factors of production are limited.<sup>547</sup> A number of authors have drawn attention to the considerable variations among countries in capital per person employed in a number of selected industries.<sup>548</sup> Bhatt, studying different input combinations on the basis of horsepower capacity, concluded that even in more developed countries technology is such as to permit the use of methods of varying capital intensity and that given the relative prices and the incentives for the use of less capital-intensive methods of production, less developed countries could adopt the least capital-intensive and the most labour-intensive method.<sup>549</sup> The analysis of data for a number of countries suggested that elasticity of substitution between capital and labour in manufacturing might typically be less than unity, while there was some indication that in primary production the situation might be the reverse.<sup>550</sup> In more general terms, it has been noted that findings suggest that in a certain number of activities it is technically feasible to substitute labour, as the abundant factor in developing countries, for capital, as the scarce factor.<sup>551</sup> It has also been observed, however, that even though capital-labour ratios can be varied considerably in such activities as transportation and construction without loss of efficiency and that in some industries it pays to use labour-intensive techniques, if labour is relatively abundant, such opportunities are limited. The technology which would permit a wide range of productive activities and would obtain high yields by using more labour in conjunction with capital does not exist.<sup>552</sup> It has, therefore, been argued that since goods and services are the joint product of labour and capital and since labour is not perfectly substitutable for other factors of production, output per worker tends to fall when, as a result of population and labour force growth, the amount of productive resources per worker declines.

<sup>546</sup> Notably Eckaus, "The factor-proportions problem in underdeveloped areas" (1955). Das Gupta, "Underemployment and dualism—a note" (1964), observed that in a technical sense the assumption of very limited factor proportions in industrial sectors is not necessarily true, but that institutional factors promoted the use of highly capital-intensive methods of production.

<sup>547</sup> A measure for such purposes is the elasticity of substitution which measures the speed with which the marginal productivity of one factor diminishes when it is substituted for another. See Allen *Mathematical Analysis for Economists* (1947), pp. 340-343; Arrow *et al.*, "Capital-labor substitution and economic efficiency" (1961); Babeau, "L'élasticité de substitution entre facteurs" (1964); and his "Elasticité de substitution. Répartition et croissance" (1964). See also on complementarity and substitution, Verdoorn, "Complementarity and long-range projections" (1956).

<sup>548</sup> For these data see Tinbergen, *The Design of Development* (1958), p. 73; and for their interpretation also Higgins, *Economic Development* ... (1959); Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), p. 285.

<sup>549</sup> Bhatt, "Employment and capital intensity" (1954).

<sup>550</sup> Arrow *et al.*, "Capital-labor substitution and economic efficiency" (1961).

<sup>551</sup> Abraham-Frois, *Essai sur le problème d'investissement* ... (1962), pp. 283-284.

<sup>552</sup> Higgins, *Economic Development* ... (1959), pp. 669-670, 672.

<sup>541</sup> Higgins, *Economic Development* ... (1959), pp. 325-330.

<sup>542</sup> Hirschman, "Investment policies and 'dualism' ..." (1957).

<sup>543</sup> Fei and Ranis, *Development of the Labor Surplus Economy* ... (1964), p. 3; and their "Agrarianism, dualism, and economic development" (1966).

<sup>544</sup> For a review of arguments in favour of, or against the use of capital-intensive as compared to labour-intensive methods of production, see section C of this chapter.

<sup>545</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 41-44; Mehta, *Economies of Growth* (1964), pp. 49, 52; Arrow *et al.*, "Capital-labor substitution and economic efficiency" (1961).

(b) *Population growth and the capital-output ratio*

220. Closely related to the aspects discussed in the preceding section is the effect of population growth on the capital-output ratio. In general terms, the use of the capital-output ratio in the Harrod-Domar type models<sup>553</sup> constitutes a deliberate theoretical simplification which does not, as a rule, correspond to reality. Its use not only implies the assumption of a fixed combination of capital and labour<sup>554</sup> but, in interpreting growth of income in terms of capital only, it does not explicitly take into account the role of other resources and factors in economic growth.<sup>555</sup> The over-all capital-output ratios are thought to be determined by a number of factors, the most important of which include: the nature of the production function for the whole economy, particularly with respect to returns to scale; the nature and direction of technological change; the relation of factor prices; the composition of demand and output.<sup>556</sup>

221. Various of the factors which determine the capital-output ratio are not independent of population growth and through them the latter may thus affect the capital-output ratio. Assuming, therefore, the capital-output ratio to be independent of the level of population growth implies an underestimation of the effects of population change.<sup>557</sup> In the present context, the implications of population growth for the structure of output and the patterns of investment, and for the factor proportions and the capital-output ratio are of special importance.<sup>558</sup>

222. Population growth is likely to affect the capital-output ratio through the patterns of investment in so far as a growing population needs certain overhead facilities. Such types of investment are not only lumpy but also have a high capital-output ratio. High population growth requires considerable investments in the expansion of educational facilities, as well as in the stock of capital

equipment in transportation, communications and so forth, or in general in not-directly productive investment, which will affect private investment, but may have repercussions especially for government spending.<sup>559</sup> One important category of investment that has received special attention in this connexion is the increased demand for housing, investment in which implies a high capital-output ratio, when population grows.<sup>560</sup>

223. While population growth tends, on the one hand, to increase the capital-output ratio through the structure of investment, it will tend to have the opposite effect, on the other hand, if it increases the relative scarcity of capital compared to labour. In general, it is assumed that the productivity of a given factor of production is greater the more abundant the supply of the other factor. Given the stock of capital and its increase, it is to be expected that the marginal capital-output ratio will be lower if the rate of population growth is higher since the same amount of capital would be associated with a larger labour force than if the population were growing more slowly. Conversely, it has been argued that a slowly growing population or a decline in the growth rate will imply a higher capital-output ratio.<sup>561</sup>

224. Various other arguments concerning the possible effect of population growth on the capital-output ratio are found in demographic literature. A rapid increase in population, it has been argued, permits capital accumulation without departing from the optimal ratio of labour to capital. In addition, a rapid population growth prevents the waste of capital by assuring markets for almost any investment.<sup>562</sup> In general, it appears that the assumption of a capital-output ratio independent of the growth of population and the labour force might exaggerate the disadvantages of a higher population growth as far as capital requirements are concerned. However, several writers have concluded that the tendency towards the increase of the capital-output ratio due to the increased demand for housing associated with population growth would outweigh the downward pressure on the capital-output ratio exerted by the other factors enumerated.<sup>563</sup>

<sup>553</sup> See section B of this chapter.

<sup>554</sup> The limitations of the Harrod-Domar model due to the assumption of fixed proportions were discussed especially by Solow, "A contribution to the theory of economic growth" (1956); and also Swan, "Economic growth and capital accumulation" (1956). See also Hahn and Mathews, "The theory of economic growth: a survey" (1964); Babeau, "Élasticité de substitution. Répartition et croissance" (1964).

<sup>555</sup> Belshaw, *Population Growth and Levels of Consumption* ... (1956), p. 91; Leibenstein, *Economic Backwardness* ... (1957), p. 177; Cairncross, *Factors in Economic Development* (1962), p. 99.

<sup>556</sup> Bruton, "Growth models and underdeveloped countries" (1955); Kurihara, *National Income and Economic Growth* (1961), pp. 134-135; Lewis, *The Theory of Economic Growth* (1963), pp. 202-213; Myint, *The Economics of the Developing Countries* (1965), pp. 94-98. Leibenstein, *Economic Backwardness* ... (1957), pp. 177-178, stressed the importance of the use of agents other than capital in the production process. Hirschman, *The Strategy of Economic Development* (1958), pp. 30-32, emphasized the importance of the level of development, arguing that whereas the use of a Harrod-Domar type model might be appropriate in the more developed countries, it would not be so in the less developed countries. For a general discussion, see also Redl, "Versuch einer ökonomischen Theorie ..." (1964).

<sup>557</sup> Myint, *The Economics of Developing Countries* (1965), p. 94.

<sup>558</sup> The effects of population growth on economies of scale and on technological progress are discussed below, as are some aspects of the interrelations between population growth and human capital, as opposed to physical capital.

<sup>559</sup> Coale and Hoover, *Population Growth and Economic Development* ... (1958), chaps. 13 and 16; Bruton, "Contemporary theorizing on economic growth" (1960); Kuznets, *Capital in the American Economy* ... (1961), pp. 327-341; Basch, *Financing Economic Development* (1964), p. 11; Myint, *The Economics of the Developing Countries* (1965), p. 116.

<sup>560</sup> Lewis, *The Theory of Economic Growth* (1963), pp. 205 ff.; Gordon, "Population growth, housing and the capital coefficient" (1956); Redl, "Versuch einer ökonomischen Theorie ..." (1964).

<sup>561</sup> Biswas and Mueller, "Population growth and economic development in India" (1955); Bruton, "Contemporary theorizing on economic growth" (1960); Lewis, *The Theory of Economic Growth* (1963), p. 205; Maddison, "Facts and observations on labour productivity ..." (1965).

<sup>562</sup> Clark, *The Conditions of Economic Progress* (1957); Higgins, *Economic Development* ... (1959), p. 648; Abraham-Frois, *Essai sur les problèmes d'investissement* ... (1962), pp. 84-85.

<sup>563</sup> Lewis, *The Theory of Economic Growth* (1963), p. 205; Redl, "Versuch einer ökonomischen Theorie ..." (1964). This conclusion would, however, be completely valid only if the need for housing gave rise to an effective demand.

(c) *Population growth and economies of scale*

225. The assumption that a proportionate increase in capital or in both capital and labour results in the same proportionate increase of output implicitly attributes all extra output to the additional labour and investment. Among the many other factors which contribute to production are the returns to scale. Population growth is thought to affect the possibilities for economies of scale in a number of ways, but as in the case of the size of population, these effects are to a great extent contingent on prevailing conditions and difficult to assess in specific terms.

226. Population growth, according to Sauvy, may in several ways contribute to creating additional economies of scale. A growing population, he asserts, increases the possibilities of advanced specialization of enterprises because of larger markets, of the specialization and division of labour for the working population and of reducing in relative terms those general costs of a nation, such as public outlays, which are independent of the size of the nation or increase less rapidly than the number of people.<sup>564</sup> Spengler also stressed the opportunities for the division of labour, the extent of the market and a decrease of the proportion of the population needed to provide basic social services, such as military and political security, so that relatively more manpower would be available for other purposes.<sup>565</sup>

227. However, a country that is already assured of most of the benefits of the economies of scale through the mere size of its population will profit little from the further growth of population. A nation with a high growth rate and a population that is already large in absolute terms cannot expect that further increases in its size will mitigate the economic disadvantages of population growth by providing economies of scale, according to some views. Spengler noted the economic limitations to the division of labour and other factors involved in economies of scale,<sup>566</sup> and similar conclusions were reached by other writers.<sup>567</sup> The existence of increasing returns to scale may be more likely, it has been argued, in the economically advanced countries where primary production, in which diminishing returns may be most important, represents in most cases a small part of total output and where technological progress and economies of scale are "built-in" in the economies.<sup>568</sup> By a similar reasoning, it might be assumed that a declining population would cause diseconomies of scale, but definite conclusions in this respect do not appear to be possible.<sup>569</sup> Contrary to the developed countries, diseconomies of scale may be more typical for developing countries when population is

<sup>564</sup> Sauvy, "Croissance de la population et productivité" (1963).

<sup>565</sup> Spengler, "Demographic patterns" (1954).

<sup>566</sup> *Ibid.*

<sup>567</sup> Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 80 ff.; Stassart, *Les avantages et les inconvénients économiques* ... (1965), pp. 160-164.

<sup>568</sup> Myint, *The Economics of the Developing Countries* (1965), p. 94.

<sup>569</sup> Reddaway, *The Economics of a Declining Population* (1939), pp. 145-146; Robinson, "Economic consequences of a decline in the population ..." (1951).

increasing. The arguments against the advantages of high rates of population growth in view of possible economies of scale are especially strong in developing countries that are small in size and have relatively limited natural resources. In these countries, any advantage of economies of scale resulting from a larger population tend to be balanced by diminishing returns due to an increasing relative scarcity of natural resources. Such tendencies could be countered either by a faster accumulation of capital or an expansion of external trade.<sup>570</sup>

(d) *Population growth, human capital and productivity*

228. Recent literature has emphasized the shortcomings in envisaging economic growth predominantly as a function of the mere amounts of capital or land. As it became clear that the long-term trends in economic growth could not be explained in terms of these conventional factors, the literature has given an increasing emphasis to other determinants of economic growth and among these the role of human capital has come to be considered as one of the most important.<sup>571</sup> The traditional concepts of capital and resources are accordingly extended to include human capital and resources, which are thought to be a crucial factor in the performance and progress of the economy and society. Expenditures on education, health and the promotion of mobility contributing directly to the knowledge, skills, capacity and availability of the country's population are, in the view of many writers, investments which greatly improve the quality of human effort and its productivity.<sup>572</sup> In terms of their contribution to economic growth, these investments, it is contended, are at least as important as other forms of capital and resources, or even more so.<sup>573</sup>

229. The concept of human capital may be defined in various ways. In general terms, it has been said to include the skills, aptitudes and acquired traits that contribute to higher production and productivity.<sup>574</sup> More specifically, the following types of investments in human capital have been distinguished: formal education at different levels; on-the-job training and apprenticeships; study programmes for adults and self-development; improvements in health, including those that increase the life expectancy, strength, vigour and vitality of the population; improvements in nutrition; and measures stimulating migration so that the supply of labour adjusts itself

<sup>570</sup> Sauvy, "Evolution récente des idées sur le surpeuplement" (1960).

<sup>571</sup> See section B of this chapter.

<sup>572</sup> Schultz, "Investment in man ..." (1959); his "Investment in human capital" (1961); and his *The Economic Value of Education* (1963), p. 2; Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964), p. 2; Goode, "Adding to the stock ..." (1959); Becker, *Human Capital. A Theoretical and Empirical Analysis* ... (1964); Johnson, "Towards a generalized capital accumulation approach ..." (1964); Piatier, *Equilibre entre développement économique* ... (1962).

<sup>573</sup> Schultz, "Investment in man ..." (1959); and his "Education and economic growth" (1961). For an early view see Nicholson, "The living capital of the United Kingdom" (1891).

<sup>574</sup> Goode, "Adding to the stock ..." (1959). On the problem of definition see also Debeauvais, "The concept of human capital" (1962).

to changing job opportunities.<sup>575</sup> Among these different categories of human capital, education is often singled out, and many authors have stressed the importance of knowledge, skills and training of the working force for productivity.<sup>576</sup>

230. Whereas expenditures on education may be considered as consumption as well as investment, it is the latter aspect which is emphasized in human resources development. Nevertheless, in practice it may be difficult and, according to some authors, virtually impossible to distinguish between the two and it is for this reason that the calculation of the rate of return on educational programmes in the same way as that of investment in physical capital is thought to be very difficult.<sup>577</sup> In addition, the acquisition of skills and knowledge through education and various forms of training is not without cost. Apart from the direct expenditures, the cost of education also involves the earnings which students forgo when they continue their schooling after the time they could have entered the working force and, it has been asserted, that this latter category constitutes probably the most important cost element.<sup>578</sup>

231. While, in general, investment in human and physical capital complement each other, in a more immediate sense they compete with each other, the more so since investments in human capital are not directly productive, and thus tend to lower the rate of return on investments in the short run, even though in a longer time perspective they are a basic requirement for economic development and may give a high rate of return both for the individual and society.<sup>579</sup> Nevertheless, where resources are scarce, investments in education and human capital may suffer. It has been noted, for instance, that earnings forgone may be an important factor in reducing the schooling of children of low-income and rural families and in increasing the rate of drop-outs.<sup>580</sup>

<sup>575</sup> Schultz, "Investment in human capital" (1961); and his *The Economic Value of Education* (1963), p. 53; Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964), pp. 2-3. See also Weisbrod, "Education and investment in human capital" (1962); Johnson, "Towards a generalized capital accumulation approach ..." (1964).

<sup>576</sup> Goode, "Adding to the stock ..." (1959); Schultz, *The Economic Value of Education* (1963), p. viii; Organisation for Economic Co-operation and Development, *Forecasting Educational Needs* ... (1962), p. 7.

<sup>577</sup> Schultz, "Investment in human capital" (1961); Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964), p. 11; Blaug, "The rate of return on investment in education ..." (1965); Bowen, "Assessing the economic contribution of education" (1963); Eicher, "La rentabilité de l'investissement humain" (1960). For a critical view, see Shaffer, "Investment in human capital: a comment" (1961) and for further discussion Schultz, "The concept of human capital ..." (1961). For a formula on estimating the efficiency of human investment in general, see Piatier, *Equilibre entre développement économique* ... (1962).

<sup>578</sup> Schultz, "Investment in human capital" (1961); and his *The Economic Value of Education* (1963), p. 5; Piatier, *Equilibre entre le développement économique* ... (1962); Bruton, *Principles of Development Economics* (1965), p. 205; Becker, *Human Capital. A Theoretical and Empirical Analysis* ... (1964), chap. 2.

<sup>579</sup> Belshaw, *Population Growth and Levels of Consumption* ... (1956), pp. 108-109; Schultz, *The Economic Value of Education* (1963), p. 22; Bruton, *Principles of Development Economics* (1965), pp. 208-209.

<sup>580</sup> Schultz, *The Economic Value of Education* (1963), p. 6.

232. In general, the implications of population growth for the formation of human capital have not as yet been fully explored. In general, it has been said that the question of numbers is at the root of the human resources problem,<sup>581</sup> and that if population grows rapidly and savings are not high enough to satisfy both the demand for investment in education or human capital and the requirements in terms of physical capital, then the levels of productivity, employment and economic progress are bound to suffer.<sup>582</sup>

#### (e) *Population growth, technological progress and productivity*

233. The role of technological progress and change in the process of economic growth and development has been widely recognized.<sup>583</sup> In its turn, population growth may be ranked among those factors which play a role in determining the level and rate of technological change. While a rapidly growing population and labour force is commonly believed to raise the problem of the choice of techniques and to contribute to the introduction of new techniques or wider use of existing ones,<sup>584</sup> population growth and the demographic trends associated with it are also thought to affect or induce technological progress in a direct manner.

234. The concept of technological progress is not easily defined; in general terms it may be described as the process by which output increases with the same factors of production and, particularly, labour. Or it may be considered to encompass those changes which increase the productivity of the available factors of production.<sup>585</sup> As such, technological progress is intimately related to the increase in knowledge, but in discussing the process a distinction is usually made between invention, in the sense of a discovery or development of a new technique and innovation and the application and utilization of the new techniques in the production process.<sup>586</sup> As far as the nature of technological progress is concerned, it is classified, as a rule, as labour saving, capital saving or

<sup>581</sup> United Nations, *World Economic Survey, 1967, Part 2* ... (1968), p. 4.

<sup>582</sup> Bruton, *Principles of Development Economics* (1965), pp. 214-215.

<sup>583</sup> See, for instance, Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* ... (1949); Lewis, *The Theory of Economic Growth* (1963); Kuznets, *Modern Economic Growth* ... (1966). For attempts to assess the influence of technological progress and, in general, of the intangible factors in economic growth, see Denison, *The Sources of Economic Growth in the United States* ... (1962); and his *Why Growth Rates Differ* ... (1967); Kendrick, *Productivity Trends in the United States* (1961); Solow, "Technical progress, capital formation and economic growth" (1962).

<sup>584</sup> See the discussion earlier in this section as well as in section C.

<sup>585</sup> Schumpeter, *The Theory of Economic Development* ... (1961). Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* ... (1949); Letinier, "Population et chômage—quelques réflexions théoriques" (1954); Evans, Mack and Wickens, "The production and consumption economics of growth" (1956); Higgins, *Economic Development* ... (1959), p. 126; Hahn and Matthews, "The theory of economic growth: a survey" (1964); Fellner, "Trends in the activities generating technological progress" (1970).

<sup>586</sup> Nurkse, *Problems of Capital Formation* ... (1953), p. 3; Leibenstein, *Economic Backwardness* ... (1957), pp. 135-139; Higgins, *Economic Development* ... (1959), p. 246; Rostow, *The Process of Economic Growth* (1960), chap. 2; Lewis, *The Theory of Economic Growth* (1963), chap. 4.

neutral. The first two of these imply, as their names suggest, a technological change with a saving in either labour or capital compared to the other. While neutral technological change suggests an equal saving of both factors, its exact nature is not unambiguous, and a number of different definitions of this concept have been proposed.<sup>587</sup>

235. Technological progress is determined by a large number of factors, among them the increase of pure knowledge; research and development; market organization; entrepreneurship and so forth, but little is known as to whether or how these aspects are affected by demographic factors. A possible indirect effect of population growth in this respect, however, has been pointed out by Kuznets, who argued that population growth would produce a larger number of exceptionally talented and gifted individuals who, assuming the necessary resources for education and training, would contribute to a more rapid increase in the stock of useful and applied knowledge which, in Kuznets's opinion, is the most important factor in the growth of *per capita* output.<sup>588</sup>

236. It is a more or less generally accepted proposition that the direction and extent of inventive and innovative activities are influenced by relative factor scarcities and thus indirectly by demographic factors, especially the size and rate of growth of population relative to land and capital. Particularly on the basis of the experience of the economically more developed countries, it has been argued that a scarcity of labour induces the development and introduction of labour-saving techniques. Profit maximization, it is argued, leads firms to direct innovative activities towards techniques which save on the most slowly growing factors.<sup>589</sup> The assumption that the growth of the active population or employment dominates the choice of techniques, either directly or indirectly through capital accumulation, is often also implied in theoretical or empirical studies.<sup>590</sup> Analogously, it is sometimes held that in those developing countries where labour is abundant, a pressure may exist to use more capital-saving techniques.<sup>591</sup>

<sup>587</sup> For different definitions of neutral technological progress, see, for instance Pigou, *The Economics of Welfare* (1932), pp. 632-638; Harrod, *Towards a Dynamic Economics* . . . (1948; 1963 ed.), pp. 24-25; Robinson, *Essays in the Theory of Employment* (1947); Solow, "Technical change and . . ." (1957); Meade, *A Neo-Classical Theory of Economic Growth* (1964).

<sup>588</sup> Kuznets, "Population change and aggregate output" (1960).

<sup>589</sup> Kennedy, "Induced bias in innovation and the theory . . ." (1964); Phelps, "Second essay on the golden rule . . ." (1965); Phelps and Drandakis, "A model of induced invention, growth and distribution" (1966).

<sup>590</sup> Bouthoul, *La surpopulation dans le monde* . . . (1958), chap. 4; Kuznets, "Population change and aggregate output" (1960); Fellner, "Two propositions in the theory of induced innovations" (1961); Habakkuk, *American and British Technology in the Nineteenth Century* . . . (1962); Bertin, "Le lien population-progrès technique . . ." (1964); Hahn and Matthews, "The theory of economic growth: a survey" (1964).

<sup>591</sup> Stassart, *Les avantages et les inconvénients économiques* . . . (1965), p. 137; Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 46; Sauvy, *Théorie générale de la population*, vol. 2 . . . (1959). Habakkuk, "Population problems and European economic development . . ." (1963), argued that an abundance of labour provides more opportunities for trying out new methods of production and leads to a more rapid absorption of existing technical knowledge.

237. Various writers have discussed in more general terms the role of population growth in technological progress. Dupréel, in his theory, asserted that population growth tends to raise levels of living through the effect it has on the augmentation of social mobility and personal contacts which serve as stimuli, a more optimistic and enterprising climate of expectation, and through the direct effects it has on the intensification of the rate of technological progress and innovation. These and other effects, in his opinion, would more than offset any adverse consequences of population growth.<sup>592</sup> In a recent study, population increase was directly related to agricultural techniques in pre-industrial economies. An analysis of techniques used under different fallows systems as applied in primitive agriculture revealed, the study suggested, that population growth was a major determinant of technological progress. The underlying assumption was that at low levels of development the agricultural techniques in use were those that required the least effort for the highest yield per man-hour—such as forest fallows. As population increased, the possibilities for continuing such techniques of extensive cultivation became more limited and a change of techniques, or a shift to a different system, was inevitable. Such changes, it is argued, took place only under population pressure, and not spontaneously, because output per man-hour was highest under systems of extensive cultivation. Output per worker, however, would probably increase, as under more intensive cultivation caused by population pressure, the input of man-hours would increase more than productivity per man-hour declined.<sup>593</sup> The thesis that the growth of population and the increased pressure on levels of living it caused would call forth a reaction against the possibility of such a decline was advanced by Hirschman. He argued that population pressure on levels of living would lead to activities aimed at maintaining or restoring the traditional levels of living and such activities would induce an increased ability to control the environment and to organize the society for its subsequent development. Although he recognized that as an inducement mechanism, population pressure is among the least desirable ones, he nevertheless held that it presents the developmental forces with an opportunity to assert themselves.<sup>594</sup>

238. Certain reservations as to the effects of population growth on productivity have been formulated by a number of writers. Schumpeter, who stressed the role of the *entrepreneur* in economic growth, affirmed that by itself an increase in population often would have no other effect than to depress levels of living, although in conjunction with technological progress, it might be a powerful driving force for economic growth.<sup>595</sup> Whereas many authors agree that population growth may in principle lead to technological change favouring more labour-intensive techniques, they express doubts for several

<sup>592</sup> Dupréel, *Deux essais sur le progrès* (1928). See also Landry, *Traité de démographie* (1949), pp. 581-582.

<sup>593</sup> Boserup, *The Conditions of Agricultural Growth* . . . (1965).

<sup>594</sup> Hirschman, *The Strategy of Economic Development* (1958), pp. 178 ff.

<sup>595</sup> Schumpeter, "The creative response in economic history" (1947). See also Bonné, *Studies in Economic Development* . . . (1957), p. 69; Goodwin, "A model of cyclical growth" (1955).



reasons as to the practicability of such a solution. In the first place, it is argued that most innovations originate in the already developed countries where labour, rather than land or capital, is the scarce factor. Hence new techniques in the developed countries mainly tend to be labour-saving and capital-using, while the opposite are needed in the developing countries.<sup>596</sup> Alternatively stated, population growth, by keeping the population-resources ratio high, mitigates against the introduction of advanced production methods, especially where modern technology is embodied in the capital equipment. Although it does not make impossible the introduction of modern technology in developing countries, rapid population growth, it is asserted, tends to weaken the possibilities and incentives to do so.<sup>597</sup> Sauvy listed, among the conditions under which the economy and productivity would adapt itself to population growth, the fact that demographic growth must be gradual and progressive and that a certain stage of development should already have been attained.<sup>598</sup>

239. In addition to the factors discussed, population growth may affect technological progress indirectly through the structure of the stock of capital and the flexibility of the labour force. As far as the first of these two factors is concerned, it has been argued that the aggregate stock of capital, given other conditions, will grow faster when the rate of population growth is higher. Consequently the average age of capital will be lower and a larger fraction of it will incorporate recent knowledge and advanced technology.<sup>599</sup> As far as the adaptability of the population growth to technological change is concerned, the argument is that population increase facilitates the structural and occupational changes required by technological progress. A stationary population will have fewer new entrants into the labour force and it is especially young workers who adapt themselves more easily to changing employment opportunities.<sup>600</sup> However, both these arguments appear to be fully valid only in the developed countries, where capital is not a scarce factor and population and labour force growth is moderate rather than high.

<sup>596</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 46.

<sup>597</sup> Faaland, "Demographic aspects of savings ..." (1966). On new technology being embodied in capital, see Lewis, "Economic development with unlimited supplies of labour" (1954); Higgins, *Economic Development* ... (1959), p. 329; Mellor, *The Economics of Agricultural Development* (1966), p. 31.

<sup>598</sup> Sauvy, "Evolution récente des idées sur le surpeuplement" (1960). See also Reboud, *Essai sur la notion de chômage structurel* ... (1964), pp. 118-119.

<sup>599</sup> Keynes, "Some economic consequences of a declining population" (1937); Sauvy, *Théorie générale de la population*, vol. 1 ... (1956), chap. 20; and his "Croissance de la population et productivité" (1963); Spengler, "Population change: cause, effect, indicator" (1961); Kaldor, "Economic growth and the problem of inflation" (1959); Stassart, *Les avantages et les inconvénients économiques* ... (1965), pp. 142-144.

<sup>600</sup> Sauvy, *Malthus et les deux Marx* ... (1963), pp. 175-176; and his "Croissance de la population et productivité" (1963). See also Stassart, *Les avantages et les inconvénients économiques* ... (1965), p. 180.

#### 4. INTERNATIONAL MIGRATION AND PRODUCTIVITY

240. As discussed earlier, migrations from one country to another respond, in many cases, to the economic opportunities assumed to exist in the country of destination. To the extent that such expectations on the part of the emigrants are fulfilled, their levels of income and productivity will be higher than before migration. The implications of emigration and immigration for the overall levels of productivity in the countries of origin and destination, respectively, depend, however, on a number of factors. Among these are the effects on the relative scarcity or abundance of labour as compared with other factors of production, including the skills and training of the migrants; on the possibilities of factor substitution, resource use and capital formation; on economies of scale; and on technological change.

241. Since immigrants, in many cases, are males of working age, immigration by increasing the relative size of the economically active population will tend to raise income per person, though not necessarily income per worker. The latter might be expected to occur where international migration brings about a more efficient combination of factors of production. In countries of immigration, the inflow of workers will lead to a higher productivity when labour is scarce in comparison with other factors of production. In countries of emigration, such an effect would result if unemployment or underemployment existed or, more generally, if the relation between labour and other resources, and especially the capital-labour ratio, would improve.<sup>601</sup> It has been pointed out that in considering these effects of emigration and immigration on production and productivity, labour cannot be considered as homogeneous and that allowance must be made for the qualifications and skills of the migrants and the complementarity between different types of labour. If, in countries of emigration, the supply of qualified labour is limited, even though general unemployment is high and productivity low, emigration of the former would be likely to result in even higher unemployment and lower productivity.<sup>602</sup> Although less probable, in principle a similar effect might occur in countries of immigration if large numbers of unskilled immigrants would cause or increase a shortage of qualified workers.

242. Migration may lead to a number of substitutive and complementary effects in countries of emigration and immigration which may affect productivity adversely in some cases, positively in others. Immigration will tend to lower the capital-labour ratio, make capital services more expensive, compared to labour, and cause wages to decline. Emigration is likely to have the opposite effects. Consequently, in countries of immigration, capital will be used more intensively per unit of labour or, alternatively stated, labour will be substituted for capital. The importance of such an effect depends, however, on the qualifications of the labour force, the type of industry

<sup>601</sup> Spengler, "Effects produced in receiving countries ..." (1958); International Labour Office, *International Migration, 1945-1957* (1959), pp. 363-364; Reder, "The economic consequences of increased immigration" (1963); Zolotas, "La migration internationale des travailleurs ..." (1967).

<sup>602</sup> Isaac, *Economics of Migration* (1947), pp. 203-204.



and, more generally, the technical possibilities of factor substitution. If the immigrant labour is unskilled, it may be argued that less capitalized and more labour-intensive industries can absorb more immigrant labour comparatively easily because their expansion requires less investment, and these industries will respond more to a fall in wage rates caused by immigration. The absorption of immigrant labour in highly capitalized industries will not only require much larger investment outlays; in addition, since in these industries the wage rate has only a small effect on the production costs and the possibilities of introducing more labour-intensive methods of production take longer because of the existing bulk of equipment, the response to a decrease in the wage rate is likely to be small.<sup>603</sup> Although various writers, in general, contend that substitution of factors of production may be likely in the case of immigration and emigration,<sup>604</sup> others have argued that possibilities of substitution are in both cases limited in view of the complementarity of factors of production and the limited technical possibilities for substitution.<sup>605</sup>

243. Indirectly, international migration may affect *per capita* income and productivity through the effect it has on the utilization of natural resources, investment and labour-force participation. As noted, an increased labour supply through immigration may reduce the real wage rate and increase the rate of return on capital. This in turn, it is asserted, would increase the incentives for capital formation. In countries of emigration, the opposite is assumed to take place; to the extent that the supply of labour becomes scarce and real wages increase, the marginal productivity of capital will decline and, in so far as the latter determines investment, so will capital formation.<sup>606</sup> Whether these effects of immigration and emigration would compensate respectively for the increased and the diminished product per worker caused by the original change in factor proportions following the migration cannot easily be determined.<sup>607</sup>

244. Immigration by increasing the size of the population may create, according to some, economies of scale. By enlarging the size of a country's market, immigration provides opportunities for the division of labour and industrial differentiation which may affect some of the increases in costs resulting from immigration.<sup>608</sup> In addition, if immigrants engage in the country of immigration in activities complementary to those of the country of emigration, international migrations may give rise to

an increased international specialization and division of labour which, it is argued, could benefit both countries of emigration and immigration.<sup>609</sup> However, it has also been asserted that international migration does not necessarily contribute to the international division of labour, but rather that it may lead to a more efficient combination of the factors of production.<sup>610</sup> It has also been argued that emigration tends to improve a country's terms of trade, whereas immigration tends to lead to their deterioration.<sup>611</sup> In this connexion it has also been noted that if goods could be moved freely and without transportation costs and certain other conditions were realized, international trade could equalize both prices of goods and those of labour. Although such conditions are unlikely to be found in practice, it is nevertheless held that, within limits, international trade could be a substitute for international migration.<sup>612</sup>

245. International migration can in a number of ways contribute to technological progress and knowledge. Immigration of technical and other skilled labour will by itself improve the stock of technical knowledge. Even unskilled labour may affect the state of techniques if, as a result of the immigration of unskilled labour, the wages of such workers would decline. Under these conditions new inventions and processes might be developed to substitute unskilled for other labour.<sup>613</sup> However, the view has also been advanced that the abundance of unskilled labour resulting from immigration could hold back technological progress. The argument is that it discourages the development of labour-saving techniques which might evolve if a labour shortage were to exist.<sup>614</sup> Immigration into the United States accompanied by the import of capital is thought to have been an important factor in bringing about a technological transformation during the late nineteenth and early twentieth centuries.<sup>615</sup>

246. International migration may affect productivity indirectly in a number of ways. It is usually assumed that international migration is selective as far as the character of the migrants are concerned, so that among migrants there is a high proportion of individuals who are willing to take risks, and who have initiative, entrepreneurship and so forth. Immigration is also said to increase the mobility of the population. The degree of mobility of the working population, in particular, would increase if the occupational composition of the immigrants were different from that of the labour force of the country of

<sup>603</sup> Isaac, *Economics of Migration* (1947), pp. 210-215; Zolotas, "La migration internationale des travailleurs ..." (1967).

<sup>604</sup> Spengler, "The economic effects of migration ..." (1958); Reder, "The economic consequences of an increased immigration" (1963); Mishan and Needleman, "Immigration: long-term economic consequences" (1968).

<sup>605</sup> Isaac, *Economics of Migration* (1947), p. 215; Pigou, *The Economics of Welfare* (1932), p. 662; Thompson, "The demographic and economic implications ..." (1947). Zolotas, "La migration internationale des travailleurs ..." (1967).

<sup>606</sup> Reder, "The economic consequences of increased immigration" (1963); Zolotas, "La migration internationale des travailleurs ..." (1967).

<sup>607</sup> Reder, "The economic consequences of increased immigration" (1963).

<sup>608</sup> Spengler, "The economic effects of migration ..." (1958).

<sup>609</sup> *Ibid.* See also Thomas, *Migration and Economic Growth ...* (1954); Duesenberry, "Some aspects of the theory of economic development" (1950).

<sup>610</sup> Isaac, *Economics of Migration* (1947). See also Taft and Robbins, *International Migrations ...* (1955), p. 81.

<sup>611</sup> Thomas, *Migration and Economic Growth ...* (1954); Spengler, "The economic effects of migration ..." (1958); Rostow, *The Process of Economic Growth* (1960), chaps. 8-9.

<sup>612</sup> Ohlin, *Interregional and International Trade* (1967); Samuelson, "International trade and the equalisation of factor prices" (1948); and his "International factor-price equalisation once again" (1949); Kindleberger, *Foreign Trade and the National Economy* (1962).

<sup>613</sup> Isaac, *Economics of Migration* (1947), pp. 216-217; Davie, *World Immigration ...* (1947), pp. 238-239.

<sup>614</sup> Fairchild, *Immigration* (1925), pp. 342-343.

<sup>615</sup> Thomas, *Migration and Economic Growth ...* (1954).

immigration or when immigration facilitated fundamental changes in the occupational structure.<sup>618</sup>

##### 5. INTERNAL MIGRATION, URBANIZATION AND PRODUCTIVITY

247. The links between internal migration and urbanization, on the one hand, and levels and trends of productivity, on the other, are strong. These interrelations derive from the close association between the redistribution of population and the changes in the structure of the economy as one of the most important correlates of economic development. Internal migration determines, but is also determined by, the process of structural and geographical change of the economy, its development and increases of levels of living and productivity. Nevertheless, this interdependence between such changes in the economy and the geographical distribution of the population does not imply of necessity a balance between the two. The lack of such a balance is an important additional factor in the effects of internal migration on productivity.

248. Internal migration, like international population movements, is thought to respond to a large extent, although not exclusively, to economic opportunities. Since internal migration is predominantly a movement towards areas with greater earning opportunities, such migrations are important factors in productivity increase and economic growth. By accelerating the shift of labour from activities characterized by comparatively low productivity to others with higher productivity, the migration of labour raises the productivity of the economy as a whole, even if that of individual activities remains constant.<sup>617</sup> It has been observed, however, that internal movements of labour, as well as capital, do not lead, as is often assumed, to a reduction of inequalities in income and productivity. Internal migration, it is argued, generally has a high degree of selectivity, especially with respect to age. Out-migration, by reducing the proportion of young workers, not only affects the dependency ratio but also the productive capacity of the remaining population, since it is likely to be more tradition-oriented and with less initiative.<sup>618</sup>

249. Among the different forms of internal migration, rural-urban movements are as a rule the most important, both in volume as well as in their effect on levels of productivity. The geographical concentration of economic activities in urban areas creates the economies of scale which are a basic characteristic of modern industrial and

related activities. Levels of urbanization, therefore, are not only an index of economic and social development but also a stimulus to change. Rural-urban migration is a condition for large-scale economic expansion and development, thus implying increasing levels of income for the population transferring from less productive pursuits to urban employment and increased productivity for the population as a whole.<sup>619</sup>

250. However, a number of authors have pointed out that in many developing countries factors may be at work which cause levels of rural-urban migration to increase beyond the absorptive employment capacity of the city. "Over-urbanization" in this sense is ascribed mainly to the pressures of population on natural resources and the high levels of underemployment in rural areas which act as "push" factors. A too rapid urbanization, which is the consequence of this "push" from rural areas instead of the "pull" exerted by urban demand, will affect economic progress in a number of ways, according to these views. Implying an excessive supply of labour, the workers thus affected will find employment only in activities with low productivity, or become unemployed. The rapid urbanization, in addition, will require economic and social infrastructure investments, and this demand for the less directly productive projects will absorb a considerable part of the already scarce capital resources. Excessive urbanization, therefore, it is concluded, will hold back economic development and rapid increases in productivity.<sup>620</sup>

251. These views, however, have not been generally accepted. While it is granted that migrants are often absorbed in low productivity employment, the argument is advanced that nevertheless such employment is more productive than the rural work. Also, it is thought that the infrastructure investments would have to be made anyway and that in urban areas they are more productive than in the countryside.<sup>621</sup> More generally, the viewpoint has been advanced that over-urbanization has its limits, and that unless the demand for urban labour is increasing rapidly, large shifts to the cities caused by push factors are unlikely. Also to the extent that cities are the locale of modern, highly productive activities, the concentration of population in urban areas constitutes a potential and stimulating factor for economic change and progress.<sup>622</sup>

<sup>618</sup> Spengler, "Effects produced in receiving countries . . ." (1958).

<sup>617</sup> International Labour Office, *Why Labour Leaves the Land . . .* (1960), pp. 7, 246; Okun and Richardson, "Regional income inequality and internal population migration" (1962); Kuznets, "Introduction: population redistribution, migration and economic growth" (1964); Beckerman, *The British Economy in 1975* (1965), p. 23; Bogue, "Internal migration, with special reference . . ." (1966).

<sup>618</sup> Myrdal, *Economic Theory and the Underdeveloped Regions* (1957), pp. 28 ff.; Hirschman, "Investment policies and 'dualism' . . ." (1957); and his *The Strategy of Economic Development* (1958), chap. 10; Williamson, "Regional inequality and the process of national development . . ." (1965). For a critical view, see Okun and Richardson, "Regional income equality and internal population migration" (1962).

<sup>619</sup> Lewis, *The Theory of Economic Growth* (1963), pp. 337-338; Davis and Golden, "Urbanization and development of pre-industrial areas" (1954); Bogue, "Internal migration, with special reference . . ." (1966); Reynolds, "Economic development with surplus labour . . ." (1969).

<sup>620</sup> United Nations, *Report on the World Social Situation . . .* (1957), p. 124; Davis, "Internal migration and urbanization . . ." (1955); United Nations, *Urbanization in Asia and the Far East* (1960), p. 133; Hauser and Medina Echavarria, eds., *Urbanization in Latin America* (1961), p. 37; Lewis, *The Theory of Economic Growth* (1963), p. 338; Bogue, "Internal migration with special reference . . ." (1966).

<sup>621</sup> Sovani, "The analysis of over-urbanization" (1964).

<sup>622</sup> Davis and Golden, "Urbanization and development of pre-industrial areas" (1954); International Labour Office, *Why Labour Leaves the Land . . .* (1960), p. 209; Sovani, "The analysis of over-urbanization" (1964).

## 6. DEMOGRAPHIC AND NON-DEMOGRAPHIC DETERMINANTS OF PRODUCTIVITY

252. The foregoing considerations of the effects of demographic factors on productivity suggest in general terms that population size, growth and characteristics may be significant factors in determining the levels of productivity and of the performance of the economy as a whole. However, the exact extent of the implications of population factors for economic growth and development are still far from clear, partly because of the complexity of the problems involved.

253. Much of the discussion on this subject has centred around the effects demographic factors have on productivity by means of the availability of factors of production and the existence of different techniques. Various of the conclusions concerning the implications of other factors of production have to be, at least in part, modified if the possibility of a choice between different techniques is taken into account. Nevertheless, the view that ultimately this does not fundamentally change the finding that pressure of population on other resources tends to depress and retard levels and rates of economic growth and development appears to be supported, at least in theory.

254. Knowledge of the direct influence which demographic factors exert on technological progress and other intangible determinants of economic growth is extremely limited. Some factors, such as population size and growth and age distribution, might create conditions favourable for economies of scale, the introduction of new techniques and so forth. However, the extent to which demographic factors do actually, as opposed to potentially, contribute to raising levels of productivity, in general, is difficult to establish. In view of the large number of determinants which affect the levels of performance of the economy in this respect, it may be doubted whether the effects of demographic factors are predominant. However, it may be argued that their potential significance justifies a more penetrating and more exhaustive analysis than has been attempted so far, even though, as the existing literature already suggests, an exact assessment and appraisal of the demographic factors as determinants of productivity and economic progress may be found to be impossible.

### E. Some principal interrelations

255. Over the last decades, there has been an impressive increase in the literature on the interrelations between population and economic growth and development. The major factor in this evolution has been the widespread preoccupation with the problems of economic progress in the developing countries, on the one hand, and their demographic trends and characteristics, on the other. No doubt large gains have been made in the understanding of these complex processes and their interaction. But despite this better insight into the demographic-economic interrelations, acquired in the recent past, this knowledge is as yet far from exhaustive and substantial gaps remain, at least as far as the demographic aspects of economic

growth and development discussed in this chapter are concerned.

256. Among the interrelationships between demographic factors and determinants of economic growth which have been most exhaustively discussed are the effects of population growth and age composition on the rate of savings and investments. The basic argument is that to the extent that consumption needs of the individual vary with his age, the age composition of the population is thought to be an important factor in determining total consumption needs and thus, for a given income, the residual which can be saved. Firm evidence, even though of an indirect nature, on the effect of the age distribution on consumption has, however, been provided especially through studies of the consumption levels and patterns of households and families. The results of such analyses generally confirm that, other factors being equal, a decrease in saving capacity occurs as the size of the family, and particularly the number of children, increases. The further development of this approach and the incorporation of family life cycle analyses in it might, it appears, contribute substantially to a better understanding of the effects of age composition on capital formation. However, such studies would relate mainly to the effects of the age structure on savings by households; they would add little to the knowledge concerning its implications for capital formation in the public sector, an area which despite its growing importance even in the non-socialist countries, has not been extensively explored.

257. The influence of population growth on consumption and, particularly, investment is evident. Granted that the maintenance of existing levels of living is a minimum requirement, the rate of population growth sets a lower limit to the expansion of consumption. A similar reasoning applies to the case of investment and, because of the problems of capital scarcity facing many developing countries, the high investment needs created by the rapid rate of expansion of the population in these countries has been extensively discussed in demographic literature. On the basis of so-called Harrod-Domar models it has been shown that, depending on the value of the capital-output ratio, demographic investments, that is those required to maintain existing levels of living, may absorb the larger part of a country's investments, leaving little room for increasing capital per worker, productivity and income, or even may require more than the country's total investment funds. Even so, it has been generally acknowledged that this interpretation places an undue emphasis on capital formation as the determining factor of economic development, ignoring the contribution of human resources and other less tangible factors.

258. Population and the economy are closely linked through employment. The size, growth and composition of the population are among the basic determinants of the supply of labour whereas economic growth, structure and production relations underlie its demand. Much of the demographic literature on this subject has stressed the typical age distribution of developing countries, with its large proportion of children and consequent heavy dependency load, as an important factor making for reduced productive capacity of the population. In more

general terms, given the production relations, the extent to which the labour force can be efficiently absorbed in the economy depends on the relative abundance or scarcity of the complementary resources—land and, particularly, capital. The existing literature has extensively discussed the implications of a high labour-land ratio with its consequent pressure of population on natural and agricultural resources. In the view of many, though not all writers, such a pressure of population on the land, especially in subsistent, peasant economies, is the basic cause of high levels of underemployment and underutilization of the productive capacity of the working population. As opposed to population size, high population and labour force growth rates, associated with low or insufficient rates of capital accumulation, are held to be a major cause of high levels of unemployment and underemployment, especially in the developing countries.

259. Apart from their implications for such determinants of economic growth as savings and investments, and employment, demographic factors may influence in a number of ways the performance of the economy, as measured in terms of productivity. Partly due to the complex nature of productivity and its determinants, the effects of the population variables cannot be easily assessed. In general terms, it has been recognized that population size, growth and composition may affect such diverse determinants of productivity as the factor proportions and methods of production; the structure of the economy and changes in it; specialization and economies of scale; innovations and technological progress, the skills and qualifications of the labour force etc. Nevertheless, many of these interrelationships are only imperfectly known or have only partly been explored. For instance, it is only in the past decade that the effects of population size on economies of scale has begun to be systematically studied; it has only recently been pointed out that the problems of development of the "dual economy" are to a great extent due to population growth; it may be argued that the role of population and factor scarcities on invention and innovation have been barely touched upon.

260. It appears that the need for more knowledge is particularly urgent in these latter fields, not only because

of the limited present understanding, but also because of the fundamental role of the productivity factor in economic growth and development. Whereas the theory of economic growth has gone through different stages in which first natural resources and then capital formation were thought to be the crucial factors in development, at present the predominant view, although not generally accepted as yet, is that the basic explanation of economic development must be sought in those intangible factors which may be summarized under the heading of productivity increases. It is mainly for this reason that further research on the demographic aspects in this field should be undertaken also, to permit an exhaustive assessment of their role in economic, as well as social, development.

261. In this chapter only the implications of the basic population variables for the principal determinants of economic growth have been considered. A complete evaluation of demographic-economic interrelations would require the integration of the subject-matter dealt with here with the analysis of the influence of economic factors on demographic variables, discussed in previous chapters of this study. To the extent that the findings of the present chapter provide a basis for a conclusion, it appears that demographic characteristics intermediate between those associated with extremely high or extremely low population growth would be most conducive to rapid economic growth and development. Even though this chapter has been concerned predominantly with the implications of the demographic situation and characteristics for developing countries, on the grounds that in these countries demographic obstacles to economic growth loom largest, the literature concerning the implications of low population growth in the more developed countries on economic growth suggests, even though the stagnation theory may have been exaggerated in this respect, that a virtually stationary population may severely limit the rate of economic growth. Under prevailing conditions in both developed and developing countries and within a limited time perspective, moderate population growth and a balanced age, geographical and occupational distribution probably provide the most favourable combination of demographic factors for rapid economic growth.

## Chapter XIV

### DEMOGRAPHIC ASPECTS OF MODERN ECONOMIC GROWTH

1. For the greater part of its history, mankind was sustained only precariously by the means of subsistence at its disposal. Even though in the long run some improvements in living conditions did materialize, in many cases they were barely noticeable or else they mainly benefited the privileged classes. Over shorter periods, any increase more than minimal in the levels of living of the masses or in the number of people was as likely as not soon to be wiped out. Only in the course of the last two centuries has it become evident that a marginal existence for the population as a whole is not inevitable. The modern period has seen a striking acceleration in the rate of economic growth, while witnessing at the same time an unprecedented increase in population. But even now modern economic growth is a process limited to only a relatively small part of the world. Comparisons of income or other indicators of levels of living of different countries reveal large inequalities between the wealthy developed minority and most of the less developed rest of the world. However, the awareness of this gap between the rich and the poor nations and the conviction that rapid economic growth of the latter is both possible and desirable are widespread and underlie the determined efforts now being undertaken by these countries to promote their economic development.

2. Rapid economic growth in comparison with earlier periods is only one of the revolutionary changes which has affected man and society in the modern period. As noted, it has been accompanied by and closely associated with another aspect of change, the emergence of new demographic trends. Whereas in earlier periods population was ultimately held in check by the slow and discontinuous improvements in food supply, since the beginning of the modern period the number of people has grown continuously and faster than ever before. While the initial impetus to this demographic expansion has taken place in the presently economically developed countries, it has gradually spread to the rest of the world and a rapid population growth has also become typical of most of the less developed countries. In fact, demographic trends in the latter group of countries has become by far the most important factor in the extraordinary growth of the world's population in the last few decades. Population in many of the developing countries has increased at rates never experienced before in the world's history, causing a considerable further speeding-up of the accelerated growth of the world's population, which has been one of the predominant characteristics of modern times.

3. Although it is generally acknowledged that economic and demographic change during the period of modern

economic growth have not been independent of each other, the exact nature and extent of the relationship between them remain still largely unknown. While this lack of knowledge may be attributed in part to a less than satisfactory exploration of these interrelations as they have manifested themselves and to the scarcity of data in this field, the fundamental reason lies in the nature of the relationships. Population and economic change are not the result of a simple cause and effect mechanism between the two. Both economic performance and demographic patterns are ultimately governed by a complex of social, cultural, political and psychological factors which shape the society's institutions and development and the behaviour of its individual members, and their interrelations are the outcome of a complicated system of interdependence between a large number of variables and factors which include not only the economic and demographic factors, but also many others. Associations between economic growth and demographic trends during the period of modern economic growth, reflecting this indirect nature of the interrelationships, have proven to be neither invariable nor equally significant at different times and under different circumstances. Even so, knowledge of such associations as exist and have existed are an indispensable element for a better understanding of the underlying relationships and, ultimately, the conception and formulation of appropriate policies.

4. The purpose of the present chapter is to review the over-all associations between population and economic growth as they have manifested themselves during the modern period. The chapter is mainly concerned with the state of knowledge of these interrelations at a relatively general level and with major emphasis on only the most fundamental economic and demographic variables, including growth of product and income and structural change in the economy, population growth, fertility, mortality and urbanization. Although the variety of experience in economic and population growth is discussed, an analysis of trends, past or present, in individual countries is not included. The chapter also excludes the consideration of those social and socio-economic aspects, such as employment, distribution of income, education, health, and so forth, which have come to be accepted as an integral part of the development process and are increasingly recognized as being affected by demographic factors and trends. Following a brief discussion on the definition and characteristics of economic growth in the first section (section A), the subsequent sections deal, respectively, with general aspects of economic and demographic trends in the modern period (section B) and with a more detailed analysis for recent years with special

reference to the more and less developed countries (section C). The final section (section D) is concerned with the historical experience of the more developed countries and its relevance for the countries presently in the process of development.

#### A. Economic growth: definition and manifestations

5. The problem of how to define or, in a broader sense, select the most appropriate indicator of economic growth and of the level of economic development has been widely discussed in economic literature. Many authors hold that the increase of real income or product, or preferably of income or output per head, is the best single, albeit incomplete, measure of economic growth.<sup>1</sup> Others, however, have expressed doubts about the adequacy of the income criterion or rejected the suggestion that it may be used as an index of economic growth or the level of economic development.<sup>2</sup> Despite the shortcomings of the income concept, economic growth is identified, in general, with the realized capacity of a country's economy to generate significant increases in *per capita* product or income.<sup>3</sup>

<sup>1</sup> Leibenstein, *Economic Backwardness and Economic Growth* ... (1957), pp. 7-14; Rostow, *The Process of Economic Growth* (1960), p. 81; United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1965), chap. 1, pp. 3-4. Piatier, *Equilibre entre développement économique* ... (1962), p. 7; Peterson, *Income, Employment and Economic Growth* (1962), pp. 459-461; Mellor, *The Economics of Agricultural Development* (1966), pp. 11-16. Bruton, *Principles of Development Economics* (1965), pp. 1-2. Even most of those writers who suggest the use of the income criterion as a measure of economic growth and development recognize the limitations inherent in a single index for measuring such a complex phenomenon as economic growth and the weaknesses of income as such a measure, including especially its failure to reflect the distribution of income.

<sup>2</sup> Clark, "Common and disparate elements ..." (1949); Viner, *International Trade and Economic Development* (1953), pp. 125-129; Frankel, *The Economic Impact on Underdeveloped Societies* ... (1953), pp. 29-55; Abramovitz, "The welfare interpretation ..." (1959, 1965); United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1961* (1962), pp. 7-8. Much of the criticism of the use of the income concept for the purpose of measuring economic growth and economic development centres on the fact that, as an indicator of well-being, it is too narrow and the use of indices of levels of living which encompass various aspects—some measurable, others not—of well-being has been proposed as an alternative. Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 5-18; Coale, "Population and economic development" (1963); Fourastié, *La civilisation de 1975* (1967), pp. 13-39. For a list of indices of levels of living see United Nations, *Report on International Definition and Measurement of Standards* ... (1954) and *International Definition and Measurement of Level of Living* ... (1961). For the application of a number of indices of levels of living to different countries see Bennett, "International disparities in consumption levels" (1945). The argument against the use of indices of levels of living as a measure of economic growth is that the latter is a more restrictive concept than increase in well-being and that, in any case, material well-being will depend to a large extent on the amount of goods and services available.

<sup>3</sup> Kuznets, *Toward a Theory* ... (1965), p. 6, used a broader definition adding as a characteristic of economic growth "sustained increases in the population", his argument being that a definition must reflect common experience and that modern history has rarely revealed cases where increases in *per capita* income had been associated with a secular stagnation or decline in population. In his *Modern Economic Growth* ... (1966), p. 19, he added increases in product per worker to increases in *per capita* product. Clark, *The Conditions of Economic Progress* (1957) preferred the increase

6. Even so, the process of economic growth involves much more than increases in total or *per capita* income. Based on the spread of empirical science and knowledge and their application in the sphere of production, economic growth as it has emerged in the course of the last two centuries has been associated with profound changes in the organization, functioning and structure of the economy and the society. One of the fundamental transformations accompanying the development process is the changing industrial distribution of the labour force and product, with the shift from agricultural to non-agricultural activities.<sup>4</sup> At the source of this process of structural change are the forces of demand and supply set in motion by the increased productivity and technological progress as the main causes of economic growth.<sup>5</sup> The low income elasticity of demand for food and primary products, reflecting the nature of human wants, implies a shift in demand away from these goods as levels of income rise, while the demand for less essential manufactured goods and services will account for an increasing share of income. On the supply side, higher productivity, together with the relative decline in the demand for agricultural products, creates the conditions for the release of resources, especially labour, from agriculture and their absorption in the expanding non-agricultural activities.<sup>6</sup> Technological progress will not only stimulate the growth of the non-agricultural sectors by creating new production processes, but also new consumer goods, the demand for

in real income per man-hour as a measure of economic growth to that of increase per person. See, also, United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1961* (1962), p. 9. In the socialist countries the basic concept used for measuring economic progress is the Net Material Product (N.M.P.). Economic advancement in these countries is in general denoted as the rise of productive forces for the measurement of which a set of indicators, most of them indices of the volume of physical production, is applied. Notkin, "Tempy ekonomicheskoy razvitiia SSSR ..." (1961).

<sup>4</sup> The changes in the industrial distribution of the labour force are said to have been observed first by Petty in the seventeenth century. Recent pioneers in this field were Fisher, Clark and Fourastié. See, for instance, Fisher, *The Clash of Progress and Security* (1935); his "The economic implications ..." (1935) and his "Production, primary, secondary and tertiary" (1939); Clark, *The Conditions of Economic Progress* (1957); Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* (1949). See also Lewis, *The Theory of Economic Growth* (1963), pp. 334 ff.; Leibenstein, *Economic Backwardness and Economic Growth* (1957), pp. 77-93; Sauvy, *Théorie générale de la population*, vol. 1 ... (1956), pp. 115-117; United Nations, *World Economic Survey, 1961* (1962); Peterson, *Income, Employment and Economic Growth* (1962), pp. 504-510; Kuznets, *Toward a Theory* ... (1965), pp. 24-29 and *Modern Economic Growth* ... (1966), chap. 3; Johnston, "Agriculture and structural transformation ..." (1970).

<sup>5</sup> As a number of writers have pointed out, increases of productivity within each of the industrial sectors and not the changes in the industrial structure are the principal determinants of economic growth. See Lewis, *The Theory of Economic Growth* (1963), p. 340; Kuznets, "Quantitative aspects of the economic growth of nations. II ..." (1957) and his "Consumption, industrialization and urbanization" (1966).

<sup>6</sup> Clark, *The Conditions of Economic Progress* (1957); Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* (1949) and his *Machinisme et bien-être* (1951); Lewis, *The Theory of Economic Growth* (1963), p. 334; Chenery, "Patterns of industrial growth" (1960); Peterson, *Income, Employment and Economic Growth* (1962), p. 509; Nicholls, "The place of agriculture ..." (1964); Kuznets, *Toward a Theory* ... (1965), pp. 25-26, 29 and his *Modern Economic Growth* ... (1966), pp. 113-114, 120-121.



which creates an additional factor in the shift away from agriculture.<sup>7</sup>

7. The structural shifts in favour of non-agricultural activities are evident in the sectoral shares of national product, and probably also capital stock, but manifest themselves most clearly in the distribution of the labour force and its movement from agriculture or primary production to the non-agricultural secondary and tertiary activities.<sup>8</sup> It is for this reason that the industrial composition of the labour force is sometimes considered an appropriate indicator of the level of economic development.<sup>9</sup> The process of structural transformation implies a reduction in the share of the agricultural labour force from as much as four fifths in the pre-industrial stage to as little as one tenth or even less at an advanced stage of development. As part of this evolution, often referred to as the process of industrialization, the shares of secondary and tertiary employment increase, although not necessarily at the same rate. Once a certain stage of development has been reached, secondary employment may stabilize or decline somewhat in relative terms while tertiary employment may continue to expand, thus leading to a predominance of these activities in the economy.<sup>10</sup> Since these

<sup>7</sup> Kuznets, "Population redistribution, migration ..." (1964); Johnston, "Agriculture and structural transformation ..." (1970).

<sup>8</sup> No uniform and generally accepted classification of primary, secondary and tertiary activities exists. In general, primary production is thought to refer to the output of food and raw materials and includes agriculture, forestry and fishing and, but with significant exceptions, mining. Secondary production may be said to transform the raw materials into commodities and is usually understood to include manufacturing, construction and, in some cases, energy production. The tertiary activities include then all other forms of economic activities, mainly of the service type, such as commerce and distribution; transportation and communications; banking and insurance and services proper. See for instance, Fisher, "The economic implications ..." (1935) and his "Production, primary, secondary and tertiary" (1939); Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* (1949), pp. 42-43, and his *Machinisme et bien-être* (1951), p. 124; Wolfe, "The concept of economic sectors" (1955); Peterson, *Income, Employment and Economic Growth* (1962), pp. 504-505.

<sup>9</sup> Peterson, *Income, Employment and Economic Growth* (1962), p. 504; Singer, "Balanced growth in economic development ..." (1960); George, *Géographie de la population* (1967), p. 51.

<sup>10</sup> Fisher, *The Clash of Progress and Security* (1935), pp. 25-31, his "The economic implications ..." (1935) and his "Production, primary, secondary and tertiary" (1939); Clark, *The Conditions of Economic Progress* (1957), chap. IX; Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* (1949), pp. 40-45, and his *La civilisation de 1975* (1967), pp. 25-29. See also Lewis, *The Theory of Economic Growth* (1963), pp. 334 ff.; Leibenstein, *Economic Backwardness and Economic Growth* ... (1957), pp. 77 ff.; Kuznets, *Toward a Theory* ... (1965), pp. 24-29. For statistical analyses of the industrial structure of the labour force and its evolution, see Bean, "International industrialization ..." (1946); Clark, *The Conditions of Economic Progress* (1957); Kuznets, "Quantitative aspects of the economic growth of nations. II ..." (1957); his *Six Lectures on Economic Growth* (1959) and his *Modern Economic Growth* ... (1966). Criticism of the thesis of structural change of the labour force has been based on the difficulties of interpretation of data and on the variety of experience of individual countries. One specific reservation, especially with respect to the less developed countries, is that in these countries occupational or industrial classifications of the labour force often have only a limited meaning, given the lack of specialization and of the division of labour characteristic of primitive societies. See Bauer and Yamey, "Economic progress and occupational distribution" (1951); their "Further notes on economic progress ..." (1953) and their *The Economics of Under-developed Countries* (1957), pp. 34-40; Rottenberg, "Note on economic

changes in the sectoral distribution of employment respond not only to the changing structure of output, but also to the differential increases of the productivity of labour in the different sectors, changes in the sectoral shares of total product are in most cases less clear-cut than those in employment.<sup>11</sup>

8. One of the most important correlates of economic growth and social change, in general, and of the structural transformation of the economy, in particular, is the spatial redistribution of the population which takes the form of urbanization. The large amount of rural-urban migration occurring in response to the new patterns of spatial organization and the increasing degree of geographic concentration of economic activities is both an essential element of economic development<sup>12</sup> and an important factor and cause of social change.<sup>13</sup> Industrialization, it has been noted, means the growth of those sectors and activities which not only require little land, but are to a considerable extent dependent upon or obtain distinct advantages from conglomeration, agglomeration and size because of the possibilities of economies of scale, the division and specialization of labour and so forth.<sup>14</sup> While industrialization and urbanization are closely linked to each other and, in general, to economic development, the exact nature of these interrelations is not

progress ..." (1953); Minkes, "Statistical evidence ..." (1955); Lewis, *The Theory of Economic Growth* (1963), p. 333. See also the discussion of change in the structure of the labour force in chapter IX, section D.

<sup>11</sup> Clark, *The Conditions of Economic Progress* (1957); Kuznets, "Quantitative aspects of the economic growth of nations. II ..." (1957), his *Six Lectures on Economic Growth* (1959) and his *Modern Economic Growth* ... (1966), pp. 96-97, where he concludes that while the declining trends in the share of agricultural product and the upward trend in that of the secondary sectors was found in all countries, the changes in the shares of tertiary activities were not pronounced nor uniform. In some cases this share increased, in others it decreased, but in the majority of all of these the changes were insignificant.

<sup>12</sup> Davis, "The origin and growth of urbanization ..." (1955); and his "Internal migration and urbanization ..." (1955); Lampard, "The history of cities ..." (1955); Hauser, ed., *Urbanization in Latin America* ... (1961), pp. 36-37; Lewis, *The Theory of Economic Growth* (1963), p. 337; Kuznets, "Population redistribution, migration ..." (1964); his *Toward a Theory* ... (1965), p. 97; and his "Consumption, industrialization and urbanization" (1966).

<sup>13</sup> Hoselitz, "The role of cities in the economic growth ..." (1953); and his "Urbanization and economic growth in Asia" (1957); Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954); Davis, "The origin and growth of urbanization ..." (1955); United Nations, *Report on the World Social Situation* ... (1957).

<sup>14</sup> Weber, *Über den Standort* ... (1909); Hoyt, "Forces of urban centralization ..." (1941); Hoover, *The Location of Economic Activity* (1948), pp. 116-141; Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* (1949), p. 180; Isard, "The general theory of location ..." (1949); and his "A general location principle ..." (1952); Lösch, *The Economics of Location* (1954); Hoselitz, "The role of cities in the economic growth ..." (1953); and his "Generative and parasitic cities" (1955); Lampard, "The history of cities ..." (1955); Davis, "Internal migration and urbanization ..." (1955); Hauser, ed., *Urbanization in Asia and the Far East* ... (1957), p. 73; Kuznets, "Population redistribution, migration ..." (1964); and his *Toward a Theory* ... (1965), p. 29; Guyot, *Essai d'économie urbaine* (1968), pp. 238 ff.



precisely known.<sup>15</sup> Not only is it technically possible to combine the pursuit of agriculture with urban living and that of modern industry with rural living,<sup>16</sup> but there is no assurance that the processes of urbanization and industrialization will always be balanced. As has been pointed out by a number of writers in connexion with recent trends, in many less developed countries urbanization may have occurred at a more rapid pace than that warranted by the rates of economic development and industrial progress.<sup>17</sup>

9. Structural transformation and urbanization are only two, though important, manifestations of economic growth. The latter, as previously indicated, is associated with a large number of other changes in the organization and functioning of the economy and society.<sup>18</sup> The spread of modern technology has as a necessary concomitant important changes in the character of the productive organization. The large capital requirements, beyond the means of the individual or the traditional firm, and the scale of operations, requiring new forms of management, give rise to the emergence of the corporate and public enterprise as the predominant form of productive organization. The breakdown of the traditional forms of production for the family or local market, which occurs once substantial food surpluses are produced, evolves, through the specialization of economic activities, into the industrial system of production for national or international markets. Related with all these changes and determined also by the ownership of and relationships with the means of production, are the rise of new occupational and social classes and the distribution of income among them.

10. The points of contact between population and economic growth are many, but as has been noted before, the lack of adequate and sufficiently detailed long-term series of statistics and the limited usefulness of short-term data as a basis for inferences regarding the relations between demographic factors and economic growth are among the main reasons for a much less than complete knowledge of these interrelationships.<sup>19</sup> With respect to

the economic data, the problems of reliability, conversion and comparability of national income estimates for purposes of international comparison are other important complicating factors. Long-run series of national income or product may be biased by a number of factors, such as changes in price-relationship between various product groups and in the quality of products or services, which cause overstatements or understatement of the long-term rate of economic growth. Likewise, the international comparison of income levels involves a multitude of problems as the conversion of national incomes into a common denominator by means of the official rates of exchange of currencies is another source of error.<sup>20</sup>

## B. Population and economy in the modern period

11. Economic growth conceived as a sustained, rapid increase of aggregate income or income per head is, as noted above, a relatively recent phenomenon in the history of mankind. Initiated about two centuries ago, its effective beginnings have come to be associated with the radical transformation of the economy which became known as the industrial revolution. Although often associated with the development of manufacturing, the industrial revolution encompassed much more than that. It revolutionized not only other economic activities, including agriculture, transportation, commerce and banking, but penetrated all levels of society changing decisively social institutions and patterns of behaviour. Also affected was population; the economic and social changes were accompanied by profound demographic changes. Thus the period of modern economic growth, apart from witnessing an unprecedented and sustained long-term economic growth, extensive structural transformations and massive social change, constitutes also a distinct phase in demographic history. Accompanying the industrial revolution, the new demographic trends which emerged at the time have come to be regarded in the view of many as an integral aspect of the era of modern economic growth.

12. Over-all trends in economic and population growth, however, do not reflect the diversity of these processes in historical and geographical perspective. They not only fail to take into account the varied experience of individual countries, but, moreover, do not reveal the limited spread of modern economic growth from which emerged the present division of the world into the economically more advanced and less advanced countries. The period of modern economic growth has come to be associated with large and increasing inequalities of income between the more developed and less developed countries. Likewise, the world-wide demographic evolution in the modern period conceals large differences between these groups of countries. Finally, great differences in the levels, evolution and structure of industrialization and urbanization were inevitably linked with these divergent economic

<sup>15</sup> Hoselitz, "The role of cities in the economic growth ..." (1953); Hauser, ed., *Urbanization in Asia and the Far East* ... (1957), pp. 65-66; United Nations, *Report on the World Social Situation* ... (1957), p. 123.

<sup>16</sup> Kuznets, *Toward a Theory* ... (1965), p. 97; and his "Consumption, industrialization and urbanization" (1966). See also Schnore, "The statistical measurement of urbanization ..." (1961); Higgins, "The city and economic development" (1967).

<sup>17</sup> Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954); Davis, "Internal migration and urbanization ..." (1955); Hoselitz, "Generative and parasitic cities" (1955); and his "Urbanization and economic growth in Asia" (1957); United Nations, *Report on the World Social Situation* ... (1957), p. 124; Hauser, ed., *Urbanization in Asia and the Far East* ... (1957); ———, *Urbanization in Latin America* (1961), p. 37; International Labour Office, *Why Labour Leaves the Land* ... (1966); George, *Géographie de la population* (1967), pp. 81-82; Guyot, *Essai d'économie urbaine* (1968), pp. 248-251. See also Sovani, "The analysis of over-urbanization" (1964).

<sup>18</sup> Kuznets, "Population, income and capital" (1955) and his *Toward a Theory* ... (1965), pp. 23, 98-101; Deane, *The First Industrial Revolution* (1965), p. 1.

<sup>19</sup> An additional complication is that since for the present chapter use has been made of data from different sources, some of the statistical information presented is not comparable with that shown in another place or originating from a different source. No attempt has been made to ensure comparability in this respect.

<sup>20</sup> For a discussion of the issues involved and attempts to prepare comparable estimates of some of the basic economic variables, including the use of purchasing power equivalents, see Clark, "Internationaler Vergleich der Volkseinkommen" (1938) and his *The Conditions of Economic Progress* (1957); Gilbert and Kravis, *An International Comparison of National Products* ... (1954); Gilbert and associates, *Comparative National Products* ... (1958).

and demographic trends. Even though at the beginning of the modern period the economic, demographic and other conditions in the presently more developed and less developed countries had already diverged substantially, the two centuries since then have seen a widening of this gap.

13. The purpose of this section is to present a broad sketch and interpretation of the major economic and demographic trends and structural changes which emerged in the period of modern economic growth. The first part deals with general aspects of the process of economic growth and demographic change as well as their general interrelations during this period with special reference to the divergencies between the more developed and the less developed countries. The second part concerns mainly the structural changes which have been associated with these processes.

# 1. ECONOMIC GROWTH AND DEMOGRAPHIC CHANGE IN THE PERIOD OF MODERN ECONOMIC GROWTH

## (a) *Growth of income*

14. As noted above, the period of modern economic growth is generally assumed to have started some two centuries ago with the industrial revolution in England.<sup>21</sup> Reliable over-all economic indicators which go as far back as several centuries are scarce and inferences on the extent, spread and rate of economic growth, especially as far as the early phases of development are concerned, are mostly based on circumstantial or indirect evidence or partial information available for selected countries only. Nevertheless, several characteristics of economic development during this period are sufficiently well-established to permit some generalizations. First, economic growth and development during the last two centuries have been so rapid that they constitute, without doubt, a distinct era in man's history. Secondly, even so, the spread of this process of economic growth has been very uneven and has been such as to create at present a large and widening gap in levels of income and living between those countries which benefited from the process of economic growth and those which did not.

15. Various arguments have been used to demonstrate rapid economic growth during the modern period. For example, indirect evidence that during this period production has expanded at rates not witnessed before is thought to be provided by a general comparison of living conditions as they are known to have existed prior to the beginning of this period and as they are at present in the more developed countries. Another indirect argument is that since there is little doubt that population growth accelerated during the modern period and *per capita* income did not decline, total production of goods and services must have increased at a substantially higher rate than before.<sup>22</sup>

<sup>21</sup> Some difference of opinion, however, still persists as to the period when the industrial revolution in England took place. See section D below.

<sup>22</sup> Kuznets, *Modern Economic Growth* ... (1966), pp. 63, 68-69. Nevertheless, the view is often found that in the early stages of modern economic growth the living conditions of large segments of the labouring classes did not improve, but deteriorated, despite a more rapid rate of over-all economic growth.

In fact, direct and circumstantial evidence, it has been asserted, suggests that *per capita* income has been rising during the modern period. Incomplete, but persuasive data, it is noted, show that since the beginning of the modern period income has increased many times in Europe and overseas areas of European settlement and that levels of living in the rest of the world have not declined significantly. Consequently *per capita* income for the world as a whole must have risen. The evidence on growth in *per capita* income in the last fifty years, which is more direct, is held to confirm this reasoning.<sup>23</sup> Some admittedly rough and tentative estimates of the growth of world income have been made. One of these suggests that in 1850 the world's total real income was between a fifth and a quarter of what it was around 1940.<sup>24</sup> A different set of estimates implies that in 1913 the world's income was only 40 per cent of what it amounted to in 1953.<sup>25</sup> Apart from these general arguments and rough estimates, inferences on long-term economic growth, especially for individual countries, have been based on partial information. Long-term series on the production and the development of manufacturing of certain goods or product categories which played a crucial role in the early phases of modern economic growth, such as textiles, iron, coal and energy production, as well as statistics on foreign trade, have been used for such purpose.<sup>26</sup>

16. A number of economists, among them especially Clark and Kuznets,<sup>27</sup> have attempted to estimate and bring together data on long-term trends in the growth of income or product for as many countries as possible.

<sup>23</sup> Hagen, "World economic trends ..." (1958).

<sup>24</sup> Robinson, "The changing structure of the British economy" (1954). See also Meier and Baldwin, *Economic Development* ... (1957), p. 247.

<sup>25</sup> Zimmerman, *Arme und reiche Länder* (1963), pp. 46-47, tables 2.4 and 2.6, p. 30.

<sup>26</sup> See, for instance, Mantoux, *The Industrial Revolution in the Eighteenth Century* ... (1928, 1961 ed.); Ashton, *An Economic History of England* ... (1955); Hoffman, *British Industry* ... (1955); Deane, *The First Industrial Revolution* (1965). For other studies where such indicators are used see Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 216-221; Parrish, "Iron and steel ..." (1956); d'Hérrouville, "Réflexions sur la croissance" (1958); Cipolla, *The Economic History of World Population* (1962), pp. 47 ff.; Gill, *Economic Development* ... (1964), pp. 49-51. In the socialist countries the volume and indices of certain important products are often used as indicators of economic growth. For studies relying to a considerable extent on statistics of international trade for the analysis of economic growth, see, for instance, Deane and Cole, *British Economic Growth* ... (1962) and Cole and Deane, "The growth of national incomes" (1965).

<sup>27</sup> Clark, *The Conditions of Economic Progress* (1957), chaps. 2 and 3, compiled data on national product for a large number of countries; Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956); his *Aspectos cuantitativos del desarrollo económico* (1959); his *Modern Economic Growth* ... (1966) and his *Economic Growth of Nations* ... (1971). Other comparative studies dealing with long-term economic growth in mostly developed countries include Maddison, *Economic Growth in the West* ... (1964), chap. 1; Bairoch, *Révolution industrielle et sous-développement* (1963); Kindleberger, *Economic Growth in France and Britain* ... (1969). Some estimates of "national income" were made at an early date. Best-known among these is Gregory King's estimate for England. See Barnett, ed., *Two Tracts by Gregory King* (1936). For a reclassification of King's estimates in modern form, see Deane, "The implications of early national income ..." (1955) and Deane and Cole, *British Economic Growth* ... (1966), pp. 155-156.

Kuznets found that in fourteen mostly developed countries for which data on income for at least five decades were available, *per capita* income had increased from between somewhat less than 10 to over 20 per cent per decade.<sup>28</sup> He confirmed these findings in later studies with data extending over a longer period and noted that, with only few exceptions, the decade rates of growth of *per capita* income were well over 10 per cent, and in some cases considerably more than 20 per cent.<sup>29</sup> Long-term estimates of *per capita* income since the beginning of modern economic growth in each country suggested per decade growth rates between 14 and 23 per cent for the majority of the fourteen countries considered, with no rates lower than 10 per cent and some as high as 30 per cent per decade.<sup>30</sup> Kuznets stressed not only the rapid rate of economic growth which these data revealed, but also that growth rates in the modern period were much higher than in pre-modern times. The evidence in this respect was direct where income estimates went as far back as pre-modern times.<sup>31</sup> Indirect proof was obtained by projecting backward, into the period before modern economic growth began, the rates of increase of *per capita* income typical for the modern period. The level of income would have declined to an impossibly low one, according to this calculation, about one century before the beginning of modern economic growth. The increase of *per capita* income in the modern period, Kuznets concluded, was thus much higher than in the period prior to that and higher than it could have been over many centuries before.<sup>32</sup>

17. Practically all data on economic performance and inferences concerning the potential for economic growth in the modern period, cited so far, are based on the experience of the presently developed countries. Comparable long-term data for developing countries are virtually lacking,<sup>33</sup> but, in general, it may be assumed that economic growth in these countries was slow or stagnant for the greater part of the modern period. Several arguments in support of such a hypothesis were advanced by Kuznets. As evidence, he cited the present low levels of *per capita* income in most developing countries as well as the fact that where economic growth had appeared possible in the past, population growth had also accelerated, increasing total output but keeping *per capita* income at low levels. The available estimates of long-term trends in *per capita* income in developing countries tended to confirm these conclusions.<sup>34</sup> In general terms, Hagen estimated that among the less developed regions only Latin America experienced a distinct increase in *per capita*

income in the first half of this century, while *per capita* income may have remained about the same in Asia, and little is known about its level and evolution in Africa.<sup>35</sup> Zimmerman's rough and tentative estimates of *per capita* income for 1913 and 1953 show only small increases in most parts of Asia, but more substantial gains in Latin America.<sup>36</sup> On the basis of similar data for the first half of this century the growth of the domestic gross product of Latin America and Asia, excluding China and the Middle East, was estimated to have fluctuated around 2 per cent annually. However, as a result of an increasing rate of population growth, *per capita* increases declined from 1.2 per cent annually in 1900-1913, to 0.9 per cent in 1913-1929 and to 0.6 per cent in 1929-1953.<sup>37</sup>

18. Statistical data, however, are not needed to confirm that modern economic growth was not only unique, but also had only a limited spread. England being the first country to experience an industrial revolution, its example was followed at different times by the countries of western, northern and central Europe, the overseas areas of predominantly European settlement, the USSR, the countries of eastern and southern Europe and Japan. The large majority of the nations of Africa, Asia and Latin America did not share in this process. Both direct and indirect evidence suggests that incomes in the countries of early development prior to the modern period were already considerably higher than in the presently developing countries.<sup>38</sup> These differences, it is generally agreed, have increased in the course of the period of modern economic growth.<sup>39</sup> Evidence of an indirect nature on the growing differentials in income has been presented especially by Kuznets, who showed that growth rates of *per capita* income as rapid as those experienced by the more developed countries could not have occurred in the less developed ones taking into account their present level of income.<sup>40</sup> Spengler speculated that product per man-hour in the most advanced countries was perhaps five times that of the least advanced before 1800, while this multiple may exceed forty at present.<sup>41</sup> Cairncross thought that in the richer countries

<sup>28</sup> Kuznets, "Population, income and capital" (1955). See also Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 214-215.

<sup>29</sup> Kuznets, *Modern Economic Growth* ... (1966), p. 67.

<sup>30</sup> Kuznets, *Economic Growth of Nations* ... (1971), p. 22, table 1.

<sup>31</sup> *Ibid.*, p. 23.

<sup>32</sup> Kuznets, *Modern Economic Growth* ... (1966), p. 69; and his *Economic Growth of Nations* ... (1971), pp. 23-27.

<sup>33</sup> Long-term estimates of income and its growth in some developing countries may be found in Clark, *The Conditions of Economic Progress* (1957); Kuznets, *Modern Economic Growth* ... (1966), pp. 391-392 and his *Economic Growth of Nations* ... (1971).

<sup>34</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956).

<sup>35</sup> Hagen, "World economic trends ..." (1958).

<sup>36</sup> Zimmerman, *Arme und reiche Länder* (1963), pp. 46-47, tables 2.4 to 2.6, estimated that *per capita* income in prices of 1952-1954 increased in Latin America from \$170 in 1913 to \$260 in 1953. For the Far Eastern countries the corresponding estimates were \$90 in 1913 and \$110 in 1953. *Per capita* income in South-East Asia was estimated to have remained virtually the same with \$64 in 1913 and \$65 in 1953. China's *per capita* income was thought to be about \$50 throughout the first half of this century.

<sup>37</sup> Bairoch, *Diagnostic de l'évolution économique du tiers-monde* ... (1969), p. 193, table 42.

<sup>38</sup> See section D below.

<sup>39</sup> Spengler, "Demographic patterns" (1954) and his "Economic factors in the development ..." (1951); Meier and Baldwin, *Economic Development* ... (1957), p. 247; Cairncross, *Factors in Economic Development* (1962), p. 18; Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956), his "Regional economic trends ..." (1958) and his *Modern Economic Growth* ... (1966), pp. 392-393.

<sup>40</sup> Kuznets, "Population, income and capital" (1955); his "Quantitative aspects of the economic growth of nations. I. ..." (1956); his *Modern Economic Growth* ... (1966), pp. 392-393, and his *Economic Growth of Nations* ... (1971), p. 27.

<sup>41</sup> Spengler, "Demographic patterns" (1954).

real income may have risen fivefold within the last century, whereas in many less developed countries it may have barely increased.<sup>42</sup> According to tentative estimates by Robinson, Africa, Asia and Latin America accounted for over 45 per cent of the world's real income in 1850, but their share had declined to less than 30 per cent in the 1930s.<sup>43</sup>

19. While thus for the greater part of the period of modern economic growth the less developed countries experienced on the whole little or no economic growth, the evolution over the last few decades shows a different tendency. In the large majority of countries, including both developing and developed, the rate of economic expansion was considerably higher than it was during most of the rest of the century. It is also generally recognized that, with some exceptions, economic growth in most developed countries has been rapid over the last two decades. But rapid growth of product and income was not limited to the countries which traditionally had expanded faster; most developing countries experienced over the last two decades rates of increase of total and, to a lesser extent, *per capita* income which were, on the average and compared with earlier periods, very high. Even though the interpretation of the reasons for such acceleration and the opinions whether the post-war period represents a new phase in economic growth differ, the fact remains that during these decades production increased at comparatively high rates in most countries.<sup>44</sup>

#### (b) *Population and economic growth: their interrelations*

20. The problem of the possible interrelations between economic and population growth is generally recognized to be a complex one. As has been noted before, not only are sufficient data lacking, but the indirect nature of the relationships implies in fact that both the direction and extent of the association between the two may vary over time and space. The concentration of broad trends in the growth of population in the major regions with the general trends in economic growth sketched in the preceding subsections suggests that while population and economic growth in the modern period have not been independent of each other, no invariable and systematic relation between the two exists.

21. Compared with the knowledge of economic trends during the modern period, more, albeit incomplete, data on population growth are available. Historical population estimates for the world, regions and some individual countries have been discussed in a preceding chapter.<sup>45</sup> Despite the limitations of the data, the findings in that chapter provide ample evidence of the emergence of new demographic patterns over the last two centuries or so. In a broad historical context and in relation to the process of modern economic growth, two distinctive features of population trends during this period stand out: first, a

very large increase of population, in both absolute and relative terms, compared with earlier periods in man's history and, secondly, a rate of increase in recent decades faster than ever before.<sup>46</sup>

22. Conjectures and estimates of population since the beginning of the Christian era attest to the large increase of population in the modern period in comparison with earlier history. At the beginning of the Christian era the world's population may have been of the order of 300 million; it probably reached some 500 million in 1650 and around 800 million in 1750. Between the approximate beginnings of the period of modern economic growth and 1900, the population of the earth increased to 1,650 million and reached close to 3,300 million by 1965.<sup>47</sup> The less than threefold increase from the beginning of the Christian era until 1750 implied, as Durand noted, a doubling of the population in as much as over a thousand years. By comparison, between 1750 and 1965, a little over two centuries, the world's population quadrupled.<sup>48</sup>

23. The estimates cited also confirm an acceleration of population growth during the modern period. It has been observed that, while it took about one and a half centuries after 1750 for the population to double, in less than two thirds of a century, between 1900 and 1965, a doubling also took place.<sup>49</sup> Although it is sometimes assumed that a steady and gradual acceleration of population growth has taken place over approximately the last two centuries,<sup>50</sup> more detailed estimates suggest that this speeding-up of population growth was a relatively recent phenomenon.<sup>51</sup> Average rates of growth for half centuries between 1750 and 1900, based on the various estimates available, reveal at most a slight acceleration in growth during this period.<sup>52</sup> More rapid population growth started to manifest itself only in the present century: between 1900 and 1950 world population is estimated to have increased at an average annual rate of 0.8 per cent.<sup>53</sup> The most startling acceleration, it is generally

<sup>46</sup> Cipolla, *The Economic History of World Population* (1962), pp. 99-101; Kuznets, *Modern Economic Growth* ... (1966), p. 37.

<sup>47</sup> See chapter II, table II.1. For years up to 1900 this table presents ranges of estimated population size of which the figures cited here are approximate mid-points.

<sup>48</sup> Durand, "A long-range view ..." (1967), and his "The modern expansion ..." (1967).

<sup>49</sup> *Ibid.*

<sup>50</sup> See, for instance, Davis, "The world demographic transition" (1945); Borrie, *Population Trends and Policies* ... (1948), pp. 1-2; Kuznets, *Toward a Theory* ... (1965), pp. 10-11.

<sup>51</sup> See chapter II, section E. Also Durand, "The modern expansion ..." (1967); Grauman, "Population growth" (1968).

<sup>52</sup> See table XIV.1. Carr-Saunders' estimates imply average annual rates of growth of 0.4 per cent between 1750 and 1800; 0.5 per cent from 1800 to 1850 and 0.6 per cent from 1850 to 1900. The estimates by Willcox signify average annual growth rates of 0.6, 0.3 and 0.7 per cent, respectively. Durand estimated the average annual growth rate to have been 0.4 per cent between 1750 and 1800, and 0.5 per cent from 1800 to 1850 and from 1850 to 1900.

<sup>53</sup> Durand, "The modern expansion ..." (1967), stressing particularly the contrast between the relatively stable growth until the end of the nineteenth century and the acceleration since then, considered the periods before and after 1900 as distinct stages in modern population growth. See also Grauman, "Population growth" (1968).

<sup>42</sup> Cairncross, *Factors in Economic Development* (1962), p. 18.

<sup>43</sup> Robinson, "The changing structure of the British economy" (1954). See also Meier and Baldwin, *Economic Development* ... (1957), p. 247.

<sup>44</sup> See also section C below.

<sup>45</sup> See chapter II, sections D and E.

TABLE XIV.1. ESTIMATED RANGES<sup>a</sup> OF RATES OF INCREASE OF THE POPULATION OF THE WORLD AND MAJOR REGIONS, 1650-1960

Regions	Average annual rate of increase (per cent)									
	1650-1750	1750-1800	1800-1850	1850-1900	1900-1910	1910-1920	1920-1930	1930-1940	1940-1950	1950-1960
World .....	0.3-0.4	0.4-0.6	0.3-0.5	0.5-0.7	0.6	0.6	1.1	1.0	0.9	1.8
Europe, North America, Oceania, and USSR .	0.3	0.5-0.6	0.7-0.8	1.0-1.1	1.0	0.7	1.1	0.7	0.3	1.3
Africa, Asia, and Latin America .....	0.3-0.4	0.4-0.5	0.2-0.4	0.4-0.6	0.4	0.6	1.1	1.2	1.2	2.0

SOURCES: 1650-1900: Carr-Saunders, *World Population* ... (1936), p. 42; Willcox, *Studies in American Demography* (1940), p. 45; 1750-1900 also Durand, "The modern expansion ..." (1967); 1900-1920: Bour-

geois-Pichat, *Population Growth and Development* (1966), table 6, p. 16; 1920-1960: United Nations, *World Population Prospects* ... (1966).

<sup>a</sup> Lowest and highest estimates from the sources cited.

recognized, was that which occurred in the post-war period, as the average annual growth rate rose to 1.8 per cent between 1950 and 1960 (see table XIV.1). These long-term trends during the modern period have led to the view that since its beginnings population growth has passed through two stages: a period of relatively modest growth, which is supposed to have lasted until the first half of the twentieth century, and a phase of very rapid growth since the Second World War.<sup>54</sup>

24. In view of both the quantitative and qualitative limitations of data, inferences on the interrelations between population and economic growth during the modern period are necessarily tentative. The available data and indirect information appear to bear out the existence of an over-all positive association between the two during the period. Kuznets pointed out that economic growth in the modern period meant not only sustained and marked increases in *per capita* product, but also in population. This combination of high rates of population growth and of *per capita* income and, by implication, very large increases in total product was, in his view, a distinctive characteristic of modern economic growth.<sup>55</sup> Hagen noted also that since the industrial revolution high and increasing rates of growth of population have been accompanied by an even more rapid growth of income.<sup>56</sup> Although it has received less attention, the recent upsurge of world economic and population growth during the post-war period would appear to confirm the existence of an over-all positive association between the two.

25. Broad generalizations of this nature, however, have little meaning failing as they do to distinguish variations in levels and patterns of growth over time and for different regions and countries. Thus it has been noted, for instance, that population growth apparently started to accelerate before the period of modern economic growth. The very rough estimates for earlier centuries indicate that up to 1650 the rate of population growth may have been less than 0.1 per cent—the average rate from the beginning of

the Christian era to 1650 being 0.07 per cent. From 1650 to 1750 and before the beginning of modern economic growth the growth rate is estimated to have increased significantly to between 0.3 and 0.4 per cent.<sup>57</sup> Growth patterns for different regions, while providing in some instances confirmation of a positive association between population and economic growth, also show that such an association is not universally valid or invariable and may, in fact, turn into a negative association.

26. Population trends during the modern period were an uneven process—as was economic growth—and affected different regions and countries in a different manner at different times. A large number of writers, in interpreting population growth trends during the modern period, have noted that, for the greater part of this era, population growth, on the whole, was higher in the area of European settlement.<sup>58</sup> The faster growth of population, which has come to be associated with modern economic growth, is often assumed to have started first in Europe where modern economic growth originated.<sup>59</sup> Subse-

<sup>57</sup> See chapter II, table II.1. Also Davis, "The world demographic transition" (1945); Thompson and Lewis, *Population Problems* (1965), p. 401. Others, however, have questioned the reliability of these and any estimates prior to the nineteenth century. See, for instance, Kuczynski, "Population" (1948). Durand, "The modern expansion ..." (1967), also expressed doubts about the accuracy of the estimates for 1650, but accepted that accelerated growth began probably before 1750 in some parts of Europe, Russia and America and possibly before 1700 in China.

<sup>58</sup> See, among others, Carr-Saunders, *World Population* ... (1937), pp. 42-45; Davis, "The world demographic transition" (1945); Thompson, *Plenty of People* (1948), pp. 7-8; Woytinsky and Woytinsky, *World Population and Production* ... (1953), p. 36; Cipolla, *The Economic History of World Population* (1962), pp. 101-104; Köllmann, *Bevölkerung und Raum* ... (1965), p. 1; Kuznets, *Modern Economic Growth* ... (1966), pp. 36-40.

<sup>59</sup> Carr-Saunders, *World Population* ... (1937); Cipolla, *The Economic History of World Population* (1962), pp. 101-104; Hauser, "World population: retrospect and prospect" (1971). This view, however, has been contested. For instance, Willcox, "Increase in the population of the earth ..." (1931), speculated that the century prior to 1750 was characterized by a relatively faster growth of the population of Asia. Reinhard and Armengaud, *Histoire générale de la population mondiale* (1961) are of the opinion that the population of the greatest part of Europe was stagnant from the end of the sixteenth to the middle of the eighteenth century. Durand, "The modern expansion ..." (1967), noted in more general terms that although it appears to be taken for granted that European countries took the lead in the modern population expansion, over the past two centuries Europe did not stand out among the major areas for its high population growth. He recognized, however, that the expansion of European peoples took place partly in areas of overseas settlement.

<sup>54</sup> See chapter II, section E. Also Cipolla, *The Economic History of World Population* (1962), p. 104; Thompson and Lewis, *Population Problems* (1965), p. 432; Macura, "The long-range outlook ..." (1968); Hauser, "World population: retrospect and prospect" (1971).

<sup>55</sup> Kuznets, *Modern Economic Growth* ... (1966), pp. 19-20, 63. See also his *Toward a Theory* ... (1965), p. 6, and his "Population and economic growth" (1967).

<sup>56</sup> Hagen, "World economic trends ..." (1958).

quently, even more rapid increases, partly as a result of immigration, were found in overseas areas of European settlement, especially North America. Carr-Saunders observed that between 1650 and the 1930s the European peoples multiplied some seven times—from about 100 to 720 million—while the rest of the world's population increased only three times.<sup>60</sup> Others have noted that the population of European stock multiplied more than five times between 1750 and 1950—from an estimated 140 to 150 million in the former year to 780 to 800 million in the latter—whereas the population of the rest of the world was estimated in 1950 to have been less than three times as large as it was in 1750.<sup>61</sup> According to another calculation, the population of the European countries of early development—Belgium, France, Germany, the Netherlands, Scandinavia and the United Kingdom—combined with that of Northern America and Oceania multiplied more than six times, from about 60 million in 1750 to more than 370 million in 1950. In the same period the rest of the world's population multiplied only slightly more than three times.<sup>62</sup>

27. Estimated growth rates for different time intervals in general confirm a more rapid increase of population in the predominantly more developed areas of European settlement than in other parts of the world between 1750 and the early decades of the twentieth century (table XIV.1). The estimates, which go as far back as 1650, indicate that growth rates in the two major regions did not differ ascertainably before 1750, and also that during the latter half of the eighteenth century population growth in the areas of European settlement was only slightly higher than that of the combined population of Africa, Asia and Latin America. As various writers have noted, a significant gap in growth rates emerged only in the first half of the nineteenth century and increased during the latter half of it.<sup>63</sup> The total population of the areas of European settlement increased on the average between 0.7 and 0.8 per cent annually from 1800 to 1850 and between 1.0 to 1.1 per cent from 1850 to 1900. Growth rates of the combined population of Africa, Asia and Latin America were estimated to be of the order of 0.4 to 0.5 per cent during the first half and of 0.2 to 0.4 per cent in the course of the second half of the nineteenth century (see again table XIV.1).

<sup>60</sup> Carr-Saunders, *World Population ...* (1937), pp. 42-45. See also Davis, "The world demographic transition" (1945); Landis and Hatt, *Population Problems ...* (1954), pp. 21-22; Borrie, *The Growth and Control ...* (1970), p. 7.

<sup>61</sup> Woytinsky and Woytinsky, *World Population and Production ...* (1953), p. 36; Köllmann, *Bevölkerung und Raum ...* (1965), pp. 1-2. The estimates are not always clear as to which population and area they refer to. The area of European settlement is usually defined as consisting of Europe, North America, Oceania and the USSR and, in a number of cases, Middle and South America. Durand, "The modern expansion ..." (1967), presents estimates of population growth for the area of European settlement including and excluding Middle and South America. In the former case the corresponding population in 1950 is 4.9 times that in 1750, in the latter case the multiplication factor is 4.4.

<sup>62</sup> Kuznets, *Modern Economic Growth ...* (1966), pp. 36-40.

<sup>63</sup> Bourgeois-Pichat, *Population Growth and Development* (1966), p. 13; Thompson and Lewis, *Population Problems* (1965), pp. 413-414, 416; Durand, "The modern expansion ..." (1967).

28. The pattern of a more rapid growth of the population in the areas of European settlement, as compared with the rest of the world, which had emerged in the course of the nineteenth century underwent a complete change in the twentieth century. Comparisons of population growth trends for the first half of the twentieth century are hampered by fluctuations in growth rates—especially in the predominantly more developed countries of the areas of European settlement—caused by periods of war, economic crisis and subsequent recovery. But on the basis of data for the decades which can be considered as more or less normal, it appears that population growth in these areas has become stabilized since the end of the nineteenth century.<sup>64</sup> In the meantime the population in the rest of the world started to grow faster and in the decades 1911-1920 and 1921-1930 rates of increase in both major segments were about the same (table XIV.1). Since then the combined population of Africa, Asia and Latin America increased at a considerably higher rate than that of the areas of predominantly European settlement. During the 1930s and 1940s this differential was mainly due to the exceptionally low rates of growth of the latter.<sup>65</sup> Since the 1950s, however, when population growth in the areas of European settlement had returned to a more normal level, the difference has been the result of a considerable acceleration of the rate at which the population of Africa, Asia and Latin America combined increased. Between 1950 and 1960 their population increased at an unprecedented average annual rate of 2 per cent as compared with about 1.3 per cent in the areas of European settlement.

29. Since the areas of European settlement coincide to a large extent with the presently more developed regions,<sup>66</sup> the reversal of the traditional situation with respect to differentials in population growth in the major areas is also found in the estimates for more developed and less developed regions. Estimated decennial growth rates since 1920, prepared by the United Nations, show that in the 1920s population increased at a faster rate in the more developed areas, but from 1930 on the opposite was true.<sup>67</sup> The most striking development occurred in the 1950s when population growth in the less developed regions accelerated to an unprecedented level with an

<sup>64</sup> Durand, "The modern expansion ..." (1967); Bourgeois-Pichat, *Population Growth and Development* (1966), pp. 14-15; Hauser, "World population: retrospect and prospect" (1971). Several writers have argued, however, that the growth of population of European stock reached a peak in the latter half of the nineteenth century. See, for instance, Reinhard and Armengaud, *Histoire générale de la population mondiale* (1961), pp. 229-230; Borrie, *The Growth and Control ...* (1970), p. 7.

<sup>65</sup> See Macura, "The long-range outlook ..." (1968); Thompson and Lewis, *Population Problems* (1965), p. 417.

<sup>66</sup> The correspondence between areas of European settlement and economically more developed regions is not complete. If Latin America is excluded from the former, such countries as Argentina and Uruguay and possibly some others, which might be considered as developed, would be excluded. In the opposite case the whole of less developed Latin America would be included. In addition, the area of European settlement excludes Japan, which forms part of the group of developed countries. See on this point also Macura, "The long-range outlook ..." (1968).

<sup>67</sup> United Nations, *World Population Prospects ...* (1966), p. 22; El-Badry, "Population projections for the world ..." (1967); Vávra, "Projection of world population ..." (1967).



increase of 23 per cent for the decade, compared to 14 per cent in the more developed regions (see section C below and table XIV.5).

30. To the extent that generalizations on population trends during the modern period are possible, the data for different regions convey the impression that, on the whole, population increased more rapidly in those areas where economic progress was also more rapid. Since the beginning of the period, the group of more developed countries has achieved enormous increases in total product, both in absolute and relative terms as well as in comparison with earlier periods,<sup>68</sup> has seen its population increase by some five times and has made gains in *per capita* income which ranged from 10 to well over 20 per cent per decade.<sup>69</sup> In contrast, during the greater part of modern history population in the less developed countries increased relatively slowly, having grown by an estimated 200 per cent between 1750 and 1950; even so, as the mostly indirect evidence discussed before suggests, *per capita* income in many of these countries increased only insignificantly or not at all as the growth of total output barely kept pace with that of population. In general, population and economic growth trends, at least until a few decades ago, suggested the existence of a positive association between population and economic growth for the broad groups of more developed and less developed countries.<sup>70</sup> To the extent that population and *per capita* income growth in the rest of the world remained below the levels characteristic for the presently developed countries, higher rates of growth and higher levels of *per capita* income in the latter were accompanied by higher rates of increases of population. Slower population growth in the less developed regions was associated with low, if any, increases in *per capita* income and levels of development.

31. Even though economic growth in the modern period has been accompanied by rapid growth of population, in general, and, until recently, a positive association also prevailed with respect to more developed and less developed regions and countries, data for the two groups of countries in the more recent period and for individual

countries imply either a negative association or the absence of a systematic relationship.

32. The higher rate of population growth since the approximate beginnings of the modern period, which had its main impact in the more developed countries, was followed, as noted before, by an even more marked acceleration in the post-war period, giving rise to an unprecedented population growth in the economically less developed countries. When economic and population growth slowed down in the more developed countries in the 1930s, while population growth in the less developed ones continued an upward trend, the traditional positive association between population and economic growth was already considerably weakened. It reversed itself in the post-war period when population growth in the developing countries rose to a level nearly double that of the more developed countries and, despite a much faster increase in total product than in the past, growth rates in *per capita* income in the developing countries remained below those of the more developed countries.<sup>71</sup> Thus, the long-term positive relation between population and economic growth and development, which had prevailed until the 1930s, no longer held and an inverse relation emerged in recent decades.<sup>72</sup>

33. Long-term data for individual countries also do not substantiate the assumption of a systematic association between population and economic growth. A number of writers have commented on the fact that in the past countries with high rates of population growth did not necessarily show high rates of increases in *per capita* income or vice versa. Nor was there any evidence of an inverse association, in the sense that low rates of population growth would be accompanied by high growth rates of *per capita* product, or vice versa. Considered individually, it is asserted, there were countries characterized by both high growth of population and *per capita* product (United States, Canada); high population growth and low *per capita* income growth (the Netherlands); low population growth, but high *per capita* income growth (Sweden) and low rates of increase in both population and income (Belgium, France).<sup>73</sup>

34. Historical population estimates raise some additional questions concerning the interrelationship with economic growth. Estimates for periods prior to 1750 imply, as noted above, that in a number of countries higher rates of population growth may have manifested themselves well before modern economic growth began. Although, as has also been pointed out, the timing of

<sup>68</sup> Kuznets, *Economic Growth of Nations* ... (1971), pp. 24-25, estimates that in the older European countries economic growth during the modern period implied increases in total product of 6 to 24 times over a century, compared with possible growth factors of 1.25 to 1.50 in the preceding centuries. Kaldor, "Characteristics of economic development" (1962) estimates that rates of growth in national production in Western Europe and Northern America since 1750 were roughly 30 to 40 times as high as that experienced over many earlier centuries.

<sup>69</sup> Kuznets, *Modern Economic Growth* ... (1966), p. 67.

<sup>70</sup> Kuznets, *Modern Economic Growth* ... (1966), pp. 36, 40; his "Population and economic growth" (1967) and his *Economic Growth of Nations* ... (1971), p. 23; Kaldor, "Characteristics of economic development" (1962). It has also been implied that at least in the case of the more developed countries, declines in the rates of *per capita* income growth, which manifested themselves in many of these countries during the first half of the present century, were accompanied by a slower growth of population. On this point see the discussion of the stagnation theory in chapter XIII. Also Kuznets, "Population, income and capital" (1955), Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 215; Bairoch, *Révolution industrielle et sous-développement* (1963), p. 26.

<sup>71</sup> See section C below.

<sup>72</sup> United Nations, *World Population Prospects* ... (1966); Kuznets, *Modern Economic Growth* ... (1966), pp. 39-40; and his "Population and economic growth" (1967); Bourgeois-Pichat, *Population Growth and Development* (1966), pp. 14-15; Borrie, *The Growth and Control* ... (1970), p. 9. See also Durand, "The modern expansion ..." (1967) who considered, however, the former positive relationship between population growth and economic development ambiguous. For a more detailed discussion of recent trends, see section C below.

<sup>73</sup> Kuznets, "Population, income and capital" (1955); his "Demographic aspects of economic growth ..." (1966) and his *Economic Growth of Nations* ... (1971), pp. 22-23; Easterlin, "Effects of population growth ..." (1967); Robinson, "Population and development" (1960).



the period of increased population growth cannot be firmly established, Easterlin concluded that possibly the phase of more rapid growth came before modern economic growth began in, at least, a number of countries.<sup>74</sup> While, if true, this would indicate a lack of association, Kuznets presented arguments which would support the assumption of a negative association between population and economic growth at that time. He speculated that rapid population growth during the early phases of development of some countries may have prevented any significant increase in levels of *per capita* income. The latter became possible only when population growth stabilized or declined.<sup>75</sup>

35. A comparative study of the growth of population, total and *per capita* product by Kuznets supported most of the findings described so far. Analysing first data for some fourteen mostly developed countries which covered a period of fifty years or more up to 1950, he showed that substantial rates of population growth tended to be accompanied by high rates of growth of total product and that, conversely, low rates of population growth meant modest rates of growth also of total income. A positive, significant association existed, he found, between growth of population and growth of total product. The association persisted even if the areas of European overseas settlement, to which the association could be in part attributed, were excluded. Further analysis of the data suggested, however, that the role of population growth in the increase of total product was limited. Finding a positive association also between the rates of growth of total and *per capita* product implied, Kuznets noted, that different rates of population growth were not the predominant factor in the growth of total product. The results of his analysis with respect to the interrelation between population and *per capita* income growth were equally inconclusive. The rank correlation coefficient between the rates of growth of population and *per capita* product was found to be positive, thus suggesting that countries with more rapid population growth also had a more rapid growth of *per capita* income, but the value of the coefficient was not significant.<sup>76</sup>

36. Although long-term data were available only for predominantly more developed countries, Kuznets extended his analysis to speculate what influence the inclusion of the less developed countries would have on these associations. Assuming that in these countries population was regulated by the Malthusian mechanism, in the sense that its growth was held back by positive checks and that where opportunities for economic expansion were created the response would be a higher population growth, he concluded that the association between the rates of growth of population and total product would be likely to remain positive and significant. He thought also that with the inclusion of the less developed countries a significant positive correlation between the growth of population and

*per capita* income would emerge for the period considered. The inclusion of the less developed countries, he argued, would mean the addition of cases with low population growth, due to economic stagnation, and low rates of growth of *per capita* income, thus strengthening the positive, but not significant, correlation found in the case of the more developed countries.<sup>77</sup> This view was supported by Easterlin, who noted that if, for the pre-war period, less developed countries were considered together with the more developed ones included in Kuznets's analysis, higher *per capita* income growth rates would tend to be associated with higher population growth rates.<sup>78</sup>

37. These findings may to some extent be considered representative of the nature of the interrelations between economic and population growth during the modern period. They imply that population and economic growth may vary in a similar manner, in general, despite the lack of any consistent relationship between the two where individual countries are concerned. The absence of the latter means that it is also possible, as has occurred in recent decades, that a positive association, such as that which characterized global and regional trends during a large part of the modern period, may reverse itself into a negative one.

38. The lack of a systematic and uniformly valid relationship between growth of population and income per head during the modern period has been more or less generally accepted. According to Robinson, it is impossible to draw from history any generalizations about such a relationship nor to draw any conclusion whether economic growth stimulates that of population or whether the growth of population stimulates the growth of wealth.<sup>79</sup> Kuznets observed, more specifically, that while modern economic growth implied a rapid increase in *per capita* income as well as population, this did not mean that population growth was a necessary condition for the former. The positive association which existed for the greater part of the period where broad groups of countries were concerned was a loose one, as exemplified by the experience of individual countries, where a diversity of relations between low and high rates of increase of population and *per capita* income is found in both more developed and less developed countries. For the range of population growth rates found in the past, there was and is, he concluded, no invariant and significant direct effect of population growth on the rate of increase of *per capita* product.<sup>80</sup>

39. This is not to imply, it has been noted, that the level of population growth is not an important factor; to the contrary, the significance of population growth for economic growth is generally recognized.<sup>81</sup> It does mean, however, that under different conditions and in different

<sup>74</sup> Easterlin, "Effects of population growth ..." (1967).

<sup>75</sup> Kuznets, *Toward a Theory* ... (1965), pp. 21-22.

<sup>76</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956). See also Kindleberger, *Economic Growth in France and Britain* ... (1969), p. 69; Easterlin, "Effects of population growth ..." (1967).

<sup>77</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956).

<sup>78</sup> Easterlin, "Effects of population growth ..." (1967).

<sup>79</sup> Robinson, "Population and development" (1960).

<sup>80</sup> Kuznets, "Population and economic growth" (1967) and his "Demographic aspects of economic growth ..." (1966).

<sup>81</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956); his "Population change and aggregate output" (1960) and his "Demographic aspects of economic growth ..." (1966); Kaldor, "Characteristics of economic development" (1962); Easterlin, "Effects of population growth ..." (1967).

stages, population growth may have different consequences and may be differently affected, even to the extent that these effects and influences may be in opposite directions. The mechanism through which population changes, its determining factors and the magnitude of the change, on the one hand, and the economic, social and institutional conditions under which the change occurs, on the other, determine what its effects will be. These conditions having varied greatly over time and space, the rise in numbers thus may affect and be related to growth in income in a number of ways from which no single and well-defined pattern of interrelationship emerges.<sup>82</sup> Simple comparisons between population and *per capita* income, failing to take into account variations in growth-determining factors, it is asserted, are an over-simplification. Even so, they tend to show that the implications of population growth are not so important as to dominate other determinants of growth in general, but, according to this argument, they also suggest that, where stark contrasts in both economic, social and demographic conditions exist, the associations between population and economic growth become more clearly defined.<sup>83</sup>

(c) *Fertility, mortality, the demographic transition and modern economic growth*

40. The new trends in population growth which emerged during the modern period were evidently the reflection of changes in its two main components, fertility and mortality. Their evolution in the European countries of early development over the last centuries not only confirmed such changes but, in addition, suggested certain regularities in fertility and mortality trends which led to the hypothesis that in the course of its economic and demographic development each population undergoes a demographic transition. The theory of the demographic transition assumes, as discussed in an earlier chapter,<sup>84</sup> that each population passes through various stages of growth under different régimes of fertility and mortality. More specifically, the transition involves the evolution from a régime of high birth and death rates and low population growth to one of low birth and death rates and low growth of population. In between there is a phase of rapid growth when a "demographic gap" emerges, since mortality declines first and it is followed only with a time-lag by the onset of a fall in fertility. Although the hypothesis of such a process of evolutionary demographic change and of the three or more stages in which it occurs appear to have a more or less general validity, the transition theory has proved to be more useful as a broad scheme for explaining demographic change than as a tool for more detailed analysis. Historical and contemporary trends have shown that the transition itself and its pattern, sequence and timing may vary greatly from country to country and over time.<sup>85</sup>

<sup>82</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. . . ." (1956); his "Demographic aspects of economic growth . . ." (1966).

<sup>83</sup> Kuznets, "Demographic aspects of economic growth . . ." (1966); Easterlin, "Effects of population growth . . ." (1967).

<sup>84</sup> See chapter III, section H.

<sup>85</sup> For instance, no uniformity has been found to exist with respect to the speed of mortality or fertility decline, the duration

41. The assessment of past trends in fertility and mortality is greatly hampered by the lack of statistical data.<sup>86</sup> This is especially true for earlier periods, but even so there is little doubt that the slow increase of population during the many centuries preceding the modern period was a consequence of high levels of both fertility and mortality. Speculations by different writers as to what levels of birth, death and growth rates could be considered typical for these primitive or pre-industrial societies are generally in accord, as far as the main traits are concerned. The "normal" birth and death rates of such a society—associated with marriage at an early age, a low incidence of birth control and conditions under which no effective control over mortality existed—are thought to have fluctuated from about 35 to 50 per thousand and from 35 to 40 per thousand, respectively. These rates, it is inferred, suggest "natural" growth rates of the order of 1 per cent. In actuality, average rates of growth were much lower than that, as recurrent crises, caused by epidemics, famines and wars, would cause high peaks in mortality. During such times, it is asserted, death rates could surpass birth rates by a considerable margin and, moreover, the birth rates themselves might be negatively affected by the crises. Average crude birth and death rates, these writers conclude, may have fluctuated between approximately 35 and 45 per thousand with death rates only slightly below birth rates and average rates of growth well below the "natural" or "normal" level.<sup>87</sup>

42. The world demographic transition was set in motion when over some two centuries ago the traditional balance between fertility and mortality was disrupted. It is generally agreed that the long-term acceleration of population growth resulted from improvements in mortality conditions, while what evidence there is excludes the likelihood of a rise in fertility.<sup>88</sup> The "demographic gap" emerged when the peaks in death rates due to epidemics and famines gradually disappeared and subsequently it widened when further gains in longevity occurred as "normal" mortality came under increasing control.<sup>89</sup> Despite a sharp fall in the more developed countries, fertility did not change much on a global scale and remained on the whole high. The decline in mortality, as the predominant factor in world demographic trends during the modern period, is thought to have been conditioned to a consider-

of the various stages, the time-lag between the fall in mortality and that in fertility or the magnitude of the "demographic gap". For a more detailed discussion of the merits and limitations of the transition theory, see chapter III, section H.

<sup>86</sup> See chapters IV and V, also chapter II.

<sup>87</sup> Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 28 ff.; and his *Malthus et les deux Marx . . .* (1962), pp. 76-77; Enke, *Economics for Development* (1963), pp. 335-336; Deane, *The First Industrial Revolution* (1965), pp. 20-21; Kuznets, *Toward a Theory . . .* (1965), pp. 12-13; Bourgeois-Pichat, *Population Growth and Development* (1966), p. 60.

<sup>88</sup> Davis, "The world demographic transition" (1945); Borrie, *Population Trends and Policies . . .* (1948), pp. 3-5, and his *The Growth and Control . . .* (1970), p. 67; Sauvy, *De Malthus à Mao Tsé-toung* (1958), p. 46; Thompson and Lewis, *Population Problems* (1965), p. 414; Durand, "A long-range view . . ." (1967); Hauser, "World population growth" (1969). See however, section D below.

<sup>89</sup> Helleiner, "The vital revolution reconsidered" (1957); Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 49-50; Cipolla, *The Economic History of World Population* (1962), pp. 80, 86; Wrigley, *Population and History* (1969), p. 165.

able extent by the process of economic growth. Improvements in mortality conditions in the modern period have been linked to such specific factors as more stable and increased food supplies, better transportation and distribution systems or, in more general terms, to the whole complex of economic and related changes associated with modern economic growth.<sup>90</sup>

43. Although world demographic trends may suggest a process of global transition taking place, these over-all trends are the result of widely diverging evolutions in the more developed and less developed countries. The demographic transition is usually assumed to have started in European countries somewhat before or in the eighteenth century with a decline in mortality. Data for earlier periods, although scarce and incomplete, suggest the existence of high levels of mortality before that time. Estimates for different periods between the thirteenth and seventeenth century, based mainly on the experience of selected population groups, showed life expectancies at birth varying between 20 and 40 years,<sup>91</sup> figures which have been accepted as more or less representative of general mortality conditions in pre-industrial societies.<sup>92</sup> Initial improvements in these conditions were probably mainly the result of the elimination of the peaks in death rates as periodic crises became less frequent and disappeared with the advent of economic growth and progress. Increases in the life expectancies of certain more privileged groups in the population which started to manifest themselves some time thereafter have been interpreted as an indication of an incipient decline also in "normal" mortality levels. Nevertheless, large gains in longevity became evident only in the second half of the nineteenth century, and the sharpest decline in mortality in the more developed countries did not occur until the twentieth century.<sup>93</sup>

44. Fertility in a number of countries of early development, especially those in northern and western Europe, is thought to have been only moderately high already in the eighteenth century. According to historical data and estimates, crude birth rates in a number of these countries may have been well below 40 per thousand at the beginning of the modern period. However, these data also show that fertility in these countries remained high on the whole during most of the eighteenth and nineteenth centuries and that the majority of the countries of early development passed into the low-fertility category only in the late nineteenth or early twentieth century.<sup>94</sup> For the western countries as a whole, it is often asserted a fall in birth rates became apparent only in the last part of the nineteenth century.<sup>95</sup> In the broader group of

presently more developed countries, accelerated fertility decrease manifested itself only in the first decades of the present century as the rate of decline speeded up and the process itself spread to countries which until then had not experienced a significant fall in birth rates. A period of short-term fluctuations as the long-term decline came to an end was followed in more recent decades by a tendency towards stabilization and decreasing fertility differentials among the group of low-fertility countries.<sup>96</sup>

45. However, the mortality and fertility experience of individual countries within this broad group varied widely and did not necessarily conform to the general scheme outlined above. Some of the evidence in this respect suggests that the sequence of mortality and fertility decline is not well-defined. It appears, for instance, that in several countries fertility decline set in at an early date and that, in a few cases, it may have preceded the fall in mortality so that population growth, instead of accelerating, may have tended to remain more or less stable.<sup>97</sup> Other findings point to the fact that the length of the transition period may have varied considerably; in particular, it has been noted that the transition process seems to have taken a much shorter time in those countries where it began later.<sup>98</sup> Despite these and other differences in trends for individual countries, conjectures and estimates of crude birth and death rates and rates of natural increase (since 1750) for the more developed regions as a whole support, in general, the assumption of a process of transition taking place (table XIV.2). Moderate reductions in mortality since the beginning of the modern period and through most of the nineteenth century were later followed by a rapid decline in death rates, a trend which was countered, in turn, in the early twentieth century by an increasing control over reproduction and a rapid fall in birth rates.

46. Notwithstanding considerable variations between individual countries, the common view is that the demographic transition in the more developed countries was associated in a general but not necessarily well-defined manner with the whole complex of economic and social changes which these countries underwent in the course of the modern period. In the areas of European settlement, according to Davis, the demographic transition accompanied and was directly related to the industrial revolution as an economic and socio-cultural phenomenon.<sup>99</sup> Notestein, among others, stressed the importance of the whole process of modernization for the decline in mortality and the subsequent reduction of fertility in these coun-

<sup>90</sup> Davis, "The world demographic transition" (1945); Kuznets, "Population, income and capital" (1955).

<sup>91</sup> See chapter V, section A; also chapter II, section D.

<sup>92</sup> Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 28-29; Dorn, "Mortality" (1959); Cipolla, *The Economic History of World Population* (1962), pp. 75-76; Durand, "A long-range view ..." (1967).

<sup>93</sup> See again chapter V, section A.

<sup>94</sup> See chapter IV, section A.

<sup>95</sup> Davis, "The world demographic transition" (1945); Durand, "World population: trend and prospects" (1958); Ryder, "Fertility" (1959); United Nations, *Population Bulletin No. 7* ... (1965), pp. 4-5; Glass, "World population ..." (1965).

<sup>96</sup> See again chapter IV, section A.

<sup>97</sup> Hauser and Duncan, "Demography as a body of knowledge" (1959); Coale, "Factors associated with the development of low fertility ..." (1967); Stolnitz, "The demographic transition ..." (1964).

<sup>98</sup> Stolnitz, "A century of international mortality trends. Part I" (1955), and his "The demographic transition ..." (1964); Smith, "The control of mortality" (1967). For a discussion of differences in the rate of fertility and mortality decline in presently developed countries see also Olin, "A note on historical birth ..." (1964).

<sup>99</sup> Davis, "The world demographic transition" (1945). See also his "The amazing decline of mortality ..." (1956); Taeuber, "The future of transitional areas" (1952) and her "Population growth in less developed countries" (1969).

TABLE XIV.2. ESTIMATED AND CONJECTURED AVERAGE ANNUAL BIRTH RATES, DEATH RATES AND RATES OF NATURAL INCREASE FOR PRESENTLY MORE DEVELOPED AND LESS DEVELOPED REGIONS, FROM 1750 TO 1970 (RATES PER 1,000 PER YEAR)

Period	More developed regions			Less developed regions		
	Birth rate	Death rate	Natural increase	Birth rate	Death rate	Natural increase
1750-1800 .....	38	34	4	41	37	4
1800-1850 .....	39	32	7	41	36	5
1850-1900 .....	38	29	9	40	38	2
1900-1910 .....	34	21	13	41	34	7
1910-1920 .....	26	23	3	40	37	3
1920-1930 .....	28	16	12	41	31	10
1930-1940 .....	22	14	8	41	29	12
1940-1950 .....	20	15	5	40	28	12
1950-1960 .....	22	10	12	43	22	21
1960-1970 .....	20	9	11	41	17	24

SOURCE: United Nations, *The World Population Situation in 1970* (1971), table 3.

tries.<sup>100</sup> Stolnitz emphasized the association between modern economic growth and the demographic transition in noting that all countries which in the modern period developed from a traditional, agrarian-based system to a largely industrial, urbanized base also moved from conditions of high mortality and fertility to low mortality and fertility.<sup>101</sup>

47. Of the two broad groups of determinants of mortality decline, economic and social development, on the one hand, and advances in medicine, public health and sanitation on the other,<sup>102</sup> the former are often thought to have been decisive particularly in the initial fall of mortality in the countries of early development and during the first part of the period of modern economic growth.<sup>103</sup> It has been asserted that, at the least, improvements in sanitation and public health and medical advances were not independent of economic and social development. Progress in the latter fields, according to this argument, made it possible to consolidate the improvements in mortality conditions attained through medical advances; and this view is shared even by most of those writers who stress such advances as the prime factors in mortality decline.<sup>104</sup> Like the decline in mortality in the more developed countries, that in fertility is thought to have been linked to the whole complex of economic and social

change in the course of the modern period. In general terms, the fall of fertility has been related to the over-all process of modernization and socio-economic change, with the time-lag in the decline of fertility compared with that in mortality being attributed to the slower response of the former to such changes.<sup>105</sup> The analysis of more specific determinants of past fertility declines—such as rising levels of living, the economic advantages of having a larger number of children as against the cost of their upbringing, the effects of industrialization and urbanization, to name but some of the factors—have produced a number of hypotheses on these interrelations,<sup>106</sup> and despite the fact that the concrete findings and evidence to support these assumptions are scarce, it is generally recognized that the complex of socio-economic determinants has had a decisive influence on fertility changes.

48. Although the demographic transition in the more developed countries may be assumed to have not been independent of modern economic growth, the nature of the arguments also suggests that the association was only a loose one. Several findings seem to confirm the lack of a consistent systematic relationship. For instance, indications are, as discussed in a different context, that a slow, but irregular, decline in death rates, attributable to the lowering of peaks in mortality, started before the process of industrialization and modern economic growth.<sup>107</sup> As to the factors in the initial decline in mortality during the modern period, Durand argued that whereas for Western European countries the fall in death rates could be explained, as postulated by the transition theory, by the improved mortality conditions following industrialization, such an explanation did not apply to Eastern Europe or areas of what is presently the Soviet Union where economic progress during the early period of modern economic growth was small, but population increased as fast as

<sup>100</sup> Notestein, "Population: the long view" (1945) and his "Economic problems of population change" (1953). See also Hauser and Duncan, "Demographic as a body of knowledge" (1959); Ohlin, *Population Control* ... (1967), p. 9.

<sup>101</sup> Stolnitz, "The demographic transition ..." (1964).

<sup>102</sup> See chapter V, section G.

<sup>103</sup> Davis, "The world demographic transition" (1945), and his "The amazing decline of mortality ..." (1956); Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 49-50; Thompson and Lewis, *Population Problems* (1965), pp. 445-446; Wrigley, *Population and History* (1969), p. 177. For a more detailed discussion of some of the more specific factors involved in the decline of mortality, such as increased food production, improvements in the transportation and distribution system, see chapter V, section G.

<sup>104</sup> Sauvy, *Malthus et les deux Marx* ... (1963), p. 67; Enke, *Economics for Development* (1963), p. 430; Vance, "The demographic gap ..." (1952); Stolnitz, "Comparison between some recent mortality trends ..." (1956), and his "A century of international mortality trends. Part I" (1955).

<sup>105</sup> Notestein, "Population: the long view" (1945). See also Taeuber, "The future of transitional areas" (1952); Hauser and Duncan, "Demography as a body of knowledge" (1959); Robinson, "The development of modern population theory" (1964).

<sup>106</sup> See chapter IV, section D.

<sup>107</sup> See chapter V, section G.

in the West.<sup>108</sup> In the case of fertility, an analysis of its decline in European countries in relation to various economic, social and other factors and the diversity of conditions under which it occurred led to the conclusion that the process of fertility decline is a far more complex phenomenon than assumed in the transition theory.<sup>109</sup>

49. In contrast to the developed countries, most of which have completed the demographic cycle, the transition in the developing areas is only of recent origin and the majority of the less developed countries are at present in the stage of rapid transitional growth. In general, mortality and fertility in these countries is thought to have been high and remained so well into the twentieth century. Small but sustained improvements in mortality started to manifest themselves in a number of countries in the 1920s and 1930s,<sup>110</sup> and several writers have placed the beginnings of the transition process in the less developed part of the world in this period.<sup>111</sup> Significant declines in mortality in most of these countries, however, did not occur until after the Second World War,<sup>112</sup> but then the fall in death rates was faster than ever before and faster than had been considered possible only a few decades ago; in many of these countries initially high death rates were halved within a short period.<sup>113</sup> Little is known about historical levels of fertility in less developed countries, but recent estimates indicate that in the majority of them birth rates are high, both in absolute terms and in comparison with most more developed countries at the beginning of the modern period and that, with few exceptions, fertility has not shown any tendency to decline.<sup>114</sup> Conjectured and estimated birth rates for the less developed regions, since 1750 show virtually stable and high rates of the order of 40 per thousand throughout the modern period. Death rates in the less developed regions fluctuated considerably until the 1920s and then started to decline, with the largest gains occurring since 1950. The unprecedented fall in mortality while fertility remained stable caused the large and increasing "demographic gap" between births and deaths, characteristic of post-war population growth in the less developed regions (see again table XIV.2).

<sup>108</sup> Durand, "The modern expansion ..." (1967). For a more general discussion of the argument that the transition as it occurred in countries of Western Europe does not necessarily repeat itself in the same manner under different conditions, see chapter III, section H. On the acceleration of population growth prior to rapid economic growth in Russia, see also Maddison, *Economic Growth in Japan and the USSR* (1969), p. xvii.

<sup>109</sup> Van de Walle and Knodel, "Demographic transition and fertility decline ..." (1967). See on this point also Coale, "Factors associated with the development of low fertility ..." (1967).

<sup>110</sup> See chapter V, section A.

<sup>111</sup> Davis, "The amazing decline of mortality ..." (1956); Smith, "The control of mortality" (1967); Taeuber, "Population growth in less developed countries" (1969).

<sup>112</sup> See again chapter V, section A.

<sup>113</sup> Stolnitz, "Comparison between some recent mortality trends ..." (1956); Sauvy, *De Malthus à Mao Tsé-toung* (1958), p. 47; Dorn, "Mortality" (1959); Cipolla, *The Economic History of World Population* (1962), pp. 88-89.

<sup>114</sup> See chapter IV, section A.

50. Until the Second World War, the experience of the less developed countries was not unlike that of the European countries of early development during the initial stages of transition. Post-war trends in the less developed countries, however, led a number of writers to question the relevance of the demographic transition as it had occurred in the European countries for the presently developing countries.<sup>115</sup> The prevalence of high levels of fertility and mortality in these countries during most of the modern period may have reflected conditions similar, although not identical, to those existing in pre-industrial Europe.<sup>116</sup> The slow decline in death rates during the 1920s has been attributed to roughly the same group of factors which set off the initial fall in death rates in the more developed countries—such as the lower incidence of acute food shortages and famines, certain health and sanitation measures, the establishment of order and security, and a limited amount of economic progress.<sup>117</sup> These similarities no longer held for the post-war period. The exceptional fall in the death rates of the less developed countries in the last few decades responded to a great extent to factors different from those which predominated in the more developed countries in the past. In the latter group of countries, as has been noted before, the reduction of mortality is generally thought to have been linked to the whole process of modernization and economic and social change, or at least not to be independent of it. The recent steep mortality decline in the less developed countries has occurred, unlike in the past, in the absence of significant economic progress, and is considered to have been mainly the result of the spread of new techniques or techniques adapted from the more advanced countries in the fields of public health, sanitation and medicine.<sup>118</sup> Requiring relatively small resources, both human and financial, and not being dependent upon the slow process of economic and social change, large gains in longevity could be attained in a relatively short period. The acceleration of population growth due to this autonomous fall in mortality not only signified the reversal of the traditional, even though tenuous, association between population and economic growth; higher population growth became an obstacle to economic growth in so far as it did not by itself generate higher rates of economic growth.<sup>119</sup>

<sup>115</sup> Taeuber, "The future of transitional areas" (1952); Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 54-55.

<sup>116</sup> See the earlier discussion in this subsection.

<sup>117</sup> Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 95-97; Taeuber, "Population growth in less-developed countries" (1969).

<sup>118</sup> Davis, "The amazing decline of mortality ..." (1956); Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 55 ff.; Vinei, "Stability and progress ..." (1958); Cipolla, *The Economic History of World Population* (1962), pp. 88 ff.; Piatier, *Equilibre entre développement économique* ... (1962), p. 33; Gill, *Economic Development* ... (1967), p. 7; Coale, "Population and economic development" (1969); Taeuber, "Population growth in less developed countries" (1969).

<sup>119</sup> Bourgeois-Pichat, *Population Growth and Development* (1966), p. 60; Wander, "Hemmt rasches Bevölkerungswachstum ..." (1970). See also United Nations, *Population Bulletin No. 6* ... (1963), p. 11.

## 2. INDUSTRIALIZATION AND URBANIZATION IN THE PERIOD OF MODERN ECONOMIC GROWTH

### (a) *The changing industrial structure of the labour force*

51. The process of modern economic growth has been accompanied by important shifts in the industrial composition of the national product and labour force. Although historical data on the long-term trends in economic structure are limited, indirect evidence suggests that in pre-industrial societies agriculture absorbs by far the largest part of the working population. At the low levels of productivity and income characteristic of such societies most of the population must necessarily be engaged in providing the necessary food for its own subsistence, and the prevailing levels of production make it impossible to support more than a small number of persons in non-agricultural pursuits. General considerations of this type, as well as available data both for presently developed countries before they embarked on the process of economic growth and for less developed countries in their early stages of development, have led many writers to conclude that in pre-industrial societies the share of agriculture in the total labour force is of the order of 70 to 80 per cent or even higher.<sup>120</sup> Conjectures like these, it should be remembered, are, however, subject to a substantial margin of uncertainty since the lack of specialization and the virtual absence of a division of labour in primitive societies may severely limit the significance of any industrial or occupational classification.<sup>121</sup>

52. One of the predominant characteristics of modern economic growth is thus the transformation of the economic structure from one where agriculture absorbs as much as four fifths of the working population to one where industry and services employ as much as or more than nine tenths of the labour force. Even though some of the most advanced countries have completed such a transformation, according to Davis, changes in the industrial composition of labour on a world-wide basis were probably relatively small during the greater part of the modern period although, in his view, significant in a longer historical perspective.<sup>122</sup> Tentative as they are, Bairoch and Limbor's estimates of the industrial distribution of the labour force since 1900 in general tend to lend support to the assumption that, prior to the twentieth century, changes in the industrial structure of the labour force had been relatively small. Around 1900, the agricultural labour force still represented well over 70 per cent of the total working population. Mining, industry and construction, according to these estimates, accounted for considerably less than 15 per cent of the total working population, and commerce, transport and services for

nearly 15 per cent.<sup>123</sup> The high estimated share of the agricultural labour force in 1900 seems to confirm that over the preceding one and a half centuries changes in the industrial composition must have been modest. Since the beginning of this century, however, considerable shifts in the structure of the labour force occurred. Bairoch and Limbor estimated that by 1960 the proportion of the total labour force in agriculture had declined to somewhat over 58 per cent while the shares of mining, industry and construction had increased to nearly 19 per cent and that of commerce, transport and services to nearly 23 per cent.<sup>124</sup>

53. In addition, the pace of structural change appears to have accelerated. According to Bairoch and Limbor, between 1900 and 1920 the proportion of the world's labour force engaged in agriculture decreased by 2.6 per cent. In the next ten years it is thought to have declined nearly as much—2.4 per cent—as in the preceding twenty years and the estimated reduction of 5.6 per cent between 1930 and 1950 and of 3.4 per cent during the 1950s confirms the continued acceleration of the rate of structural change. Trends in each of the two other major sectors are less clear, but their combined shares, of course, increased at an accelerating rate.<sup>125</sup>

54. Given the close, although not necessarily fully defined, association between economic growth and development, on the one hand, and the industrial structure and its evolution, on the other, considerable differences may be expected to exist in the composition of the labour force between the economically more developed and less developed countries. Reliable statistical information on the industrial structure in the pre-modern period and during the phases of early development are available only for a limited number of developed countries.<sup>126</sup> Where they exist these data confirm the high share of agriculture in the total labour force and its decline during the period of modern economic growth.<sup>127</sup> It has been estimated

<sup>123</sup> Bairoch and Limbor, "Changes in the industrial distribution..." (1968). The authors stress that these estimates may be subject to a considerable margin of error.

<sup>124</sup> *Ibid.* Estimates for 1950 are also found in International Labour Office, "The world's working population..." (1956), and for 1950 and 1960 in Baum, "The world's labour force..." (1968), and in International Labour Office, *Labour Force Projections*, part V... (1971), table 3, p. 55. The lowest percentages for agriculture and the highest for the non-agricultural sectors are found in the earliest of these estimates. The later ones all implied an upward revision of the proportion corresponding to agriculture and decreases in the shares of industrial and service activities. See also chapter IX, section D.

<sup>125</sup> Bairoch and Limbor, "Changes in the industrial distribution..." (1968).

<sup>126</sup> Data on long-term trends in a number of individual countries have been brought together in Clark, *The Conditions of Economic Progress* (1957), chap. 9; Kuznets, "Quantitative aspects of the economic growth of nations. II..." (1957); his *Modern Economic Growth*... (1966), chap. 3; and his *Economic Growth of Nations*... (1971), chap. 6; Bairoch *et al.*, *The Working Population*... (1968). For references to studies on labour force structure and its evolution in individual countries see chap. IX, section D.

<sup>127</sup> Kuznets, "Quantitative aspects of the economic growth of nations. II..." (1957); his *Modern Economic Growth*... (1966), pp. 87-97; and his *Economic Growth of Nations*... (1971), p. 249, where he notes that in some countries, however, the share of agriculture was already fairly low before entry into modern economic growth. Bairoch, *Agriculture and the Industrial Revolution* (1969), pp. 24 ff.

<sup>120</sup> Clark, *The Conditions of Economic Progress* (1957), pp. 497-498; Kuznets and Thomas, "Internal migration and economic growth" (1958); Kuznets, "The economic requirements of modern industrialization" (1962); Singer, "Balanced growth in economic development..." (1960); Cipolla, *The Economic History of World Population* (1962), pp. 24-25; Lewis, *The Theory of Economic Growth* (1963), pp. 333-334; Thompson and Lewis, *Population Problems* (1965), p. 402. See also Dovring, "The transformation of European agriculture" (1965) who notes that a pure agricultural society does not exist and probably never did.

<sup>121</sup> See section A of this chapter.

<sup>122</sup> Davis, "Population and the further spread..." (1951).



that, in the presently developed non-socialist countries, about 56 per cent of the working population was still engaged in agricultural activities by 1880, but that at the turn of the century this proportion had declined to less than half. Since then the percentage share of agriculture in these countries has been falling at an accelerated rate, with the exception of the period between 1930 and 1950.<sup>128</sup> Estimates for all presently developed countries (including the socialist countries) since 1900 suggest a similar pattern. They indicate that at the beginning of the century nearly three fifths of the total working population was still found in agriculture, but that since then this proportion has fallen at an increasing rate so that by 1960 it was half of what it was at the beginning of the century. They also suggest a speeding-up in the growth of the combined share of mining, industry and construction, which in 1960 reached about 33 per cent, nearly one and a half times as high as it was in 1900 (less than 22 per cent). Large, but varying increases were found in the combined shares of commerce, transport and services so that, over the period considered, the corresponding proportion nearly doubled—from 19 to 36 per cent.<sup>129</sup>

55. Compared to the evolution in the more developed countries, the structure of the labour force in the less developed countries experienced only relatively small changes in the course of the present century. Around 1900, according to Bairoch and Limbor, the share of agriculture in their total labour force was estimated to be close to 80 per cent, a figure which leaves little room for substantial change in previous periods. This proportion has declined since that time and was estimated by these authors to have been 75 per cent in 1950 and decreased further to approximately 73 per cent by 1960. The estimates also suggest that for the greater part of this period the relative decrease in agriculture was brought about to a very large extent by an increase in activities of the service type, whereas the proportion in mining, manufacturing and construction remained relatively stable until 1950, after which year it experienced a substantial increase.<sup>130</sup>

56. Although the relative share of agriculture in the world's labour force has been decreasing for a considerable time, the absolute number of agricultural workers continued to grow substantially. Even in the case of the more developed countries this number probably did not decrease until the 1920s.<sup>131</sup> Since then up to 1960, the

agricultural labour force in the more developed countries, excluding the Soviet Union and Eastern Europe, may have fallen by some 20 million.<sup>132</sup> Between 1950 and 1960, according to Baum, the decrease was especially great, amounting to possibly as much as 10 million.<sup>133</sup> In contrast, the size of the agricultural labour force in the less developed regions continued to increase and did so at an accelerated rate. The estimated increase of some 60 million in the number of agricultural workers in the less developed regions, excluding the Asian socialist countries, between 1950 and 1960 was higher than that experienced during the twenty years from 1930 to 1950.<sup>134</sup>

### (b) Industrialization and urbanization

57. The structural and spatial changes in the economy which manifest themselves primarily in the shifts in the industrial composition of the labour force and the rural-urban distribution of the population are, as noted before, closely interrelated.<sup>135</sup> Nevertheless, relatively little is known about the actual trends in industrialization and urbanization during the period of modern economic growth and even less about the interrelations between them as they existed during this period. In general terms, it has been observed that, although cities have existed in some form since early times, their rapid growth over the last centuries was made possible by, and resulted from the technological development, economic and social change associated with modern economic growth.<sup>136</sup> The agricultural and industrial revolutions ended the traditional predominance of the agricultural and rural sector and created the conditions as well as the need for large transfers of rural agricultural workers to urban, industrial occupations.<sup>137</sup>

58. As discussed in more detail in chapter VI, the process of urbanization during the modern period was rapid. The population living in localities of 20,000 inhabitants or more in 1800 was estimated to have been some 22 million, representing 2.4 per cent of the population at that time. Between 1800 and 1950, the population in localities of that size multiplied some 23 times, to over 500 million, while the total world population increased 2.6 times. The proportion of the total population living in localities of 20,000 inhabitants and over multiplied nearly ninefold to reach over 20 per cent. The growth of urban population during this period was both rapid and accelerating. Urban population in the sense defined here is estimated

<sup>128</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968). The countries include Europe (with the exception of Eastern Europe and excluding the Soviet Union); Canada and the United States; Japan; Australia and New Zealand; and the Republic of South Africa. The authors note that in some of these countries (such as Finland, Italy, Portugal, Spain and Turkey) the share of agriculture in the total labour force is still comparatively high.

<sup>129</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968). The estimates for 1960 differ somewhat from other estimates, cited earlier, prepared for that year.

<sup>130</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1960), table 6. See also Bairoch, *Diagnostic de l'évolution économique du tiers-monde* ... (1969), pp. 205-210. The other estimates for 1950 and 1960 referred to earlier differ somewhat from those cited here.

<sup>131</sup> International Labour Office, "The world's working population ..." (1956); Doving, "The transformation of European agriculture" (1965); Hoselitz, "Population pressure ..." (1957).

<sup>132</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968).

<sup>133</sup> Baum, "The world's labour force ..." (1967).

<sup>134</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968).

<sup>135</sup> See section A above.

<sup>136</sup> Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954); Lampard, "The history of cities ..." (1955), and his "Historical aspects of urbanization" (1965); United Nations, *Report on the World Social Situation* ... (1957), pp. 113-114; Hauser, "World and Asian urbanization ..." (1957), and his "Urbanization: an overview" (1965); Hawley, "World urbanization ..." (1964).

<sup>137</sup> Fisher, "The economic implications ..." (1935); Clark, *The Conditions of Economic Progress* (1957), p. 492; Fourastié, *Le grand espoir du XX<sup>e</sup> siècle* (1949), chap. 2; Kuznets, *Toward a Theory* ... (1965), pp. 25 ff.



to have increased by nearly two times between 1850 and 1900 and by nearly two and a half times from 1900 to 1950.<sup>138</sup> Rapid urbanization continued through the recent period. The world's total population living in agglomerations of 20,000 inhabitants and over was estimated to have increased from somewhat over 14 per cent in 1920 to over 25 per cent by 1960 and projections suggest that by 1970 this proportion may have increased to over 28 per cent.<sup>139</sup>

59. Estimates on historical levels and trends of urbanization in more developed and less developed regions are scarce, but suggest in general that in both groups of countries urbanization was not far advanced in the beginning of the nineteenth century and that the present large differences between them have since emerged.<sup>140</sup> The estimated proportion of the population in cities of 100,000 inhabitants and over in 1800 was uniformly low in all of the continents of the world. Since then and continuing into the twentieth century, the growth of large cities was especially rapid in the more developed regions. The population of the large cities of America, Europe, Oceania and the Soviet Union increased about 35 times between 1800 and 1950, compared with a tenfold rise in Asia.<sup>141</sup> Urban growth in the more developed continents was, however, uneven and has tended to slow down in the more recent period especially as a result of trends in Europe. It has been estimated that the large-city population of these regions multiplied nearly three times between 1800 and 1850 and about four and a half times between 1850 and 1900, but that between 1900 and 1950 the multiplication factor declined to about three times.<sup>142</sup>

60. Thus while it is generally inferred that during the modern period as a whole the substantial structural changes in the presently developed countries were accompanied by rapid urban growth,<sup>143</sup> more recent trends only partly confirm the existence of such a close association. Although levels of both industrialization and urbanization in these countries increased considerably since the beginning of the twentieth century, the estimates cited also suggest that while the share of the agricultural labour force has been decreasing at an accelerating rate,

the rate of urbanization in most of these countries may have slowed down or remained fairly stable.<sup>144</sup>

61. The growth of urban population of the less developed regions in the nineteenth century, although probably higher than before, remained relatively slow and far below the very rapid increase in the more developed regions. The population in cities of 100,000 inhabitants and over in Africa and Asia is estimated to have increased only by one fourth between 1800 and 1850 and by two thirds between 1850 and 1900. Since 1900 urban growth in these continents accelerated strongly: in 1950 their large city population was five and a half times as high as at the beginning of the century, surpassing by far the increase in the other continents. This speeding-up of urban growth is confirmed by recent, more detailed data for the presently less developed regions as a whole: between 1920 and 1940 cities with 100,000 and more inhabitants in these regions increased by more than 120 per cent and between 1940 and 1960 the increase was nearly 200 per cent. Even so, levels of urbanization in the economically less advanced regions are still considerably below those of the more advanced countries and while in the majority of the latter the absolute size of the rural population has remained relatively constant or declined in recent decades, in the less developed countries rural population has continued to grow at a substantial rate, although lower than in the urban areas.<sup>145</sup> Knowledge as to the relative pace of and interrelations between industrialization and urbanization in these countries is relatively scarce. What evidence there is, according to many authors, suggests that, as a result of the combined effect of rapid natural increase and migration, the urban population has reached levels in excess of what would be commensurate with their stage of industrialization and higher than those found in the presently developed countries at a similar stage of development.<sup>146</sup>

### C. Recent evolution and situation

62. Both from the point of view of economic growth and demographic trends, the recent decades have been a period of great changes which distinguish them from earlier periods. As far as population growth is concerned, the decades since the 1940s witnessed a strong acceleration in world population growth and an increasing gap between the rates of increase in the less developed and more developed countries. During the same period, both developed and developing countries embarked on a phase of rapid growth of production, which especially in the latter of the two signified in most cases a break with the earlier periods of slow expansion or virtual stagnation. Nevertheless, despite this considerable acceleration in

<sup>138</sup> See chapter VI, section C.

<sup>139</sup> See again chapter VI, section C, and for the projected value in 1970, United Nations, *Growth of the World's Urban and Rural Population* . . . (1969), table 31, p. 58.

<sup>140</sup> Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954). See also United Nations, *Report on the World Social Situation* . . . (1957), table 3, p. 114.

<sup>141</sup> See chapter VI, section C, table VI.5. Also Hauser, "World and Asian urbanization . . ." (1957); United Nations, *Report on the World Social Situation* . . . (1957), p. 114; Hoyt, "The growth of cities from 1800 to 1960 . . ." (1963).

<sup>142</sup> Hauser, "World and Asian urbanization . . ." (1957); United Nations, *Report on the World Social Situation* . . . (1957), p. 114. See also Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1955); Davis, "The origin and growth of urbanization . . ." (1955).

<sup>143</sup> Davis and Hertz Golden, "The world distribution of urbanization" (1951); Davis, "The origin and growth of urbanization . . ." (1955); Hoselitz, "The role of cities in the economic growth . . ." (1953).

<sup>144</sup> The possibility of a changing relationship over time between industrialization and urbanization has received some empirical report. Sovani, "The analysis of over-urbanization" (1964) found, on the basis of data for a number of more developed countries, a much lower correlation coefficient between the proportion of the labour force engaged in non-agricultural activities and the proportion urban in 1950 than in 1891. See section C.

<sup>145</sup> For further discussion and data see chapter VI, section C and tables VI.5 and VI.7.

<sup>146</sup> See section C below.

levels of production in the economically less advanced countries, the large differences in levels of *per capita* income between them and the economically more advanced countries have shown no tendency to decline, but, on the contrary, widened.

# 1. ECONOMIC GROWTH AND DEMOGRAPHIC CHANGE IN THE POST-WAR PERIOD

## (a) *Growth of income*

63. As discussed in the preceding section, despite the scarcity of estimates of *per capita* income on a world-wide basis for the period prior to the Second World War, the great gap in income between the more developed and less developed regions was evident. Both Kuznets<sup>147</sup> and Deane<sup>148</sup> compiled data on relative *per capita* income in different regions of the world for 1938 which give some indication of the disparities in income levels at the time. Taking the average world income as 100, the index for North America and Oceania was 420, for Western Europe 275, for the Soviet Union 102 and for the other European countries 129. In contrast, the indices for the predominantly less developed regions were all below 100: for Latin America it was 71 and for Asia and Africa 33 and 32, respectively (see tables XIV.3 and XIV.4). Developments during the 1940s were greatly affected by the war and its aftermath and although data on growth of total and *per capita* domestic product for this period showed considerable variations for regions and individual countries, they suggest that on the whole the difference in income levels between the more industrialized and less industrialized countries widened. According to estimates, which exclude the Soviet Union and Eastern Europe, between 1938 and 1948 the gross domestic product of the less industrialized countries grew at an average rate of 2.9 per cent annually, which was only slightly below that of the more industrialized nations, 3.1 per cent. However, because of the faster growth of population in the former—1.4 per cent annually as against 1.0 per cent in the more advanced countries—growth rates of *per capita* product diverged considerably. In the more industrialized countries the rate of increase in *per capita* gross domestic product was 2.1 per cent annually, while in the less industrialized it amounted to only 1.5 per cent.<sup>149</sup>

64. The large relative gap in income levels between the more developed and less developed regions at the beginning of the 1950s is revealed by Kuznets's estimates of indices of relative *per capita* income in 1949 for the same regions as in 1938 (table XIV.3). The index of *per capita* income of the most developed regions—North America and Oceania—was nearly thirty times that of the world's poorest region, Asia; somewhat less than twenty-five

TABLE XIV.3. RELATIVE *per capita* INCOME BY REGIONS, 1938 AND 1949

	Relative per capita income	
	1938	1949
World .....	100	100
North America and Oceania <sup>a</sup> .....	419	590
Western Europe <sup>b</sup> .....	275	214
Soviet Union .....	102	133
Other Europe <sup>c</sup> .....	129	94
Latin America <sup>d</sup> .....	71	66
Asia .....	33	20
Africa .....	32	24

SOURCE: Kuznets, "Quantitative aspects of the economic growth of nations. I. . . ." (1956), table 4, p. 17.

<sup>a</sup> United States, Canada, Australia and New Zealand.

<sup>b</sup> Western, Central and Northern Europe, excluding countries east of the German Democratic Republic and Austria; excludes also the Balkan, Iberian and Apennine peninsulas.

<sup>c</sup> Includes countries not included in Western Europe and the Soviet Union.

<sup>d</sup> South of the United States, including the Caribbean.

times that of Africa and still nine times that of Latin America. The *per capita* income ratio between the more developed regions of America, Europe and Oceania combined and the less developed regions, formed by Africa, Asia and Latin America—calculated on the basis of the income indices for regions and their share in the total population—was at that time more than 10 to 1.<sup>150</sup> Another series of estimates of population and income in major regions for 1949 suggests a somewhat lower margin between income levels in the most and least advanced regions. Average *per capita* income in the more developed regions (Europe, North America, Oceania and the USSR), according to these estimates, was somewhat less than 10 times as high as in the less developed regions (Africa, Asia and Latin America).<sup>151</sup> However, the estimated *per capita* gross domestic product of the developed market economies of North America and Europe and the then emerging Japan in 1950 was estimated to have been over ten times that of the less developed regions.<sup>152</sup> A ratio of 10 to 1 between the *per capita* income of the average more developed and less developed countries appears thus to have existed around 1950.

65. Since the post-war period, growth in total income and income per head have varied both in the more developed and less developed countries and whereas in some years total production may have expanded faster in the one or the other, on the whole it increased at a fairly similar rate in both groups of countries. But with population growing much faster in the developing countries, their

<sup>147</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. . . ." (1956). See also his "Regional economic trends . . ." (1958).

<sup>148</sup> Deane, "The long term trends . . ." (1961).

<sup>149</sup> United Nations, *The Growth of World Industry . . .* (1965), chap. IV, table 4. See also United Nations, *Economic Survey of Asia and the Far East, 1965* (1966), p. 156, table V.1. Kristensen et al., *The Economic World Balance* (1960), p. 31, table 1.4, presents estimates of population growth and the growth of domestic product by regions for 1938 to 1950.

<sup>150</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. . . ." (1956); also his "Regional economic trends . . ." (1958).

<sup>151</sup> United Nations, *National Income and its Distribution . . .* (1951), p. 3, table 2. See also Bonné, *Studies in Economic Development . . .* (1957), p. 37.

<sup>152</sup> United Nations, *World Economic Survey, 1963*, part I . . . (1964), p. 21, table 2.3.

TABLE XIV.4. RELATIVE *per capita* INCOME BY REGIONS,  
1938 AND 1961

	Relative <i>per capita</i> income	
	1938	1961
World .....	100	100
North America and Oceania .....	419	542
Europe (including Asiatic USSR) .....	177	181
Latin America .....	71	69
Asia .....	33	23
Africa .....	32	22

SOURCE: Deane, "The long-term trends ..." (1961).

relative gains in *per capita* income remained in most years below that of the economically more advanced countries. In absolute terms, increases in income per head in the developing countries were at all times only a very small amount compared with the increases found in the more developed countries.

66. Both more developed and less developed countries experienced a rapid growth of production in the early 1950s. Rough estimates of commodity output in the period 1948-1955, for market economies only, suggest that in this period the production of agriculture, mining and manufacturing in all countries considered increased by 30 per cent, while the corresponding relative increases were 31 per cent in the more developed and 26 per cent in the less developed countries.<sup>153</sup> According to another estimate, gross domestic product in the years between 1950 and 1955 increased at virtually the same rate in the more and in the less developed market economies, the figures being 4.7 and 4.6 per cent, respectively.<sup>154</sup> Despite the similarity in growth of total commodity output and of gross domestic product, *per capita* increases in the less developed countries remained, because of the more rapid growth of their population, considerably below those of the more developed countries. Thus while the commodity output per head of the less developed market economies increased by 15 per cent between 1948 and 1955, in the more developed ones the rise was 22 per cent.<sup>155</sup> Likewise, in the period 1950-1955, *per capita* gross domestic product in the less developed market economies expanded at a rate of 2.5 per cent as compared with 3.4 per cent in the economically more advanced countries.<sup>156</sup>

67. Economic growth in the developed market economies, and especially in the United States, slowed down during the latter half of the 1950s, when the gross domestic product of these countries is estimated to have increased

<sup>153</sup> United Nations, *World Economic Survey, 1955* (1956), table 1, p. 25.

<sup>154</sup> United Nations, *World Economic Survey, 1963*, part I ... (1964), table 2-1, p. 19.

<sup>155</sup> United Nations, *World Economic Survey, 1955* (1956), table 1, p. 25.

<sup>156</sup> United Nations, *World Economic Survey, 1963*, part I ... (1964), table 2-3, p. 21. For data on the growth of net domestic product in major regions between 1950 and 1955 see also, Kristensen *et al.*, *The Economic World Balance* (1960), pp. 25, 250.

at an average annual compound rate of 3.3 per cent compared with 4.7 per cent in the preceding quinquennium. In the less developed market economies, gross domestic product increased, according to various estimates, at a rate of the order of 4.3 to 4.6 per cent. The corresponding estimated increases in product per head varied between 1.8 and 2.3 per cent for the developing countries and amounted to 2.0 per cent in the more developed. Despite the fact that thus, in *per capita* terms, economic growth in these years was similar in both groups of countries, in absolute terms the average gain in *per capita* income in the less advanced countries—10 to 15 dollars over the five-year period—was only a fraction of the average increase of over 130 dollars in the more developed countries.<sup>157</sup>

68. The income gap thus widened in these years: according to the estimates cited, *per capita* product in the developed market economies was in 1955 well over 10 times that of the developing countries.<sup>158</sup> Hagen, using estimates of *per capita* gross national product for 1957, found on the basis of these data that the poorest half of the world's population had a *per capita* income which represented only one thirty-fifth of that of the United States. He also noted, however, that conventional methods of international comparisons of income by means of rates of exchange tend to over-estimate the income differential. If income is assessed by direct comparison of prices instead of the use of foreign exchange rates, the difference becomes considerably smaller. Using rough estimates for conversion, he concluded that the 50 per cent of the population at the bottom of the income pyramid had a *per capita* income one-twelfth, instead of one thirty-fifth, of that of the United States.<sup>159</sup>

69. By the end of the 1950s *per capita* income in the developed countries is estimated to have been nearly eleven times that of the developing countries as compared with somewhat over ten times in 1950.<sup>160</sup> Indices of relative *per capita* income for major regions in 1961 were prepared by Deane (see table XIV.4). Setting the world *per capita* income at 100, the index for North America and Oceania was 542 and for Europe (including Asiatic USSR) 181. In contrast the index for Latin America was 69, for Asia 23 and for Africa 22. Compared with the pre-war estimates, gains in relative incomes were limited to the two more developed regions, while the indices for all three predominantly less developed regions declined.

<sup>157</sup> United Nations, *World Economic Survey, 1963*, part I ... (1964), tables 2-1 and 2-3, pp. 19, 21, gives a rate of growth of total gross domestic product for the developing market economies of 4.3 per cent and a *per capita* increase of 1.8 per cent. Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969), give rates of 4.4 and 1.8, respectively. United Nations, *World Economic Survey, 1967*, part I ... (1968), table 2, p. 17, using a broader range of data than the 1963 survey, estimated the total gross domestic product of the developing countries to have increased at 4.6 per cent and the *per capita* product at 2.3 per cent. Estimates for the more developed market economies were similar in all three sources.

<sup>158</sup> United Nations, *World Economic Survey, 1963*, part I ... (1964), table 2-3, p. 21.

<sup>159</sup> Hagen, "Some facts about income levels ..." (1960); also his "World economic trends ..." (1958).

<sup>160</sup> United Nations, *World Economic Survey, 1963*, part I ... (1964), table 2-3, p. 21.

In addition, however, the largest increases since 1938 are found in the most developed regions and the largest losses in the poorest regions, implying not only that the average income levels between more and less developed regions widened, but that also the gap between the poorest and richest became larger.<sup>161</sup>

70. In the period 1960-1965, the real gross domestic product of the developing countries has been estimated to have risen at a rate not unlike that of the second half of the 1950s, the estimates varying between 4.4 and 4.7 per cent. In contrast, in the developed market economies production expanded faster than in the previous five years and gross domestic product increased at a rate only slightly below 5 per cent. Because of this acceleration in economic growth and the moderate and somewhat lower rate of population growth compared with the 1950s, *per capita* product increased 3.6 per cent annually in these countries. In the absence of a comparable speeding-up of economic growth, while population growth accelerated, the annual percentage gain in *per capita* product in the developing countries remained below 2 per cent, only little more than half of that of the more developed countries.<sup>162</sup> Available data suggest, however, that in the latter part of the 1960s production in the developing nations rose faster than in the preceding years. Gross domestic product of these countries was estimated to have grown at an annual rate of 4.7 to 4.8 per cent in 1960-1967 and by 6.1 per cent in 1967-1968. Faster growth was also found in the more developed market economies in recent years: in 1960-1967 their gross domestic product increased annually by 5.2 per cent on the average, whereas in 1967-1968 it rose by some 5.6 to 5.7 per cent.<sup>163</sup>

71. Because of the different concepts used in measuring economic growth, the possibilities of comparing economic performance in the predominantly market economies and the centrally planned economies are very limited. Comparisons of growth trends in these two groups of countries are especially scarce for the early post-war period, but for more recent years some comparable estimates of economic growth in the socialist and market economies are available. On the whole, economic growth in the centrally planned economies appears to have been more rapid than in the market economies. A direct comparison of the growth of gross domestic product in the developed countries of Western Europe and of net material product<sup>164</sup> in the centrally planned economies of Eastern Europe led to the conclusion that during the 1950s the latter expanded faster than the market economies. This

conclusion was not significantly altered when allowance was made for differences in concepts, by means of growth comparisons of net material product estimates prepared for some Western European countries with the net material products of Eastern European countries, or vice versa, by estimating gross domestic product in some Eastern European countries. With few exceptions, the pace of economic development in Eastern Europe for the period 1949-1959 was found to be considerably faster than in Western Europe.<sup>165</sup>

72. Estimates of the levels and trends of total and *per capita* gross domestic product for the socialist, as well as the market economies, especially for the period 1955-1960, were prepared by Hagen and Hawrylyshyn. These data confirm the continued faster economic growth in the socialist countries: gross domestic product in European and Asian socialist countries increased in this period at an estimated rate of 6.4 per cent annually, whereas the corresponding estimate for all market economies together was only 3.6 per cent. Significant differences in growth trends were found, however, within the socialist countries. The estimates for the Asian socialist countries imply a rate of growth of gross domestic product of 7.8 per cent annually. The less developed European socialist countries—which according to these authors consist of Albania and Yugoslavia—experienced a rate of growth of gross domestic product of 6.5 per cent and the remaining more developed European socialist countries one of 6.0 per cent. Large differences also existed as far as growth in *per capita* product was concerned. For all socialist countries combined, *per capita* product in this period is estimated to have increased at a rate of 4.9 per cent annually; in the Asian socialist countries the rate was estimated at 6.3; in the less developed European countries 5.4; and in the more developed European socialist countries 4.6 per cent.<sup>166</sup>

73. Data for the European socialist countries suggest a continued rapid growth of income in the 1960s. Total gross domestic product was estimated to have increased at a rate of 6.6 per cent annually between 1960-1967 and 7.0 per cent in 1967-1968.<sup>167</sup> In comparison, gross domestic product of the developed market economies increased, as noted before, at a rate of 5.2 per cent in 1960-1967 and by 5.6 per cent between 1967-1968. On the whole, economic growth of the socialist countries during the post-war period appears to have been considerably faster than in the rest of the world. As far as the European socialist countries are concerned, it was estimated that,

<sup>161</sup> Deane, "The long-term trends ..." (1961).

<sup>162</sup> United Nations, *World Economic Survey, 1967*, part I ... (1968), table 2, p. 17, which estimated the rate of growth of gross domestic product in the developing countries to have been 4.4 per cent. Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969), reached the figure of 4.7 per cent.

<sup>163</sup> United Nations, *World Economic Survey, 1968*, part II ... (1969), table 1, p. 2; ———, *World Economic Survey, 1969-1970* ... (1971), table A.1, pp. 177-179.

<sup>164</sup> In simple terms, material product may be said to include, in principle, only the production, transport and distribution of goods (excluding retailing) and to exclude other services and rent. In practice, it may include all transport and distribution. See United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 1, p. 4.

<sup>165</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 2, pp. 10-12.

<sup>166</sup> Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969).

<sup>167</sup> United Nations, *World Economic Survey, 1968*, part II ... (1970), table 1, p. 2; ———, *World Economic Survey, 1969-1970* (1971), table A.1, p. 179. However, Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969), estimated that during 1960-1965 total and *per capita* gross domestic product in the more developed European socialist countries increased much more slowly, the figures being 4.7 for total and 3.4 for *per capita* product. Growth in the less developed European socialist countries, according to their estimates, remained high, the annual growth rates being 6.6 for total and 5.3 for *per capita* gross domestic product.

TABLE XIV.5. ESTIMATES OF POPULATION OF THE WORLD AND MORE DEVELOPED AND LESS DEVELOPED REGIONS, AND DECENNIAL INCREASES, 1920-1970

	World		More developed regions		Less developed regions	
	Population (millions)	Increase in preceding decade (percentage)	Population (millions)	Increase in preceding decade (percentage)	Population (millions)	Increase in preceding decade (percentage)
1920 .....	1,861		674		1,187	
1930 .....	2,070	11	759	13	1,311	10
1940 .....	2,296	11	822	8	1,474	12
1950 .....	2,486	10	858	4	1,628	12
1960 .....	2,982	20	976	14	2,005	23
1970 <sup>a</sup> .....	3,632	22	1,090	11	2,542	27

SOURCES: 1920-1940 data from United Nations, *World Population Prospects* ... (1966), table 6.1, p. 23; 1950-1970 data from *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

<sup>a</sup> Projected figure.

between 1950 and 1967, their total product increased at an average annual rate of 7.0 per cent and their *per capita* product at a rate of 5.6 per cent annually.<sup>168</sup>

74. Despite the fact that, during the considerable period which has elapsed since the Second World War, the developing countries have experienced rates of growth of their total income which in historical perspective were quite high and probably never had occurred before for any extended period in their history, the accomplishment in terms of the absolute increases in *per capita* income was only moderate and their position in fact deteriorated in comparison with the progress in the economically more advanced countries. According to the available estimates, toward the end of the 1960s the *per capita* income of the less developed market economies remained well below 200 dollars and that for the less developed centrally planned economies was not much more than 100 dollars. In contrast, the level of *per capita* income in the more developed market economies was estimated to be over 2,200 dollars, or about twelve times that of the less developed market economies, while in the more developed centrally planned economies the *per capita* income of nearly 1,200 dollars was also some ten times that of the less developed centrally planned economies.<sup>169</sup>

#### (b) Demographic trends

75. The post-war period constitutes not only what may appear to be a distinct phase in economic trends, but it also was characterized by an unprecedented growth in population. World population, which increased by 10 per cent or somewhat more in each decade between 1920 and 1940, has grown at an accelerating rate since then. The world's population increased by 20 per cent between 1950 and 1960 and is estimated to have grown 22 per cent between 1960 and 1970. This increase implies an average annual rate of growth of 2 per cent, which

would result in a doubling of the population each 35 years, compared with an average annual rate of growth in the two pre-war decades of 1 per cent, a rate which means a doubling of the population each 70 years. In absolute terms, the world's population increased by around 200 million persons in each decade between 1920 and 1940, but is estimated to have grown nearly 500 million between 1950 and 1960 and nearly as much as 650 million between 1960 and 1970<sup>170</sup> (see table XIV.6).

76. The recent period stands out not only because of the rapid growth of world population but also because it implied a reversal of historical trends, when population in the more developed regions increased faster to a situation where the higher growth was found in the less developed countries. As noted in section B, population has increased faster in the less developed regions since the 1930s, but a large differential emerged only in the post-war period, owing to the very high rates of growth in the less developed regions, which also dominated world population trends. In the 1950s, when population growth rates in the more developed regions returned to levels similar to those prevailing prior to the 1930s—resulting in a decennial increase of 120 million or 14 per cent—rates of growth in the less developed regions had already started to accelerate. Between 1950 and 1960 the combined population of the less developed countries increased by some 375 million, or 23 per cent. Between 1960 and 1970 a further acceleration in growth took place in these countries. The estimated increase of some 535 million over the decade implies a relative increase of about 27 per cent. During that same period, growth in the more developed regions slowed down to 11 per cent and an absolute increase of somewhat less than 115 million (table XIV.5).

77. The extent of the acceleration of population growth in the less developed regions and its predominant role in world population trends over the last two decades is evident from a comparison with the two decades preceding the war. Between 1920 and 1940 the population of the

<sup>168</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1969*, part I ... (1970), table 2.3, p. 9.

<sup>169</sup> United Nations, *World Economic Survey, 1969-1970* ... (1971), table A.1, pp. 177-179. The estimate for the less developed centrally planned economies is for 1965 and is taken from Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969).

<sup>170</sup> United Nations, *World Population Prospects* ... (1966), p. 13; El-Badry, "Population projections for the world ..." (1967); Ohlin, *Population Control* ... (1967), pp. 16-17; Borrie, *The Growth and Control* ... (1970), p. 7; United Nations, *The World Population Situation in 1970* (1971), pp. 3 ff.

TABLE XIV.6. LABOUR FORCE OF THE WORLD AND MORE DEVELOPED AND LESS DEVELOPED COUNTRIES  
BY BROAD INDUSTRY GROUPS, 1900 TO 1960  
(Percentage of total labour force)

	Agriculture <sup>a</sup>				Industry <sup>b</sup>				Services <sup>c</sup>			
	1900	1930	1950	1960	1900	1930	1950	1960	1900	1930	1950	1960
World .....	72.1	67.1	61.5	58.1	13.2	14.7	16.9	18.8	14.7	18.2	21.7	22.9
Developed countries .	59.4	50.1	38.7	30.5	21.7	24.2	29.7	33.5	19.0	25.7	31.6	36.0
Developing countries	79.4	77.7	75.0	73.1	8.4	8.9	9.3	11.2	12.2	13.5	15.7	15.6

SOURCE: Bairoch and Limbor, "Changes in the industrial distribution ..." (1968), table VI.

<sup>a</sup> Includes agriculture, forestry and hunting.

<sup>b</sup> Includes mining and quarrying, manufacturing, and construction.

<sup>c</sup> Includes commerce, transport, storage and communication, services.

more developed and less developed regions increased by rather similar percentages (22 and 24 per cent). The average annual increase of the world population was some 22 million, of which about 7.5 million occurred in the more developed regions and somewhat less than 14.5 million in the less developed regions. From 1950 to 1970 the estimated increase of population in the more developed regions—26 per cent—was not much different from that for the pre-war period. In the less developed regions, however, the population is estimated to have increased in the same period by 52 per cent, or more than twice the percentage increase of 1920 to 1940, and double that for the more developed regions during 1950 to 1970. World population, dominated largely by the trend in the less developed regions, increased by about 46 per cent between 1950 and 1970, or twice as much as the relative growth in the twenty years before 1940. The average annual increase in the world's population during the two most recent decades was about 57 million of which 12 million was in the more developed regions and the remaining 45 million in the less developed regions. Between 1960 and 1970, it has been estimated, the average annual increment in the world's population has been of the order of 65 million, of which about 10 million in the more developed regions and 54 million in the less developed regions.<sup>171</sup>

78. Trends in world population growth are the result of the world-wide evolution of fertility and mortality. To a large extent the same is true for recent trends in the more developed and less developed regions. Although, especially in earlier periods, international migrations have been important as a determinant of population growth in a number of individual countries, they have most likely had only a relatively small importance so far as recent trends in the two major groups of regions are concerned.<sup>172</sup>

79. World demographic trends since the Second World War have been dominated by the decline of mortal-

ity in the less developed countries while their fertility remained relatively stable. In the more developed countries fertility and mortality declined only slowly and showed a tendency towards stabilization and convergence.<sup>173</sup> Crude birth rates for the more developed regions as a whole were estimated to have been around 22 per thousand persons between 1950 and 1960 and to have declined somewhat to 20 per thousand in the 1960s. The crude death rates in these countries, which were comparatively high during the 1940s, decreased to about 10 per thousand in the 1950s and were about 9 per thousand in the 1960s (table XIV.2). In the less developed countries fertility maintained its traditionally high level and long-term estimates of crude birth rates reveal relatively stable rates of somewhat over 40 per thousand continuing through the post-war period.<sup>174</sup> In contrast, mortality in this group of countries decreased at an unprecedented rate during this period. Crude death rates, which had been declining slowly for some time, were estimated to be still near 30 per thousand between 1920 and 1950. During the 1950s the death rate declined by about one fifth from an estimated 28 to 22 per thousand and between 1960 and 1970 it further decreased by about the same proportion to 17 per thousand (table XIV.2).

80. High fertility and declining mortality in the developing countries resulted not only in rapid population growth but also in an age distribution which compares unfavourably with that of the economically more advanced countries. According to estimates for 1965, nearly 42 per cent of the population in the less developed regions was below 15 years of age and 3.3 per cent was 65 years and over. The population in the intermediate group, from 15 to 64 years, which comprises the population in working ages, represented somewhat over 55 per cent of the total. In the more developed regions, however, the latter group accounted for 63 per cent of the total, while persons in the dependent age groups under 15 and 65 and over represented about 28 and 9 per cent, respectively.<sup>175</sup> The higher dependency burden in the less developed regions, is, as has been discussed before, generally thought to affect unfavourably the prospects for rapid economic growth both because of the heavier burden it places on

<sup>171</sup> United Nations, *The World Population Situation in 1970* (1971), pp. 3-5.

<sup>172</sup> See United Nations, *World Population Prospects ...* (1966), pp. 4-5. Also chapter VII, section D. This does not mean, however, that international migrations have had no effect at all. While small in absolute number, the migration of technical and professional workers from less developed to more developed regions has had an impact on human resources which has received considerable attention.

<sup>173</sup> See chapter IV, section A and chapter V, section A.

<sup>174</sup> See table XIV.2.

<sup>175</sup> See chapter VIII, section A.

the working population as well because of the needs created by a large youth population.<sup>176</sup>

(c) *Structural change and urban growth*

81. As has already been noted in the preceding section, the pace of change in the employment and production structure has quickened since the beginning of the century and rapid economic growth in recent decades has been accompanied by considerable changes in both. Estimates of the industrial structure of the world's labour force between 1900 and 1960, prepared by Bairoch and Limbor, provide evidence of this speeding-up of the process of structural change in employment<sup>177</sup> (see table XIV.6) and various, but differing, estimates of the industrial structure of the labour force in 1950 and 1960, all confirm considerable changes during the recent period.<sup>178</sup> According to the most recent estimates of the International Labour Office the proportion of the labour force in agriculture declined from about 64 per cent in 1950 to less than 58 per cent in 1960. The share of industry increased from some 16 to over 20 per cent, an increase which surpassed that for the services sectors, for which the percentage was somewhat over 19 in 1950 and about 22 in 1960.<sup>179</sup> The long-term estimates of Bairoch and Limbor not only confirm a more rapid growth of the non-agricultural sectors between 1950 and 1960, but also suggest a shift in the growth patterns of the non-agricultural sectors as, until 1950, employment in the services sector appears to have grown considerably more rapidly than that in industries, a trend which, as noted, was reversed since the 1950s (see again table XIV.6).

82. Despite the recent rapid economic growth and the large scope for structural change in the less developed countries, the available estimates suggest that, on the whole, shifts in the employment structure during the past decades have been greater in the more developed countries (table XIV.6). Data for this latter group for 1950 and 1960 indicate, first, a sharp decline in the relative share of agriculture and, second, in contrast to world-wide trends, a rapid increase of employment, especially in the services sector. The estimates by Baum imply a decrease of more than 6 percentage points in the share of agriculture, while the estimates by Bairoch and Limbor show an even larger decline of 8 per cent. The former estimated an increase of over 4 per cent in the share of the services sector compared with one of over 2 per cent for industries, while Bairoch and Limbor estimated that the proportion in the services sector rose by 4.4 per cent,

whereas that for the industrial sectors increased by 3.7 per cent.<sup>180</sup>

83. Changes in the industrial distribution of the labour force in the less developed regions as a whole, were not very great during the 1950s, although they exceeded those in the preceding decades. The proportion of the labour force in agriculture declined by about 2 per cent, both according to the estimates of Baum, and those by Bairoch and Limbor. The estimated distribution of the increase in the non-agricultural labour force between secondary and tertiary sectors diverged, however, in one important aspect from the pre-war trends. Whereas prior to 1950 additions to the non-agricultural labour force apparently accrued mostly to the services sector (see table XIV.6), between 1950 and 1960 the percentage share of this sector remained virtually stable (at somewhat over 16 per cent according to Baum and less than 16 per cent according to Bairoch and Limbor). The increase in the relative share of the non-agricultural labour force during the 1950s is estimated to have occurred nearly entirely in the industrial sector. The percentage of the total labour force in this sector rose from about 9 to 11 per cent.<sup>181</sup>

84. Population and economic growth in the post-war period were associated with rapid urban growth and an accelerated urbanization. Between 1950 and 1960, when the world's population increased by somewhat less than 19 per cent, the "agglomerated population"—defined as that living in localities of 20,000 or more inhabitants—grew by nearly 43 per cent. The speeding up of urban growth is evident from a comparison with earlier periods: decennial increases between 1920 and 1950 varied from 24 to 28 per cent, approximately.<sup>182</sup> As noted earlier,<sup>183</sup> urban populations have increased especially rapidly in recent decades in the less developed regions, while urban growth in the more developed regions has shown a tendency to slow down since the beginning of this century. In the latter group of countries, the decennial increases averaged about 24 per cent during the 1920s and 1930s, declined to 13 per cent in the 1940s, but rose again to 31 per cent between 1950 and 1960. In comparison, urban growth rates in the less developed regions rose during each decade, a sharp acceleration occurring between 1950 and 1960 when the agglomerated population increased by 64 per cent.<sup>184</sup> Of course the level of urbanization in the less developed regions still remained well below that of the more developed regions. In 1960, about 46 per cent of the total population of the latter lived in localities of 20,000 or more inhabitants, whereas the corresponding proportion in the less developed regions was barely one third, 15.4 per cent (table VI.6).

<sup>176</sup> See chapter XIV.

<sup>177</sup> Bairoch and Limbor, "Changes in the industrial distribution ..." (1968).

<sup>178</sup> Apart from those cited by Bairoch and Limbor, estimates of the industrial distribution of the labour force in 1950 and 1960 are found in Baum, "The world's labour force ..." (1967); International Labour Office, *Labour Force Projections*, part 5 ... (1971), table 3, p. 55. Estimates for 1950 are also found in International Labour Office, "The world's working population ..." (1956). Estimates of the occupational distribution in 1960 and projections to 1980 are found in International Labour Office, "The occupational structure of employment ..." (1969).

<sup>179</sup> International Labour Office, *Labour Force Projections*, part 5 ... (1971), table 3, p. 55.

<sup>180</sup> Baum, "The world's labour force ..." (1967); Bairoch and Limbor, "Changes in the industrial distribution ..." (1968). On the basis of data for 1966, the latter authors infer that the decline in the share of the agricultural labour force has been even more rapid since 1960.

<sup>181</sup> Baum, "The world's labour force ..." (1967); Bairoch and Limbor, "Changes in the industrial distribution ..." (1968).

<sup>182</sup> See chapter VI, section C, table VI.6 and United Nations, *Growth of the World's Urban and Rural Population ...* (1969), table 8.

<sup>183</sup> See section B above.

<sup>184</sup> See table VI.6.



## 2. SOME IMPLICATIONS AND ASSOCIATIONS OF RECENT ECONOMIC AND DEMOGRAPHIC TRENDS

### (a) *The relative spread of under-development*

85. The inversion of the traditional positive association between economic and population growth and the higher rates of population growth characteristic of the economically less advanced countries have had various implications for the development outlook both of individual countries and the developing countries as a whole. Given a more rapid increase in population, a smaller rise of *per capita* income will result from a given level of growth of total production. As far as the latter is concerned, it has been generally recognized that the post-war period has been an era of unprecedented economic expansion for the world as a whole as well as for the majority of both developed and developing countries.<sup>185</sup> It has also been noted that although there has been much discussion of the widening gap between the two regions, it is often overlooked that total production in the developing countries as a whole increased at about the same rate as that of the more developed countries as a group. Both industrial and agricultural output in the less developed countries, it is asserted, expanded at about the same rate as in the more advanced countries.<sup>186</sup> However, when population growth is taken into account and progress is measured in terms of *per capita* income, the deterioration of the position of the less developed countries vis-à-vis the more developed ones becomes evident. According to estimates cited earlier in this section, it appears that, between 1950 and 1967, total output in the developing and developed market economies increased at a very similar rate of around 4.5 per cent annually and that, in fact, it may have been somewhat higher in the former. However, since the population of the less developed countries increased on the average by 2.2 per cent annually during this period compared with only 1.2 per cent in the developed countries, *per capita* income rose by 3.2 per cent annually in the latter, but by approximately 2.4 per cent in the less developed.<sup>187</sup> Thus, although in historical perspective, total output and even *per capita* income increased rapidly in the less advanced countries, their relative position with regard to the more advanced countries deteriorated considerably. Present patterns of population growth, as has been observed, thus have increased the existing imbalance between the distribution of the world's population and wealth.<sup>188</sup>

86. The divergence between the population growth rates of the two principal world segments naturally affects their relative share of world population. According to the United Nations estimates, the percentage of the total population of the world living in the less developed regions increased from somewhat less than 64 per cent in 1920 to an estimated 70 per cent in 1970, with the largest increases occurring since the 1950s. The share of the more developed countries decreased accordingly from

TABLE XIV. 7. DISTRIBUTION OF WORLD POPULATION BETWEEN MORE DEVELOPED AND LESS DEVELOPED REGIONS, 1920-1960

Year	Percentage of total population	
	More developed regions	Less developed regions
1920 .....	36.2	63.8
1930 .....	36.7	63.3
1940 .....	35.8	64.2
1950 .....	34.5	65.5
1960 .....	32.1	67.9
1970 <sup>a</sup> .....	30.0	70.0

SOURCE: 1920-1940: United Nations, *World Population Prospects ...* (1966), table 2, p. 23.

<sup>a</sup> Projected.

somewhat over 36 to 30 per cent (table XIV.7). The combination of a slower rise in *per capita* income and a more rapid increase of population in the developing countries has thus had, as a result, an increased impoverishment of the world's population in the sense that both the share of the poorer countries' population in the world's total increased and their relative income in comparison with that of the more developed countries declined. According to estimates of the distribution of the world's population and income prepared by Kuznets and Deane, the share of the population of the less developed regions of Africa, Asia and Latin America in the world total increased from somewhat more than 66 per cent in 1938 to over 71 per cent in 1961, whereas the share in the world's income of these regions went down from nearly 24 per cent to less than 20 per cent during the same period<sup>189</sup> (table XIV.8).

87. Estimates of income and population for some seventy countries in the early post-war period.<sup>190</sup> have been used for determining the percentage distribution of income and population according to *per capita* income groups<sup>191</sup> (table XIV.9). The data indicate that whereas more than half of the population included lived in countries having a *per capita* income of less than 100 dollars and received only some 9 per cent of the total income, the one third of the population in countries with *per capita* income of 200 dollars or more accounted for some 85 per cent of the total income of the seventy countries. More recent estimates for 1965, although not completely comparable with the former ones, suggest that a further relative

<sup>189</sup> Kuznets, "Quantitative aspects of the economic growth of nations. I. ..." (1956); Deane, "The long term trends ..." (1961). For other similar estimates for years since 1949, see Bonné, *Studies in Economic Development* ... (1957), p. 37; d'Hérouville, "Réflexions sur la croissance" (1958); Kaldor, "The growing disparity ..." (1958); Kristensen *et al.*, *The Economic World Balance* (1960), table 1.1, pp. 25-26.

<sup>190</sup> United Nations, *National and Per Capita Incomes* ... (1950). The countries covered were estimated to account for about 90 per cent of the world population and well over that percentage for income. The study stresses the various limitations of the data, including the fact that the different economic structure and the varying importance of the market economy in low and high income countries may seriously affect the comparability of the data.

<sup>191</sup> Kuznets, "Population, income and capital" (1955); d'Hérouville, "Réflexions sur la croissance" (1958); and Mertens de Wilmars, "Les soucis démographiques ..." (1952).

<sup>185</sup> See section B above.

<sup>186</sup> Singer, *International Development* ... (1964), p. 14.

<sup>187</sup> See on this point also International Bank for Reconstruction and Development, *Partners in Development* ... (1969), p. 27.

<sup>188</sup> Dorn, "World population growth" (1963).

TABLE XIV.8. PERCENTAGE DISTRIBUTION OF WORLD POPULATION AND INCOME BY REGIONS, 1938-1961

Region	Percentage of total population			Percentage of total income		
	1938	1949	1961	1938	1949	1961
World .....	100.0	100.0	100.0	100.0	100.0	100.0
North America and Oceania .....	7.1	7.5	7.4	29.6	44.4	41.4
Europe (including the USSR) .....	26.4	24.8	21.4	46.6	38.7	38.8
Latin America .....	6.0	6.6	7.0	4.2	4.4	4.7
Asia .....	53.2	52.4	56.9	17.3	10.5	13.1
Africa .....	7.3	8.6	7.4	2.3	2.0	2.0

SOURCES: 1938 and 1949 data from Kuznets, "Quantitative aspects of the economic growth of nations. I..." (1956); 1938 and 1961 data, Deane, "The long term trends..." (1961).

TABLE XIV.9. DISTRIBUTION OF POPULATION AND INCOME ACCORDING TO LEVELS OF *per capita* INCOME, SEVENTY COUNTRIES, 1949

Per capita income (US dollars)	Population		Total income	
	Millions	Percentage distribution	Millions of US dollars	Percentage distribution
Total .....	2,080	100	513,101	100.0
Less than 50 .....	651	31	18,632	3.6
50 to 100 .....	477	23	27,498	5.4
100 to 200 .....	253	12	28,832	5.6
200 to 400 .....	394	19	18,073	23.0
400 and over .....	305	15	320,066	62.4

SOURCES: Kuznets, "Population, income and capital" (1955); d'Hérouville, "Réflexions sur la croissance" (1958). Based on data from United Nations, *National and Per Capita Incomes*... (1950).

TABLE XIV.10. DISTRIBUTION OF WORLD POPULATION AND GROSS DOMESTIC PRODUCT ACCORDING TO LEVELS OF *per capita* INCOME, 1965

Per capita income (US dollars)	Population		Total gross domestic product	
	Millions	Percentage distribution	1,000 millions of US dollars	Percentage distribution
Total .....	3,271.5	100.0	2,073.3	100.0
0 to 125 .....	1,732.7	53.0	164.4	7.9
126 to 375 .....	432.9	13.2	115.8	5.6
376 to 750 .....	188.2	5.8	110.1	5.3
751 to 1,500 .....	477.4	14.6	512.0	24.7
1,501 and over .....	440.3	13.5	1,171.0	56.4

SOURCE: Hagen and Hawrylyshyn, "Analysis of world income and growth..." (1969), table 2, p. 6.

Note: Because of rounding, percentages do not in all cases add to exactly 100.

deterioration may have taken place in the position of the group of lower income countries<sup>192</sup> (table XIV.10). According to these estimates, 53 per cent of the world's population with a *per capita* product of up to 125 dollars received less than 8 per cent of the world's gross domestic product. At the other extreme, the 28 per cent of the world's population with a *per capita* product of 751 dollars or more accounted for 81 per cent of the world's total product.

<sup>192</sup> Hagen and Hawrylyshyn, "Analysis of world income and growth..." (1969). The writers, however, also draw attention to the limitations of these income data.

88. Estimates of the distribution of world gross domestic product and population and of absolute and relative levels of product per head in different regions in 1958 were prepared by Kuznets. They revealed large inequalities in the distribution of world product and population between the more developed and less developed regions.<sup>193</sup> Estimates for 1960, compiled by Zimmerman, suggested similar conclusions.<sup>194</sup> More recent estimates, for 1967,

<sup>193</sup> Kuznets, *Modern Economic Growth*... (1966), table 7.1, pp. 360-363. For estimates of net domestic product by regions in 1955, see Kristensen *et al.*, *The Economic World Balance* (1960), table VII.2, p. 250.

<sup>194</sup> Zimmerman, *Arme en Rijke landen* (1964), table 2.7, p. 32.

TABLE XIV.11. GROSS DOMESTIC PRODUCT *per capita* AND THE DISTRIBUTION OF GROSS DOMESTIC PRODUCT AND POPULATION BY MAJOR REGIONS, 1967

Region	Gross domestic product per head (US dollars)	Percentage distribution		Indices of per capita product (world = 100)
		Gross domestic product	Population	
		(Percentage)	(Percentage)	
Total .....	706	100.0	100.0	100
Developed market economies (including				
South Africa <sup>a</sup> ) .....	2,232	68.4	21.6	316
United States and Canada .....	3,928	36.1	6.5	556
Europe .....	1,596	25.3	11.2	226
Australia and New Zealand .....	2,247	1.4	0.4	318
Japan .....	1,201	5.0	3.0	170
Developing market economies .....	180	11.8	46.2	25
Africa .....	135	1.8	9.1	19
Asia (excluding Japan) .....	129	5.4	29.8	18
Latin America .....	446	4.6	7.3	63
Developed centrally planned economies ...	1,182	16.7	9.9	167
USSR .....	1,184	11.7	7.0	168
Eastern Europe .....	1,178	5.0	2.9	167
Developing centrally planned economies ...	100	3.1	22.3	14
China .....	100	3.0	21.3	14
Other <sup>b</sup> .....	95	0.1	1.0	13

SOURCES: Gross domestic product: data from United Nations, *World Economic Survey, 1969-1970* ... (1971), table A.1, pp. 177-179, except for China, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam. Total gross domestic product for these countries was calculated from population data and estimates of the gross domestic product per head for 1965 in Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969). Population data from United Nations, *Demographic Yearbook, 1969* ... (1970), table 4, pp. 136-143.

<sup>a</sup> Not shown separately.

<sup>b</sup> Includes: Mongolia, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam.

which cover most countries of the world<sup>195</sup> and which are not completely comparable with Kuznets's estimates, suggest the same conclusions (table XIV.11). According to these estimates the less developed countries—both market economies and centrally planned economies—accounted for more than two thirds of the world's population, but for less than 15 per cent of the total product. The developing market economies, with a population representing 46 per cent of the total, produced only 12 per cent of the total gross domestic product. The Asian centrally planned economies with a population representing 22 per cent of the total accounted for only 3 per cent of the product.

89. Even though the estimates cited may be subject to a considerable margin of error and may have underestimated in particular the levels of production and income in the less developed countries, they confirm the trend towards a relative spread of under-development. Population in the less developed regions has increased during the post-war period at a much more rapid rate than in the economically more advanced countries. Growth of product and income in the former, however, has been lower or has barely kept up with the increase in the more developed regions. An increasing portion of the world's population is thus living in areas where incomes and levels of living are low and have remained so in comparison with those in the economically more developed countries.

<sup>195</sup> The total population of the countries included represented nearly 99 per cent of the estimated world population in 1967.

## (b) Levels and growth of income and population

### (i) Global trends

90. The observed recent trends in growth of population, total product and *per capita* income in the more developed and less developed countries suggest a number of possible associations and interrelations. One of the most evident among these is the inverse relation between population growth and levels of *per capita* income. As discussed earlier, this negative association emerged in the 1930s, when the growth of population in the less developed countries began to surpass that in the more developed countries. Income data and estimates of population growth, classified according to growth types, for fifty-three countries in 1939, cited by Bonné, provide evidence that already at that time population growth was inversely related to *per capita* income. In particular, all countries with a high potential growth of population had *per capita* incomes of less than 100 dollars<sup>196</sup> (see table XIV.12).

91. Data for the post-war period confirm the existence of such a negative association.<sup>197</sup> Estimates for the late 1950s brought together by Kuznets showed large differences in population growth between more developed and less developed countries. Rates of natural increase of

<sup>196</sup> Bonné, *Studies in Economic Development* ... (1957), pp. 20-21.

<sup>197</sup> See, for instance, George, *Géographie de la population* (1967), pp. 120-121.

TABLE XIV.12. LEVELS OF *per capita* INCOME ACCORDING TO POPULATION GROWTH TYPES, FIFTY-THREE COUNTRIES, 1939

Per capita income (US dollars)	Number of countries	Population growth type		
		Low growth	Transitional growth	High growth potential
100 or less .....	28	—	2	26
101 to 200 .....	10	5	5	—
201 and over .....	15	14	1	—

SOURCE: Bonné, *Studies in Economic Development ...* (1957), pp. 20-21.

TABLE XIV.13. CRUDE BIRTH RATES, CRUDE DEATH RATES AND RATES OF NATURAL INCREASE OF POPULATION FOR COUNTRIES GROUPED ACCORDING TO LEVEL OF *per capita* GROSS DOMESTIC PRODUCT AROUND 1957-1959

Per capita gross domestic product (US dollars)	Number of countries	Crude birth rates (per 1,000 population)		Crude death rates (per 1,000 population)		Rates of natural increase (per 1,000 population)	
		Unweighted average	Weighted average <sup>a</sup>	Unweighted average	Weighted average <sup>a</sup>	Unweighted average	Weighted average <sup>a</sup>
Less than 100 .....	13	44.5	36.5	20.8	14.9	23.7	21.6
100-199 .....	19	41.8	41.2	17.1	16.4	24.7	24.8
200-399 .....	28	38.4	37.7	11.2	14.3	27.2	23.4
400-699 .....	10	24.2	19.0	8.7	8.6	15.5	10.4
700-1,099 .....	11	21.9	22.1	9.4	9.1	12.5	13.0
1,100 and over .....	7	21.3	24.1	9.5	9.4	11.8	14.8

SOURCES: Data compiled by Kuznets from United Nations, *Demographic Yearbook, 1962 ...* (1963), tables 14, 18 and 4; United Nations, *Yearbook of National Accounts Statistics, 1962 ...* (1963), table 3. In addition, Kuznets estimated the *per capita* product of Japan at 400 dol-

lars and the *per capita* product of China and the Soviet Union, obtained independently, at less than 100 and 700 dollars, respectively.

<sup>a</sup> Weighted by the size of the population of each country in the same income class.

TABLE XIV.14. ESTIMATED RATES OF NATURAL INCREASE OF POPULATION FOR COUNTRIES AND TERRITORIES GROUPED ACCORDING TO LEVEL OF *per capita* GROSS DOMESTIC PRODUCT, 1967

Per capita gross domestic product (US dollars)	Number of countries	Rates of natural increase (per 1,000 population)							Unweighted average	Weighted average <sup>a</sup>
		Less than 10	10-15	15-20	20-25	25-30	30-35	35 and over		
Less than 100 ....	24	—	—	1	16	7	—	—	23.7	25.8
100 to 199 .....	23	—	1	3	9	5	5	—	24.6	21.1
200 to 299 .....	20	—	—	1	5	2	12	—	29.2	30.0
300 to 399 .....	10	—	—	—	—	7	3	—	29.4	29.2
400 to 699 .....	17	2	4	1	3	2	4	1	22.2	23.1
700 to 1,199 .....	13	4	4	2	2	—	1	—	14.5	11.4
1,200 and over ...	23	15	5	2	—	—	1	—	9.7	8.7

SOURCES: Data on gross domestic product from United Nations, *World Economic Survey, 1969-1970 ...* (1971), table A.1 pp. 177-179. Data for China from Hagen and Hawrylyshyn, "Analysis of world income and growth ..." (1969). Rates of increase of population cal-

culated from United Nations, *Demographic Yearbook, 1969 ...* (1970), table 4, pp. 136-143.

<sup>a</sup> Weighted by the size of the population of each country in the same income group.

population in eighty-eight countries, when classified according to *per capita* gross domestic product revealed a marked population growth differential between countries with a *per capita* product below or over 400 dollars (see table XIV.13). In the different income groups below the level of 400 dollars, average annual growth rates, unweighted or weighted, were all well over 20 per thousand, the lowest average rate being 21.6 per thousand. In contrast, in countries with a *per capita* product of 400 dollars or over, average annual rates of growth, unweighted or weighted, for each income group were below 20 per thousand, and in all income groups but one the average

was below 15 per thousand. If it may be assumed that at that time a *per capita* product of 400 dollars constituted an approximate dividing line between developed and developing countries, these estimates thus confirm the generally observed negative relation between population growth and level of development. At the same time, if rates of growth within each of the two broad groups of countries with *per capita* product below 400 dollars and above 400 dollars are compared, little if any association appears to exist between population growth and level of income. Only in the case of the unweighted averages for countries with a *per capita* product of 400 dollars or

TABLE XIV.15. ANNUAL RATES OF GROWTH OF POPULATION AND TOTAL AND *per capita* GROSS DOMESTIC PRODUCT BY REGIONS, EARLY 1950S TO 1964

Region and number of countries	Average rates of growth (percentage) for groups of countries arrayed in increasing order of rates of growth of population		
	Population	Gross domestic product	Per capita gross domestic product
Developed countries (including Japan) .....	1.10	4.77	3.64
4 .....	0.29	3.96	3.66
4 .....	0.65	4.28	3.60
5 .....	0.94	6.05	5.07
4 .....	1.16	5.00	3.49
4 .....	2.19	4.25	2.02
Africa and Asia (excluding South Africa and Israel) .....	2.66	4.95	2.23
4 .....	1.81	4.02	2.17
4 .....	2.25	5.23	2.91
5 .....	2.76	4.07	1.28
4 .....	3.05	5.46	2.34
4 .....	3.43	6.19	2.67
Latin America .....	2.61	4.86	2.20
4 .....	1.56	4.12	2.51
4 .....	2.30	3.26	0.94
4 .....	2.84	6.17	3.24
3 .....	3.05	4.70	1.60
4 .....	3.40	6.15	2.66

SOURCE: Kuznets, "Population and economic growth" (1967), p. 191.

over do rates of population growth vary inversely with the *per capita* product. It is doubtful whether this association is significant, however, since the weighted averages of population growth in this group of countries suggest a positive relation between the increase of population and *per capita* product as do the unweighted averages for the different income classes below 400 dollars.

92. The distribution of countries according to estimated rates of population growth and of *per capita* product for 1967, shown in table XIV.14, support, in general, the earlier findings of significant differences in rates of population growth between more developed and less developed countries. The distribution of rates of growth within each income class<sup>198</sup> and the corresponding averages for countries and areas with *per capita* product below 400 dollars contrast sharply with the distribution and averages of population growth rates in those with incomes of 700 dollars and over. In the latter group, nearly nine tenths of the countries had population growth rates below 2 per cent per annum; conversely, growth rates were 2 per cent or over in more than nine tenths of the countries with *per capita* product below 400 dollars. The distribution of growth rates in the intermediate class—with *per capita* products varying between 400 and 699 dollars—is less

clear. Both unweighted and weighted average rates of natural increase for this group are high. But it includes besides a number of rapidly developing countries with comparatively high levels of *per capita* product and rapidly growing populations—such as Hong Kong, Mexico and Panama—also various countries—such as Argentina, Portugal and Yugoslavia—with low population growth, but a relatively low level of *per capita* product in comparison with other countries of low population growth.

93. Despite the close and inverse relation between levels of *per capita* income and growth of population and the considerably more rapid increase of population in the developing countries, no relation appears to exist between growth of population and growth of total product. As has been noted in preceding subsections, during the post-war period the growth of product was similar in the more developed and less developed countries. The lack of any distinct pattern in this respect is suggested by data on the growth of income discussed earlier in this section. It is also illustrated by estimates for the period 1955 to 1965 when the developing countries registered an over-all growth of product appreciably higher than that of the developed countries, but their relative gains occurred all during the latter part of the 1950s. In the first half of 1960 the growth of gross domestic product in these countries slowed down, while that of the more developed countries accelerated and surpassed that of the former group.<sup>199</sup>

94. A comparison of growth of population and total product in sixty-one non-socialist countries between the early 1950s and 1964, made by Kuznets, confirms the

<sup>198</sup> The grouping of countries in classes of *per capita* gross domestic product has been done in such a manner that the variations of average rates of growth for subdivisions within each class would be small. For instance, the unweighted average rate of population growth for countries with *per capita* products between 400 and 499 dollars was 22.9 per thousand; 22.5 per thousand for countries with products per head between 500 and 599 dollars and 21.2 per thousand for those with incomes between 600 and 699 dollars. For the income class from 300 to 399 dollars *per capita*, the unweighted average was, as can be seen from the table, 29.4 per thousand, while for countries with *per capita* products between 700 and 799 dollars it was 15.9 per thousand.

<sup>199</sup> United Nations, *World Economic Survey, 1967*, part II ... (1968), pp. 15-17 and table 2.

TABLE XIV.16. ESTIMATED RATES OF POPULATION GROWTH FOR COUNTRIES GROUPED  
ACCORDING TO RATES OF GROWTH OF GROSS DOMESTIC PRODUCT, 1960-1967

Annual rate of growth of gross domestic product <sup>a</sup> (percentage)	Number of countries	Less than 1	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	3.5 and over	Unweighted average	Weighted average <sup>b</sup>
Less than 2.0 .....	6	—	1	1	2	2	—	—	2.2	2.2
2.0 to 3.0 .....	17	1	1	5	4	3	2	1	2.3	2.0
3.0 to 4.0 .....	15	6	1	1	3	1	2	1	1.8	2.4
4.0 to 5.0 .....	29	6	3	4	4	6	5	1	2.1	2.0
5.0 to 6.0 .....	18	3	3	1	3	6	2	—	2.0	1.8
6.0 to 7.0 .....	13	2	1	—	3	—	5	2	2.5	2.5
7.0 to 8.0 .....	11	1	1	2	—	5	2	—	2.4	1.6
8.0 and over .....	13	4	—	1	—	3	4	1	2.3	1.6

SOURCES: Rates of growth of gross domestic product from United Nations, *World Economic Survey, 1969-1970*... (1971), table A.1, pp. 177-179; population estimates from United Nations, *Demographic Yearbook, 1969*... (1970), table 4, pp. 136-143.

<sup>a</sup> Compound rate between terminal years, based on gross domestic product at market prices, except in the case of centrally planned economies where the basis is net material product at market prices.

<sup>b</sup> Weighted by the size of the population of each country in the same income group.

lack of any significant relationship between the two (table XIV.15). In twenty-one developed countries (including Japan), total product increased by 4.77 per cent annually, while total population increased by only 1.1 per cent. In twenty-one African and Asian countries (excluding Israel and South Africa) total product increased at an average annual rate of 4.95 per cent, but population growth was 2.66 per cent annually, while for nineteen Latin American countries the corresponding rates were 4.86 for total product and 2.61 for population. Despite large differences in population growth between the first group of more developed countries and the two remaining groups of less developed countries, growth rates of total product were very similar. Additional evidence in this respect is provided by data for groupings of individual countries, arranged according to rates of population growth, within the three broad regional groups distinguished (table XIV.15). Within each of these regional groups growth rates of total product are shown to vary in a manner independent of population growth.<sup>200</sup> The lack of a significant relation between growth of population and total product was also suggested by other findings. An analysis of growth rates of population and net national product in a sample of twenty-two countries for the years between 1953 and 1965 revealed that although the relationship between the two was positive, it was not clearly defined and not significant.<sup>201</sup>

95. Data on growth rates of gross domestic product and population for a large number of countries in the period 1960 to 1967 lead to similar conclusions (table XIV.16). The distribution of individual countries according to population growth within each of the levels of growth of product is fairly uniform for all levels. Likewise, average population growth rates for different levels of growth of product vary within comparatively narrow limits in relation to the variation in population growth rates in individual countries. Whereas for individual countries these rates fluctuate from very low, or even

negative values, to close to 4 per cent, the unweighted averages range between only 1.8 to 2.5 per cent and the weighted averages from 1.6 to 2.5 per cent. Even so, the comparatively low weighted averages at the upper level of growth of product—7 per cent and over—suggest that high rates of growth of total gross domestic product may be more common in countries with a lower growth of population.

96. The general finding that no apparent relationship between the growth of product and that of population does exist, in conjunction with the fact that population increases on the average at a much higher rate in the less developed countries, implies a negative association between growth of *per capita* product or income and of population if the two broad groups of more developed and less developed countries are distinguished. Estimated growth rates of population and *per capita* gross domestic product between the early 1950s and 1964 for more developed and less developed regions compiled by Kuznets confirm the existence of a negative association between the two in the two broad groups of countries (see again table XIV.15). In twenty-one non-socialist developed countries an average annual rate of growth of population of 1.1 per cent was accompanied by a growth of over 3.6 per cent in *per capita* product. In contrast, the corresponding averages for population growth in twenty-one African and Asian countries and in nineteen Latin American countries were 2.7 and 2.6 per cent respectively, whereas the growth of *per capita* income in both of these two groups of countries was 2.2 per cent. The Spearman index of rank correlation between growth of population and growth of *per capita* income for sixty-three countries was found to be  $-0.309$ <sup>202</sup> (see table XIV.18).

97. Population and *per capita* product growth rates of individual countries between 1960 and 1967 grouped according to different levels of increase also indicate a general negative association between these two variables (see table XIV.17). Low rates of growth in *per capita* gross domestic product appear to be concentrated in countries

<sup>200</sup> Kuznets, "Population and economic growth" (1967).

<sup>201</sup> Rose, *Some Demographic Changes and their Relationship*... (1970), pp. 61 ff.

<sup>202</sup> Kuznets, "Population and economic growth" (1967).

TABLE XIV.17. ESTIMATED RATES OF POPULATION GROWTH FOR COUNTRIES GROUPED ACCORDING TO RATES OF GROWTH OF *per capita* GROSS DOMESTIC PRODUCT, 1960-1967

Annual rate of growth of <i>per capita</i> gross domestic product <sup>a</sup> (percentage)	Number of countries	Rates of growth of population (percentage)							Unweighted average	Weighted average <sup>b</sup>
		Less than 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	3.5 and over		
Less than 0 .....	14	—	1	1	5	3	2	2	2.6	2.4
0.0 to 1.0 .....	11	—	—	5	2	2	2	—	2.3	2.2
1.0 to 2.0 .....	17	—	1	1	2	6	6	1	2.8	2.6
2.0 to 3.0 .....	28	5	2	3	4	8	4	2	2.2	1.9
3.0 to 4.0 .....	19	8	2	2	4	—	3	—	1.5	1.6
4.0 to 5.0 .....	14	2	3	—	1	5	3	—	2.2	1.7
5.0 to 6.0 .....	8	3	2	1	—	2	—	—	1.5	1.4
6.0 and over .....	11	5	—	2	—	1	2	1	1.8	1.2

SOURCES: Rates of growth of gross domestic product from United Nations, *World Economic Survey, 1969-1970* ... (1971), table A.1, pp. 177-179; population estimates from United Nations, *Demographic Yearbook, 1969* ... (1970), table 4, pp. 136-143.

<sup>a</sup> Compound rate between terminal years, based on gross domestic

product at market prices and population estimates, except in the case of centrally planned economies where the basis is net material product at market prices.

<sup>b</sup> Weighted by the size of the population of each country in the same income group.

TABLE XIV.18. INDICES OF RANK CORRELATION (SPEARMAN) BETWEEN RATES OF GROWTH OF POPULATION AND OF *per capita* PRODUCT, ABOUT 1950-1964

Countries	Number of countries	Index of rank correlation	Standard duration
All countries <sup>a</sup> .....	63	-0.309	0.1270
Developed countries .....	21	-0.434	0.2236
Developed countries excluding Canada, United States of America, Australia, New Zealand .....	17	0.061	0.2500
Less developed countries .....	40	0.111	0.1601
Africa and Asia (excluding South Africa and Israel) ....	21	0.079	0.2236
Latin America .....	19	0.246	0.2357

SOURCE: Kuznets, "Population and economic growth" (1967).

<sup>a</sup> Including Israel and South Africa, which are not included in regional groups.

where population was increasing rapidly and high rates of growth where population growth was slower. Of the seventy countries, out of a total of 122, in which the annual growth of *per capita* product remained below 3 per cent, 51, or about three fourths, had an annual growth of population of 2 per cent or more. In comparison, of the fifty-two countries with a rapid increase in *per capita* product of 3 per cent or more, thirty, or somewhat less than 60 per cent, had a rate of growth of population less than 2 per cent. Both unweighted and weighted average growth rates of population for the different levels of growth in *per capita* product show that, on the whole, population growth is more rapid in those groups of countries where economic growth in terms of *per capita* product is slower. Where the *per capita* product growth rates were below 3 per cent annually, average rates of population growth were, with a single exception, well over 2 per cent. Where *per capita* product increased at an annual rate of 3 per cent or more, population growth remained, again with a single exception, below 2 per cent. Nevertheless, the negative association is much less than perfect, and the results suggest primarily the contrast between the more developed countries, on the one hand, with higher growth of *per capita* income and a slow or moderate increase in population on the average and, on

the other hand, the predominantly less developed countries where, on the whole, population increased rapidly but *per capita* income growth was relatively slow.

98. Even this broad negative association has a much less than universal applicability. As far as individual countries are concerned, it has been noted that high growth of *per capita* product or income was accompanied in a number of cases by high rates of population growth and that low rates of growth of product or income per head went together in various instances with low population growth.<sup>203</sup> Kuznets calculated correlation coefficients between estimated growth rates of population and *per capita* product for a large number of countries and different regional groupings of them (see table XIV.18). The Spearman index of rank correlation for all sixty-three countries considered, which, as noted before, was -0.309, reflected, according to Kuznets, mainly the difference between more developed and less developed regions. Correlation coefficients for the different regions did not confirm the existence of such a negative association. Although an inverse relation was found for twenty-

<sup>203</sup> Kuznets, "Population and economic growth" (1967); Easterlin, "Effects of population growth ..." (1967). See also Raulet, "Family planning and population control ..." (1970).



one developed countries it resulted, Kuznets asserted, from different economic growth trends within this group not related to population.<sup>204</sup> The indices of rank correlations for twenty-one African and Asian countries, for nineteen Latin American countries and for these 40 predominantly less developed countries combined were all found to be positive, but small and insignificant<sup>205</sup> (see table XIV.18). Easterlin compiled estimates of *per capita* income and population growth in a number of developing countries, but speculated also on the over-all relationship between the two, the growth of population and *per capita* income. He believed that if data on the recent experience of the more developed and less developed countries were combined, higher rates of growth of *per capita* income would tend to be associated with lower population growth rates, although for the less developed countries by themselves no significant positive or negative association appeared to exist.<sup>206</sup>

99. In general the available findings, although too few and not exhaustive or sufficiently representative to permit any firm conclusions, suggest certain tentative inferences. Rates of growth of total product during the post-war period were in historical perspective high in both the more developed and less developed parts of the world. Thus, it has been observed, the capacity for growth of total product was well above that of population, even in the less developed countries where the latter was growing rapidly. Accelerated population growth, it is thus held, has not precluded growth of *per capita* income in these countries.<sup>207</sup> However, to the extent that rates of growth of total product or income were similar in both more developed and less developed countries, but population increased faster in the latter group, levels and growth of *per capita* income tended to be negatively associated with population growth.

100. This negative relationship appears to hold only when the experience of the more developed countries is contrasted with that of the less developed ones and even then the correlation is relatively weak. In the case of more developed and less developed regions taken separately, no significant association appears to have existed, a conclusion which seems also to be supported by the experience of a number of individual countries. Fundamentally, these findings based on the post-war trends are similar to those reached with respect to long-term trends, discussed in the preceding section. As noted there, given the great number of and variations in determinants of population and economic growth, the interrelations

between the two as they manifest themselves in practice are diverse and do not conform to one single pattern.<sup>208</sup>

## (ii) *The more developed countries*

101. Post-war economic growth in the more developed countries is generally recognized to have been very rapid.<sup>209</sup> This recent acceleration was in sharp contrast with developments during the inter-war period. Whereas prior to the First World War the Western European countries had experienced a considerable growth of population, high rates of capital formation and a rapid growth of output, the period after the First World War witnessed only a slow increase of output with interruptions and setbacks caused by the Depression.<sup>210</sup> Since the Second World War, however, economic growth has speeded up, in many cases to levels unprecedented in earlier history. Although these post-war economic trends in the more developed countries have been studied in considerable detail, comparatively little attention has been given to the interrelations between economic and population growth during this period.

102. Post-war trends contrasted sharply with the previous period. Economic trends in the inter-war period have been extensively analysed by Svernilson, who attributed the slow economic growth during this time to a great extent to the lack of transformation of the European economy. Among the factors responsible for the absence of a sufficiently strong transformation necessary to adjust to the changed conditions after the First World War, he listed the shift in patterns of population growth. On the whole, he asserted, Europe's population expanded rapidly during that period, but the centre of demographic growth moved from the Western, more industrialized countries, where growth was slowing down, to the Southern and Eastern European countries. Arguing in the tradition of the stagnation theory, Svernilson held that the retardation of population growth in most of the western countries, accompanied by a slow growth or stagnation of many large cities, may have had a depressing effect on the expansion of employment and economic growth. In contrast, in Southern and Eastern Europe, the acceleration of population growth, as a result of declining mortality and the closing of immigration outlets overseas, was accompanied by a lagging industrialization. The consequent failure to increase employment opportunities rapidly enough in the non-agricultural sectors created widespread employment problems, including those in the agricultural sector where a pressure on agricultural resources already existed. These regional disequilibria within Europe could have been solved, according to Svernilson, by the transfer of capital from the more

<sup>204</sup> See section C.2 (b) (ii) below.

<sup>205</sup> Kuznets, "Population and economic growth" (1967). The estimates used referred to non-socialist countries only. Kuznets thought that even if the latter were to be added and if data over a longer period were to be available, the lack of any significant association between population and *per capita* income growth would still hold true. For a more recent comparison for twenty more developed market economies and thirty-five developing market economies which led to a similar conclusion, see Sauvy, "Les charges économiques ..." (1972).

<sup>206</sup> Easterlin, "Effects of population growth ..." (1967). See section C.2 (b) (iii) below.

<sup>207</sup> Kuznets, "Population and economic growth" (1967); Easterlin, "Effects of population growth ..." (1967). See also Raulet, "Family planning and population control ..." (1970).

<sup>208</sup> See section B above.

<sup>209</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 2, p. 4; Maddison, *Economic Growth in the West ...* (1964); Adler, "World economic growth ..." (1956); d'Hérouville, "Réflexions sur la croissance" (1958); Fourastié, *La grande métamorphose du XX<sup>e</sup> siècle ...* (1961), pp. 55-59; Kuznets, *Postwar Economic Growth* (1964); Niveau, *Histoire des faits économiques contemporains* (1966), p. 378.

<sup>210</sup> Svernilson, *Growth and Stagnation ...* (1954); Hansen, *The American Economy* (1957), pp. 5-6; Paige, Blackaby and Freun, "Economic growth: the last hundred years" (1961); Maddison, *Economic Growth in the West ...* (1964), p. 28.

developed western parts to the countries of Southern or Eastern Europe or by migration of labour from the latter to the countries in the west where labour supply was scarce.<sup>211</sup>

103. The Second World War is generally thought to have had a considerable effect on economic growth and a smaller, though significant effect on population during the war period itself and for a number of years thereafter.<sup>212</sup> Rapid post-war economic growth in these countries, although involving an element of recovery, has been accompanied by population growth at a level well above that of the previous decades, but it is not clear to what extent the two were interrelated. In general terms, it has been speculated that in highly developed economies a substantial rate of population growth, acting as an autonomous factor, stimulating demand, accompanied by a rapid increase in the working population which facilitates the expansion and flexibility of employment, might be conducive to economic growth.<sup>213</sup>

104. Indications whether substantial population growth may have facilitated the growth of output were found to be inconclusive in a United Nations study on economic growth in Europe and North America during the 1950s. A comparison of rates of increase of total and *per capita* gross domestic product revealed a significantly different ranking of some countries for each of the two indices, which suggested the existence of some association between the rates of growth of total product and population, but the evidence was far from conclusive. With regard to the Eastern European countries and the Soviet Union, it was noted that, except for Bulgaria, the estimates of growth of net material product and population growth also pointed to some, but not very strong, association between the two. However, such an association, it was noted, did not necessarily imply in the case of the latter group of countries a direct relation between growth of population and that of product; it may have been the result of a negative correlation between population growth and the level of development of a country and, as at lower levels of development economic growth can be much more rapid, a positive one between the level of development and the rate of economic growth.<sup>214</sup>

105. The same study discusses in more detail the relations between the growth of labour force and that of total product and productivity. Data for twenty-two countries, including Turkey and Yugoslavia, revealed a marked, although far from perfect, positive association between the rates of growth of gross domestic product

and of the labour force.<sup>215</sup> The existence of a positive association was, however, less clear in the case of thirteen more industrialized countries.<sup>216</sup> Estimates of the rates of growth of labour supply in productive sectors and net material product in five centrally planned economies did not show a clear association, although it was held that, in general, the rates for these countries were such that they would tend to strengthen the broad association found in the twenty-two countries.<sup>217</sup> An analysis of growth in output, productive capacity and labour force in twelve developed countries during the period 1950 to 1958 also suggested the conclusion that the rate of expansion of the labour force seemingly contributed to differences in growth of output, although the relation between growth of product and labour force was clearest when countries at the extremes were considered.<sup>218</sup> The results of the earlier study cited also suggested the possible existence of a positive association between labour force and productivity growth. Higher rates of increase of the labour force were accompanied by still higher rates of growth of total gross domestic product, implying thus a tendency for high rates of growth of working population to be associated with higher output per worker.<sup>219</sup>

106. The importance of the rate of growth of the labour force for post-war economic growth in Europe was stressed by Kindleberger. Using a modified version of the model of unlimited supplies of labour developed by Lewis, he held that a large supply of labour, resulting from rapid increase of population, the transfer of workers out of agriculture or immigration, was a major factor in growth trends in different countries. Economic growth slowed down, he argued, when the abundant supply of labour no longer existed.<sup>220</sup> Although this view has found little support in other comparative studies of economic growth in Europe during the post-war period,<sup>221</sup> the slow increase in labour force was one of the principal constraints on planning objectives in both the market and centrally planned economies of Europe.<sup>222</sup>

107. In general, it appears that a weak, but far from significant association may have existed between population and total income growth in the more developed countries during the post-war period, but there is little

<sup>211</sup> Svernillson, *Growth and Stagnation* ... (1954), pp. 20, 43 ff., 62 ff. For a discussion of the pressure of population on resources and estimates of the extent of underemployment in Eastern and Southern Europe, see also Moore, *Economic Demography* ... (1945); Mandelbaum, *The Industrialization of Backward Areas* (1961).

<sup>212</sup> See, for instance, Kuznets, *Postwar Economic Growth* (1964), pp. 70 ff., and on the effect of the war on growth in the years following it; also Maddison, *Economic Progress and Policy* ... (1970), pp. 30 ff.; Lamfalussy, *The United Kingdom* ... (1963), pp. 12 ff.

<sup>213</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 2, p. 2.

<sup>214</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 2, pp. 2, 8.

<sup>215</sup> The simple correlation coefficient between growth of product and labour force was 0.71. Multiple correlation analysis, including also the rates of increase of fixed capital investment, gave a partial correlation coefficient of 0.70, with the rate of labour force growth explaining about half of the variations in the growth rates of output.

<sup>216</sup> The simple correlation coefficient in this case was 0.47; but the partial correlation coefficient, when also investment was considered, was very low.

<sup>217</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 2, pp. 13-14, 30-31.

<sup>218</sup> United Nations, *World Economic Survey, 1959* (1960), pp. 26, 57.

<sup>219</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe in 1961*, part II ... (1964), chap. 2, p. 13.

<sup>220</sup> Kindleberger, *Europe's Postwar Growth* ... (1967). See also Cornwall, "Post-war growth in western Europe ..." (1968).

<sup>221</sup> Maddison, *Economic Growth in the West* ... (1967), pp. 59-60, however, estimated that the reduction of underemployment may have accounted for up to a third of the differential between fast and slow growing countries, but noted that this effect was declining in importance.

<sup>222</sup> See chapter XVI, section B.

TABLE XIV.19. DISTRIBUTION OF SIXTY-THREE DEVELOPING MARKET ECONOMIES BY RATES OF GROWTH OF TOTAL GROSS DOMESTIC PRODUCT AND POPULATION, 1955-1965

Average annual rate of growth (percentage)	Countries		Percentage of population in 1965
	Number	Percentage	
<i>Gross domestic product</i>			
Total .....	63	100	100
Less than 2.0 .....	4	6	2
2.0 to 3.4 .....	11	17	46
3.5 to 4.9 .....	27	43	36
5.0 to 6.4 .....	13	21	14
6.5 to 7.9 .....	3	5	2
8.0 and over .....	5	8	1
<i>Population</i>			
Total .....	63	100	100
Less than 2.0 .....	15	24	8
2.0 to 2.4 .....	10	16	56
2.5 to 2.9 .....	17	27	24
3.0 to 3.4 .....	16	25	12
3.5 and over .....	5	8	1

SOURCE: United Nations, *World Economic Survey*, 1967, part I... (1968), tables 11 and 12, pp. 33-34.

evidence, if any, of an association between population growth and growth in *per capita* income. This is confirmed by Kuznets's findings mentioned before. He found a negative index of rank correlation at  $-0.434$  between growth of population and *per capita* product in twenty-one more developed non-socialist countries (including Japan). This association, he noted, reflected, however, mainly differences between the European countries and Japan, on the one hand, and the areas of European overseas settlement, on the other. In the latter, population increased relatively rapidly, partly as a consequence of immigration, but *per capita* product expanded, due to factors not related to population, at lower rates. Exclusion of these countries—Canada, United States of America, Australia and New Zealand—reduced the index of rank correlation to only  $0.06$ <sup>223</sup> (see table XIV.19). On the basis of data for 1959-1969 for 20 more developed market economies, Sauvy found a negative correlation between growth of population and *per capita* product, but a positive one when countries with rapid population growth were excluded.<sup>224</sup>

### (iii) The developing countries

108. As in the case of the more developed countries, large differences exist between the less developed regions and countries with respect to past and present levels and rates of growth of income and the size and increase of population. Moreover, these differences date back a long time. According to crude estimates, at the outset of the First World War *per capita* income, in prices of 1953, was about \$170 in Latin America; \$90 in the Far Eastern countries; somewhat over \$60 in South-East Asia and

about \$50 in China.<sup>225</sup> Levels of income in Africa were probably at that time not much above the figure cited for China.<sup>226</sup> As noted before,<sup>227</sup> significant increases in the levels of living between the First and Second World War were in all likelihood limited to Latin America, while in the other developing regions estimated income levels increased only slowly or not at all. It has also been shown that population growth rates in the predominantly less developed regions varied considerably in the past, with higher growth rates found especially in Latin America.<sup>228</sup>

109. Post-war trends in total income and population in the different less developed regions have probably tended to a greater extent than before towards convergence. As far as trends in total product are considered, estimated rates of growth for each of the major less developed regions appear to have diverged only comparatively little from their average. According to one set of estimates for 1950 to 1960, the gross product of the developing market economies increased at an average annual rate of growth of 4.4 per cent compared with regional growth rates of 4.6 per cent for Latin America, 4.2 per cent for the Far East (excluding Japan) and 4.1 per cent for Africa.<sup>229</sup> Estimates for the period 1955 to 1965 indicate that while the over-all growth rate of the gross domestic product for all developing market economies included was 4.5 per cent annually, those of the major regions varied from 3.9 per cent in Southern and South-East Asia to 4.4 per cent in Africa and 4.5 per cent in Latin America.<sup>230</sup>

<sup>225</sup> Zimmerman, *Arme und reiche Länder* (1963), table 2-6, p. 47. Also Bairoch, *Diagnostic de l'évolution économique du tiers-monde...* (1969), pp. 191 ff.

<sup>226</sup> It was speculated that in Africa *per capita* income (in 1960 prices) a century ago may have been of the order of \$45. See United Nations, Economic Commission for Africa, *Survey of Economic Conditions in Africa*, 1968 (1972), p. 6.

<sup>227</sup> See section B of this chapter.

<sup>228</sup> See chapter II, table II.8.

<sup>229</sup> United Nations, *World Economic Survey*, 1963. I... (1964), table 2.1, p. 19. It must be remembered, however, that these estimates are subject to a considerable margin of error. Nevertheless, they appear to be generally consistent with other estimates for the same period or subperiods thereof. For Asia, other estimates are consistent with those cited here. See, for instance, United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East*, 1969 (1970), table 1, p. 4, and *Economic Survey of Asia and the Far East*, 1970 (1971), table II.1.3, p. 95. The estimates cited for Latin America may have been somewhat low—see United Nations, Economic Commission for Latin America, *Economic Survey of Latin America*, 1965 (1967), table 1, p. 1. Estimates for Africa show, in general, a much wider range of variation than for the other regions. See, for instance, United Nations, Economic Commission for Africa, *A Survey of Economic Conditions in Africa, 1960-1964* (1968), table 3, p. 21, for estimates for the period 1955 to 1960, which are well below the estimates for that period in the main source cited above.

<sup>230</sup> United Nations, *World Economic Survey*, 1967, part I... (1968), table 2, p. 17. The estimate for the Asian region of developing market economies appears to be generally consistent with other estimates for that period. United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East*, 1966 (1967), table II.1.1, p. 100, gives a higher estimate for the period 1960 to 1965 than the one in the source cited here. The estimate for Latin America conforms to those from other sources. See, for instance, United Nations, Economic Commission for Latin America, *Economic Survey of Latin America*, 1965 (1967), table 1, p. 1; Hagen and Hawrylyshyn, "Analysis of world income and growth..." (1969). This latter study, however, gives estimates

<sup>223</sup> Kuznets, "Population and economic growth" (1967).

<sup>224</sup> Sauvy, "Les charges économiques..." (1972).

110. Population growth in the major developing regions in the post-war period exhibited a marked tendency towards greater uniformity. The rate of increase of population in Latin America, which traditionally had been higher than in other regions, had already attained a very high level early in the post-war years and remained at about 2.8 per cent annually during the 1950s and 1960s. In both Africa and South Asia population growth had already accelerated to about 2 per cent annually between 1950 and 1955 but speeded up further during 1965-1970 to reach an estimated 2.6 per cent in the former and 2.8 per cent in the latter.<sup>231</sup>

111. Estimated rates of growth of *per capita* product in the major developing regions were fairly uniform during the 1950s. According to one source of estimates, between 1950 and 1960 *per capita* product increased by 1.8 per cent annually in Latin America, by 1.9 per cent in Africa and by 2.1 per cent in the Far East.<sup>232</sup> While the same rate of increase in *per capita* product as in 1950 to 1960 prevailed during 1955 to 1965 in Latin America, in Africa the growth of *per capita* product was estimated to have accelerated in the latter period to 2.2 per cent annually. In contrast, in South and South-East Asia progress was slower, as *per capita* product increased at a rate of only 1.6 per cent.<sup>233</sup> Post-war trends, however, have contributed little to the narrowing of the gap in income levels between Latin America, on the one hand, and the developing countries of Africa and Asia, on the other. In absolute terms the differences increased and in 1967 the *per capita* product in Latin America was estimated to have been, as noted before, of the order of 450 dollars compared with figures of around 130 dollars in Africa and Asia (excluding Japan and the centrally planned economies).<sup>234</sup>

112. In general, little is known concerning the interrelations between population and economic growth in these different regions. With respect to Africa, a United Nations study, for instance, observed that it was not possible to determine to what extent the slow growth of income and the failure of African economies to expand at a high enough rate was the result of the rapid increase of population. It was argued, however, that although there might be certain seeming advantages from a larger population, other demographic characteristics of the African population might have an adverse effect on

economic growth. Population growth, it was recognized, could bring about a more favourable population-resources ratio in view of the over-all low density. Any conceivable advantages of a rapidly growing population, it is further asserted, are counteracted by the high dependency ratio, with the consequent lower income per person for a given product per worker and the higher outlays needed for education, and so forth. The comparatively still high death rates, and especially the high infant mortality, it is further argued, means that a substantial proportion of the resources used in raising and educating children is lost before they make a significant contribution to income. On the whole, the study concluded that although in many African countries a larger and better distributed population may be a condition for development over a long period, in the short run a high rate of population growth is likely to be an obstacle to rapid economic evolution.<sup>235</sup> While the lack of sufficient data precludes a detailed analysis of the interrelationships, there are some indications, it is asserted, that in recent periods rapid population growth may have had an adverse effect on growth in *per capita* product. Data on population growth and the rate of increase of *per capita* income in thirty-five African countries between 1960 and 1966 revealed that of the ten of these countries where population increased at a rate of less than 1.9 per cent annually, only two experienced a decline in *per capita* product while the remaining eight had increases of between 1.4 to 1.7 per cent annually. In contrast, of the twenty-five countries where population increased at an annual rate of 1.9 per cent or more, eleven had negative rates of growth of *per capita* product, *per capita* product increased less than 1 per cent annually in seven, and in the remaining seven the rate of growth of *per capita* product varied between 1.6 and 3.2 per cent annually.<sup>236</sup>

113. Economic growth in the developing market economies of Asia during the war period and the first post-war years is thought to have been slow partly as a result of the dislocations and destruction caused by war. Although the rate of economic development since then has been considerably faster than before the war in the majority of countries, it has been noted that the acceleration of growth during the post-war period made for only limited gains in *per capita* income. Although the growth in total product of the region in the 1950s was estimated to have been higher than in the developed market economies as a whole, its *per capita* product increased more slowly than that of the developed market economies due to higher population growth.<sup>237</sup> Despite a further accel-

lower than the one cited for Africa. Earlier estimates for the latter five years of the period 1955 to 1965 were below those from the primary source cited here. See, for instance, United Nations, Economic Commission for Africa, *A Survey of Economic Conditions in Africa, 1967* (1969), tables 1 and 3, pp. 1-3. Recent estimates suggest rather a faster growth. See United Nations, Economic Commission for Africa, *A Survey of Economic Conditions in Africa, 1969*, part I (1971), table 3, p. 8, and *Survey of Economic Conditions in Africa, 1970*, part I (1971), table 2.1, p. 21.

<sup>231</sup> United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication). However, population growth in East Asia, which includes China and Japan, remained moderate and stable at a level of about 1.8 per cent annually in the two most recent decades.

<sup>232</sup> United Nations, *World Economic Survey, 1963*. I. ... (1964), table 2.3, p. 21.

<sup>233</sup> United Nations, *World Economic Survey, 1967*, part I ... (1968), table 2, p. 17.

<sup>234</sup> See table XIV.12.

<sup>235</sup> United Nations, Economic Commission for Africa, *A Survey of Economic Conditions in Africa, 1960-1964* (1968), pp. 2, 46-58.

<sup>236</sup> United Nations, Economic Commission for Africa, *A Survey of Economic Conditions in Africa, 1967* (1969), pp. viii-ix. Also United Nations, Economic Commission for Africa, *A Survey of Economic Conditions in Africa, 1969*, part I (1971), pp. 89-90.

<sup>237</sup> United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1965* (1966), pp. 155-156. It has been pointed out that the population censuses taken around 1960 revealed that in a number of countries previous population estimates had been too low, so that the real increase in levels of income were much less important than they had appeared to be. See, for instance, United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1961* (1962), pp. 3, 119.

ation in the growth of total product during the 1960s, from about 4.0 per cent annually during 1950-1960 to about 4.4 per cent in 1960-1968, the *per capita* product is estimated to have increased at about the same rate as in the 1950s, about 2 per cent annually, due to the fact that population growth accelerated from 2.1 per cent a year in the 1950s to 2.5 per cent in the 1960s. In more general terms, it has been argued that rapid population growth in a number of Asian countries during the post-war period neutralized a considerable part of the growth in total output and held back a more rapid economic development.<sup>238</sup> A lowering of the present high rates of population growth through suitable population policies is seen as an important and urgent need. Even so, it is recognized that measures to control population growth are not a substitute for those aimed at a more rapid increase of output. A reduction in population growth, it is asserted, does not raise output, but only means that with a given growth of production, *per capita* income would increase more rapidly than if population had continued to grow at its earlier higher rate.<sup>239</sup>

114. With respect to Latin America, it has been noted that while total and *per capita* product during the early post-war period increased rapidly, subsequent gains were less as the annual rate of growth of total product slowed down and that of population accelerated due to the fall in death rates.<sup>240</sup> Although between 1950 and the late 1960s total and *per capita* product improved considerably in absolute terms, the latter having been estimated at 355 dollars in 1950 and over 500 dollars towards the end of the 1960s, annual rates of growth in *per capita* product, it is asserted, were only modest. The consequent relative drop in the region's share of the total world product was, at least, in part attributed to the high rates of population growth.<sup>241</sup> Apart from the acceleration of the rate of growth of population in Latin America and its effects on levels of *per capita* income and its distribution, the high rate of increase of the labour force and the problems connected with the limited capacity of the economy to absorb the supply of labour has received special attention.<sup>242</sup> Not only did economic growth proceed at a relatively slow pace, but a considerable proportion of the increase in the economically active population could not be absorbed in an efficient manner into the production process.<sup>243</sup> Considering that modern industrial activities require relatively little labour, an economic growth rate

<sup>238</sup> United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1969* (1970), p. 1, and *Economic Survey of Asia and the Far East, 1970* (1971), pp. 1, 91-93.

<sup>239</sup> United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East, 1965* (1966), pp. 7-8, and *Economic Survey of Asia and the Far East, 1970* (1971), p. 1.

<sup>240</sup> United Nations, *The Economic Development of Latin America in the Post-War Period* (1964), pp. 1, 3-4.

<sup>241</sup> United Nations, Economic Commission for Latin America, *Economic Survey of Latin America, 1968* ... (1970), pp. 8-9. See also United Nations, Economic Commission for Latin America, *Economic Survey of Latin America, 1969* (1970), p. 5.

<sup>242</sup> United Nations, *The Economic Development of Latin America in the Post-War Period* (1964), p. 3.

<sup>243</sup> United Nations, *Towards a Dynamic Development Policy* ... (1963), pp. 23-27.

TABLE XIV.20. DISTRIBUTION OF SIXTY-SEVEN DEVELOPING MARKET ECONOMIES BY LEVEL OF *per capita* GROSS DOMESTIC PRODUCT, 1965

Per capita gross domestic product (US dollars)	Countries		Percentage of population
	Number	Percentage	
Total .....	67	100	100
100 and less .....	17	25	65
101 to 200 .....	14	21	9
201 to 300 .....	19	28	18
301 to 500 .....	7	11	4
501 and over .....	10	15	4

SOURCE: United Nations, *World Economic Survey, 1967*, part I ... (1968), table 10, p. 33.

of 4 to 5 per cent, it is asserted, is insufficient to absorb the labour force when, as in the case of many Latin American countries, population is increasing at a rate of 3 per cent annually.<sup>244</sup> Employment problems in the region intensified during the decade of the 1960s when the labour force is estimated to have increased by 30 per cent while the absorption rate during this period apparently declined. With this relative decline in absorptive capacity has come increased levels of unemployment and underemployment and the spread of marginality, especially in the urban areas.<sup>245</sup> It was estimated that by the end of the 1960s some two fifths of the labour force was underemployed, overtly unemployed, or employed in services which could be regarded as unproductive. It is considered that this problem is likely to become more urgent and create serious social tensions and distortions unless economic growth speeds up significantly.<sup>246</sup>

115. Over-all and regional trends in population and levels of product in the developing world do not reflect the wide variations of growth rates and levels of income in individual countries. Estimated rates of increase of gross domestic product and of population in sixty-three developing market economies between 1955 and 1965 convey an idea of the large differences which exist within the group of developing countries both with respect to increase of income and of population (table XIV.19). Data on *per capita* product and population in sixty-seven developing market economies in 1965 illustrate the large disparities in current levels of living<sup>247</sup> (table XIV.20). Although these distributions show primarily the wide variety of conditions in the developing world, a comparison of the percentage distribution of countries with the percentage distribution of their populations reveals a

<sup>244</sup> United Nations, *The Economic Development of Latin America in the Post-War Period* (1964), p. 31.

<sup>245</sup> United Nations, Economic Commission for Latin America, *Economic Survey of Latin America, 1968* ... (1970), pp. 21-28.

<sup>246</sup> United Nations, Economic Commission for Latin America, *Economic Survey of Latin America, 1969* ... (1971), pp. 18-19. See also United Nations, Economic Commission for Latin America, "Population trends and policy alternatives in Latin America" (1971).

<sup>247</sup> United Nations, *World Economic Survey, 1967*, part I ... (1968), tables 10, 11 and 12, pp. 33-34. For similar data for an earlier period, see United Nations, *World Economic Survey, 1963*, part I ... (1964), tables 2.4 to 2.6, pp. 21-22.

TABLE XIV.21. DISTRIBUTION OF THIRTY-SEVEN DEVELOPING COUNTRIES BY RATES OF GROWTH OF REAL *per capita* INCOME AND POPULATION, 1957-1958 TO 1963-1964 APPROXIMATELY

Annual rate of population growth (percentage)	Number of countries	Annual rate of growth of real per capita income (percentage)						
		Less than 0.0	0.0 to 1.0	1.0 to 2.0	2.0 to 3.0	3.0 to 4.0	4.0 to 5.0	5.0 and over
Total .....	37	3	4	12	12	2	2	2
3.5 and over .....	2	1	0	0	0	0	1	0
3.0 to 3.5 .....	10	0	2	3	4	0	1	0
2.5 to 3.0 .....	11	1	2	5	1	1	0	1
2.0 to 2.5 .....	8	0	0	3	5	0	0	0
1.5 to 2.0 .....	4	1	0	0	2	1	0	0
Less than 1.5 .....	2	0	0	1	0	0	0	1

SOURCE: Easterlin, "Effects of population growth ..." (1967).

marked asymmetry both for the growth rates of total output and levels of *per capita* income. Thus, one fourth of the countries had a *per capita* product of less than 100 dollars in 1965, but their population accounted for nearly two thirds of the total population. At the other extreme, also, about one fourth of the countries had a *per capita* product of 301 dollars or more, but their combined population was less than one tenth of the total (see again table XIV.20). These results indicate not only that levels of living in these economies were, on the average, considerably lower than might be inferred from the distribution of countries, but also that the countries which are relatively better off are predominantly the smaller ones in terms of population, while the larger countries are, on the whole, the poorer ones. The data on the growth of total product (table XIV.19) show the same asymmetry between the distributions of countries and of their population and suggest that these divergencies are increasing. While one third of the countries for which data were available for 1955 to 1965 achieved growth rates of total product of more than 5 per cent, their population represented only one sixth of the total. In contrast, about one fourth of the countries experienced a growth of total product at a rate of less than 3.5 per cent annually, but their population accounted for nearly half of the total. On the basis of data for 1960 to 1967, it has been noted that most of the high-growth countries had relatively small populations. Further evidence in this respect was revealed by a comparison with more developed countries: whereas 45 per cent of the population of this group was in countries in the upper quartile of growth rates (with output increasing 6.6 per cent or more annually), only 10 per cent of the population of the developing countries was found to be in the corresponding upper quartile (with output increasing at 6.7 per cent or more a year). At the other extreme, the proportion of population in the developing countries that was in the lower quartile of growth rates (with output increasing annually at 2.7 per cent or less) was 18 per cent, as compared with 9 per cent in the lower quartile in the more developed countries (with output increasing 4.0 per cent or less annually).<sup>248</sup>

116. Although the discussion of regional trends suggests that under given conditions a lower rate of population growth in most developing countries would help

their economic development, actual growth trends in developing countries do not provide evidence of a significant and systematic association between the two within the developing countries. Comparisons of rates of population growth in low income countries with levels of *per capita* income (tables XIV.13 and XIV.14) and with rates of growth of total and *per capita* product (tables XIV.15 to XIV.17) did not, as noted before, reveal the existence of such an association. As discussed earlier, the index of rank correlation between growth of population and *per capita* product for forty developing countries, obtained by Kuznets, was positive, but low and not significant (0.111). For twenty-one developing African and Asian countries, the index of rank correlation was also low (0.079) and for nineteen Latin American countries it was higher (0.246), but not significant (table XIV.18). Whereas the relationship between growth of population and *per capita* income in developing countries is open to different interpretations,<sup>249</sup> a comparison of growth rates of *per capita* income and population made by Easterlin lends support to the earlier conclusion (table XIV.21). Based on data for thirty-seven developing countries, excluding those with populations under 2 million, the results showed, according to Easterlin, that there is little evidence of any significant positive or negative association between the growth rates of *per capita* income and population.<sup>250</sup> Sauvy also found that the correlation coefficient between the growth of population and *per capita* income in thirty-five developing countries during 1959-1969 was low and not significant.<sup>251</sup>

117. Even if there appears to exist no direct and verifiable relation between population and economic growth in the less developed countries, this does not imply that population and economic development are unrelated. It is likely that lower population growth under given conditions would speed up the growth of *per capita* income, if not necessarily that of total product. Moreover, as Kuznets observed, there are other important and desirable aspects of economic growth in addition to income. He

<sup>249</sup> Stockwell, "The relationship between population growth ..." (1962), compared growth rates of population and *per capita* income in 16 developing countries between 1952 and 1958 and found a negative rank correlation coefficient (-0.68). The selected countries considered as less developed included, however, Austria, Greece, Italy and Portugal.

<sup>250</sup> Easterlin, "Effects of population growth ..." (1967).

<sup>251</sup> Sauvy, "Les charges économiques ..." (1972).

<sup>248</sup> United Nations, *World Economic Survey, 1969-1970* ... (1971), pp. 9-10 and table 1.



speculated that even if growth in *per capita* income were not slowed down by a higher population growth, the latter might create other serious problems.<sup>252</sup> Providing the growing labour force with sufficient employment opportunities, achieving a just and equitable distribution of income, and creating acceptable social conditions and opportunities, such as in education, housing and social services, are some development goals which may be seriously hampered by rapid population growth.

(c) *Fertility, mortality and economic development*

118. Underlying the reversal in recent decades of the traditional positive association between the growth of population and levels of income are the changes in the relationship between the main components of population growth, especially mortality, and economic development. Even though mortality differentials between more developed and less developed countries persist, the traditional close association between death rates and levels of development is at present much weaker than it used to be, although with respect to fertility a clear dichotomy between more developed and less developed countries remains.<sup>253</sup>

119. The general fact of the existence of fertility differentials between more developed and less developed countries has been generally recognized. Crude birth rates in the less developed regions in 1965-1970 were estimated to have been about 41 per thousand compared with 19 per thousand in the more developed regions. Corresponding gross reproduction rates were about 2.7 and 1.3, respectively.<sup>254</sup> A United Nations study based on 1960 data revealed also that the distribution of individual countries by levels of crude birth or gross reproduction rates was strikingly bi-modal with a clear distinction between a high fertility and a low fertility group and with few countries on the borderline between them. The dividing line between the two groups of countries could be drawn at a crude birth rate of 30 per thousand population and a gross reproduction rate of 2.0.<sup>255</sup> Birth rates and gross reproduction rates above these levels were nearly all found in the less developed regions of Africa, Asia and Middle and South America, whereas countries with rates below the dividing line were nearly all in the more developed regions. Of the more than eighty countries in the less developed regions (Africa, Asia and Middle and South America) only six had crude birth rates less than 30 per thousand and a gross reproduction rate of less than 2.0. In contrast, only two of the more than thirty countries in the more developed regions (Europe, North America and USSR) had birth rates over 30 per thousand and only three gross reproduction rates of 2 or

more. The exceptions, it was noted, were, in general, countries which, as far as their levels of economic and social development were concerned, were not typical for the regions in which they were located.<sup>256</sup>

120. From these associations it follows that a negative relation may be expected to exist between crude birth rates or gross reproduction rates, on the one hand, and *per capita* income, on the other, for the two broad groups of more developed and less developed countries. The estimates for the late 1950s, shown in table XIV.13, confirm that, on the whole, crude birth rates were significantly higher in those countries where the level of *per capita* income was below 400 dollars. In the latter group of countries, average crude birth rates for different levels of income varied between about 38 to more than 44 per thousand, compared with averages for different income groups above 400 dollars between 21 and 24 per thousand. Similar results emerged when the average crude birth rate for each income class was weighted by the size of the population of each country in the particular class.

121. The distribution of individual countries according to the estimated levels of gross reproduction rates and of *per capita* income in a recent period confirms the earlier finding (table XIV.22). Average gross reproduction rates for all income classes below 700 dollars are all higher than 2.0 and lower than 2.0 for all classes where the *per capita* product is 700 dollars or over. More specifically, no country with a *per capita* gross domestic product under 400 dollars has a gross reproduction rate less than 2.0 and, at the other extreme, only one of the twenty-three countries with a *per capita* product of 1,200 dollars or more has a gross reproduction rate over 2.0 and this, too, is a special case (Libya).<sup>257</sup> The two intermediate income classes include countries with distinctive features. The first of the two—with a *per capita* product varying between 400 and 700 dollars—is dominated by nations with comparatively high or intermediate fertility, but also includes some countries—especially from southern Europe and temperate South America—which have attained low levels of reproduction but whose *per capita* income has remained relatively low. Countries with low fertility predominate among those with a *per capita* product between 700 and 1,200 dollars, but in it are also some countries with special characteristics—such as Namibia, South Africa and Venezuela—with comparatively high levels of income, but gross reproduction rates well over 2.00.

122. The relationships between levels of fertility and several indicators of economic and social development, including the level of income per head, were analysed in the United Nations study cited above.<sup>258</sup> When coun-

<sup>252</sup> Kuznets, "Population and economic growth" (1967).

<sup>253</sup> See chapter IV and V.

<sup>254</sup> See chapter IV, section A.

<sup>255</sup> United Nations, *Population Bulletin of the United Nations*, No. 7 ... (1965), pp. 1-2. For countries with a gross reproduction rate of 2 or more, the unweighted average gross reproduction rate was 2.94, while, for countries with a gross reproduction rate of less than 2, the average value was 1.41. The difference between the two means of 1.53 with a standard error plus or minus 0.07 was statistically significant, being more than 21 times the standard error. See United Nations, *Population Bulletin of the United Nations*, No. 7 ... (1965), p. 2.

<sup>256</sup> United Nations, *Population Bulletin of the United Nations*, No. 7 ... (1965), tables 1.2 and 1.3.

<sup>257</sup> Kuwait, data for which are not included, also would fall in this category.

<sup>258</sup> United Nations, *Population Bulletin of the United Nations*, No. 7 ... (1965), chap. 9. The other economic and social indicators selected were: energy consumption per head; proportion of the labour force in non-agricultural industries; degree of urbanization; female literacy rate; number of hospital beds; newspaper circulation; cinema attendance; number of radio receivers per 1,000 population; expectation of life at birth; and infant mortality. See also chapter IV, sections D and E, table IV.9.



TABLE XIV.22. ESTIMATED LEVELS OF GROSS REPRODUCTION RATES FOR COUNTRIES AND TERRITORIES GROUPED ACCORDING TO LEVEL OF *per capita* GROSS DOMESTIC PRODUCT, 1967

Per capita gross domestic product (US dollars)	Number of countries	Gross reproduction rate											Unweighted average	Weighted average <sup>a</sup>
		1.0 or less	1.1 to 1.3	1.4 to 1.6	1.7 to 1.9	2.0	2.1 to 2.3	2.4 to 2.6	2.7 to 2.9	3.0 to 3.2	3.3 to 3.5	3.6 and over		
Less than 100 .....	24	—	—	—	—	—	—	1	5	12	6	—	3.08	2.99
100 to 199 .....	23	—	—	—	—	—	2	3	7	3	7	1	2.98	2.44
200 to 299 .....	20	—	—	—	—	—	1	2	2	4	11	—	3.16	3.14
300 to 399 .....	10	—	—	—	—	—	—	1	3	2	4	—	3.07	2.94
400 to 699 .....	16	1	1	3	1	1	3	—	2	3	1	—	2.19	2.22
700 to 1,199 .....	13	3	3	2	1	1	—	—	2	1	—	—	1.70	1.33
1,200 and over .....	23	1	13	6	2	—	—	—	—	—	1	—	1.41	1.28

SOURCES: Data on gross domestic product (except for China) from United Nations, *World Economic Survey, 1969-1970*. . . (1971), table A.1, pp. 177-179. Data for China from Hagen and Hawrylyshyn, "Analysis of world income and growth . . ." (1969); Gross reproduction rates are unpublished United Nations estimates.

<sup>a</sup> Weighted by the size of the population of each country in the same income class.

tries were classified in two broad groups—high fertility and low fertility countries—average values for all economic and social indicators in each of them differed greatly and a high negative association between fertility and economic and social development was found to exist. In the case of *per capita* income, the unweighted average for countries with a gross reproduction rate below 2.0 was 720 dollars compared with 170 dollars for the group of countries with gross reproduction rates of 2.0 or more. The correlation coefficient between the gross reproduction rate and income per head for this two-level classification of fertility was  $-0.60$ . Even so, this correlation coefficient was, on the whole, lower than those between *per capita* income and other economic and social indicators suggesting, according to the study, that the association between gross reproduction rates and *per capita* income may be indirect, operating through other variables.<sup>259</sup>

123. Despite the negative association between fertility and level of development when only two broad groups of countries, more developed and less developed, were distinguished, within each of these groups no clear relationships appear to exist. When instead of two, six different levels of fertility were distinguished, large differences in the average income per head were found only between the gross reproduction rates of the high fertility groups, on the one hand, and of the low fertility groups, on the other, but within each of these two groups correlation coefficients between fertility and income and the other indicators were small (table XIV.23). Among low fertility countries, the correlation coefficients between gross reproduction rates and *per capita* income was low and positive ( $+0.07$ ). Nor was there any clear association between gross reproduction rates and the other economic and social indicators. Within the high fertility countries the correlation coefficient between gross reproduction rates and income per head was negative ( $-0.16$ ). The findings for the high fertility countries suggested, however, that some association may be present in high fertility countries between levels of fertility and economic and

social indicators, taking into account the consistency of the variations in the different indicators which, with few exceptions, are higher the lower the gross reproduction rates.<sup>260</sup>

TABLE XIV.23. AVERAGE INCOME PER HEAD CLASSIFIED ACCORDING TO LEVEL OF FERTILITY, AROUND 1960

Gross reproduction rate	Range	Group average	Income per head (US dollars)
Under 1.30 .....		1.15	674
1.30-1.59 .....		1.40	583
1.60-1.99 .....		1.78	971
2.00-2.49 .....		2.32	223
2.50-3.09 .....		2.82	166
3.10 and over .....		3.31	154

SOURCE: United Nations, *Population Bulletin of the United Nations*, No. 7 . . . (1965), table 9.2, p. 141.

124. In general, the findings indicating that fertility levels are closely associated with *per capita* income if the economically more advanced and less advanced countries are compared, but not within each of these groups, is confirmed by other data discussed earlier (see table XIV.13). However, the indeterminate nature of the effects which economic variables have statistically on fertility has been emphasized by Kuznets<sup>261</sup> and a number of other studies, which included both more developed and less developed countries, have shown somewhat different results. A multiple regression analysis of fertility in thirty-seven countries, both developed and developing, by Adelman suggested a positive, but weak association between age specific birth rates, especially in the younger reproductive age groups, and levels of *per capita* income.<sup>262</sup> A similar conclusion was reached by Wein-

<sup>260</sup> United Nations, *Population Bulletin of the United Nations*, No. 7 . . . (1965), pp. 6, 141-143, 148 and tables 9.2 and 9.8.

<sup>261</sup> Kuznets, "Economic aspects of fertility trends . . ." (1969).

<sup>262</sup> Adelman, "An econometric analysis . . ." (1963). The independent variables in the multiple regression analysis included, apart from *per capita* income, the levels of urbanization and education, population density and infant mortality.

<sup>259</sup> United Nations, *Population Bulletin of the United Nations*, No. 7 . . . (1965), pp. 6, 141-142, 145 and tables 9.2 and 9.6.

TABLE XIV.24. ESTIMATED LEVELS OF EXPECTATION OF LIFE AT BIRTH FOR COUNTRIES GROUPED ACCORDING TO LEVEL OF *per capita* GROSS DOMESTIC PRODUCT, 1967

Per capita gross domestic product (US dollars)	Number of countries	Expectation of life at birth (years)										Unweighted average	Weighted average <sup>a</sup>
		30 to 35	35 to 40	40 to 45	45 to 50	50 to 55	55 to 60	60 to 65	65 to 70	70 and over			
Less than 100 .....	24	1	10	8	5	—	—	—	—	—	41.2	46.2	
100 to 199 .....	23	1	2	9	5	3	2	1	—	—	45.6	50.0	
200 to 299 .....	20	—	—	5	2	7	4	1	1	—	51.3	53.6	
300 to 399 .....	10	—	—	1	1	3	3	2	—	—	54.6	56.8	
400 to 699 .....	16	—	1	—	—	—	1	4	8	2	64.4	64.5	
700 to 1,199 .....	13	—	1	—	1	—	—	1	2	8	65.7	69.1	
1,200 and over .....	23	—	—	—	—	1	—	—	1	21	70.9	71.1	

SOURCES: Data on gross domestic product (except for China) from United Nations, *World Economic Survey, 1969-1970* . . . (1971), table A.1, pp. 177-179; data for China from Hagen and Hawrylyshyn, "Analysis of world income and growth . . ." (1969). Data on expectation of life

at birth from United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

<sup>a</sup> Weighted by the size of the population of each country in the same income class.

traub in an analysis for 30 countries, also including both developed and developing countries.<sup>263</sup> Frederiksen, on the basis of a correlation analysis for twenty-one countries, including developed and developing, concluded that while birth rates were strongly associated with other demographic variables, the associations between birth rates and economic variables were only weak.<sup>264</sup> On the whole, it has been suggested, that fertility change and economic and social progress are related processes which, however, are part of a broader process of cultural, institutional and political change in which the weight of purely economic variables may be quite limited.<sup>265</sup>

125. Whereas, traditionally, mortality changes were thought to be dependent upon economic and social change, such an association no longer is evident where recent mortality trends in the presently developing countries are concerned. Large and rapid gains in longevity in these countries have occurred in the absence of significant economic progress and social change.<sup>266</sup> Despite the fact that recent mortality declines have been largely independent of economic development, however, longevity in the economically less advanced countries is still considerably lower than in the more advanced countries. Data for the period 1955-1959 suggested that crude death rates in the less developed regions of Africa, Asia and Latin America were well above or, in the case of the latter, close to the world average of 19 deaths per 1,000 population, while death rates in the more developed

regions were, on the average, considerably lower.<sup>267</sup> For the period 1965-1970, expectation of life at birth was estimated to be 70 years on the average in the more developed countries, as compared with 50 years in the developing regions.<sup>268</sup> Estimated crude death rates in the period 1957 to 1959, classified according to different levels of *per capita* gross domestic product, confirm in general the existence of a significant difference in death rates in countries with high and low incomes (table XIV.13). In the group of countries with *per capita* incomes below 400 dollars, average weighted rates for the different income classes vary from about 14 to 16 per thousand. In comparison, the averages for the different levels of *per capita* income of 400 dollars or more are around 9 per thousand in each of the income classes distinguished. The unweighted averages, however, suggest a less pronounced demarcation between the two groups with a comparatively low average crude death rate for countries with a *per capita* product between 200 and 399 dollars.

126. A comparison of product per head and expectation of life at birth, which, unlike the crude death rate, is not affected by the age composition of the population, for a recent period confirms the existence of a significant positive association between level of development and longevity (table XIV.24). In income classes below 400 dollars by far the largest proportion of countries have life expectancies at birth inferior to 60 years, whereas in the higher income classes the great majority of countries have life expectancies of well over 60 years. Moreover, those countries in the latter group which have comparatively low expectancies are special cases, such as Libya, Namibia and South Africa.

127. Although both unweighted and weighted average life expectancies show the largest difference between the income classes immediately below and over 400 dollars, the data suggest that within each of these two groups of countries and, in general, mortality varies inversely with the level of *per capita* product. Average life expectancies, both weighted and unweighted, increase, although not

<sup>263</sup> Weintraub, "The birth rate and economic development . . ." (1962). The independent variables in the multiple regression analysis were: *per capita* income, the ratio of population in farming and the infant mortality rate. See also on this subject Heer, "Economic development and fertility" (1966) and his "Economic development and the fertility transition" (1968).

<sup>264</sup> Frederiksen, "Dynamic equilibrium . . ." (1966).

<sup>265</sup> United Nations, *Population Bulletin of the United Nations*, No. 7 . . . (1965), pp. 6, 143; Kuznets, "Economic aspects of fertility trends . . ." (1969). For a more detailed discussion of the determinants of fertility see chapter IV. Adelman, "An econometric analysis . . ." (1963) concluded tentatively that the influence of socio-economic variables upon demographic ones is probably much smaller than the effect of population growth upon economic development.

<sup>266</sup> See section B above. Also chapter V, section H.

<sup>267</sup> United Nations, *Population Bulletin of the United Nations*, No. 6 . . . (1963), p. 17.

<sup>268</sup> Chapter V, section A, table V.1.

to the same degree, in all cases when passing from one level of income per head to the next higher one. The presumption of an association between mortality and *per capita* income is supported by an analysis of age-specific death rates in thirty-four countries undertaken by Adelman. Regression coefficients of age-specific death rates upon income were found to be negative for all age groups and statistically significant up to age 50. The elasticity of death rates with respect to income were found, however, to be considerably below unity.<sup>269</sup> In general, these findings thus suggest the continued existence of a significant mortality differential between the economically more advanced and the less advanced countries despite the recent rapid decline of mortality in the latter, although it may be assumed that in view of this process of rapid decline the relation is weakening. The results also indicate a systematic, but probably not very significant, inverse association between mortality and income within the groups of more developed and less developed countries and with respect to individual countries.

(d) *Industrialization, urbanization and economic development*

128. Economic development, industrialization and urbanization are, as has been noted before, linked in a number of ways. Although increases in productivity within each of the sectors, and not the changes in the industrial structure are the main factor in economic growth, and, in principle, industrialization could take place without urbanization, in practice these changes are closely inter-related.<sup>270</sup> From these different associations results a complex of interrelations between economic growth, industrialization and urbanization.

129. Whatever data are available suggest the existence of a consistent relation between levels of economic development, as expressed in an index such as *per capita* income, and the industrial distribution of the labour force. Davis found, for instance, that the average *per capita* income for thirty agricultural countries—defined

as those in which 50 per cent or more of the economically active males were engaged in agriculture—in 1939 was 87 dollars compared with an average of 287 dollars in twenty-two industrial countries.<sup>271</sup> An analysis of data on *per capita* income and the share of agriculture in the labour force in different regions and countries by Bean also led to his conclusion of the existence of a negative association between the two.<sup>272</sup> On the basis of data for forty-three countries, Kuznets found that the proportion of the total working population occupied in the non-agricultural sectors declined from an average of more than 85 per cent for countries with a *per capita* product of 775 dollars or more to one of somewhat over 40 per cent in countries where the product per person was 150 dollars or less.<sup>273</sup> Chenery, using multiple regression analysis, estimated that the proportion of the labour force in primary activities declined from 75 per cent when the *per capita* product was 50 dollars to barely 8 per cent when the *per capita* product increased to 2,000 dollars.<sup>274</sup> In more general terms, a positive association has been found to exist between levels of development and the proportion of the labour force in industrial activities. In 1950, for instance, the more developed countries of Europe, North America and Oceania accounted for 15 per cent of the world's working population, but for 30 per cent of the world's industrial labour force. In contrast, the working population of Asia was estimated to represent half of the world's total, but its industrial labour force was only a quarter of the corresponding total for the whole world.<sup>275</sup>

130. A more detailed study by Kuznets of the industrial distribution of the labour force in fifty-three countries confirmed the existence of an over-all negative association between levels of development, as measured in terms of

<sup>271</sup> Davis, "Population and the further spread ..." (1951).

<sup>272</sup> Bean, "International industrialization ..." (1946).

<sup>273</sup> Kuznets, "Consumption, industrialization and urbanization" (1966).

<sup>274</sup> Chenery, "Targets for development" (1971).

<sup>275</sup> International Labour Office, "The world's working population ..." (1956).

<sup>269</sup> Adelman, "An econometric analysis ..." (1963).

<sup>270</sup> See section A of this chapter.

TABLE XIV.25. AVERAGE SHARES OF MAJOR SECTORS IN LABOUR FORCE FOR GROUPS OF COUNTRIES CLASSIFIED BY *per capita* INCOME—FIFTY-THREE COUNTRIES, AROUND 1950

Average per capita income of each class (US dollars)	Number of countries	Average share in total labour force <sup>a</sup>		
		Agriculture <sup>b</sup>	Manufacturing <sup>c</sup>	Services <sup>d</sup>
1,700 .....	8	15.0	40.2	44.8
1,000 .....	8	34.4	29.2	36.3
650 .....	8	34.8	28.0	37.2
400 .....	9	57.6	18.3	24.1
270 .....	7	59.9	16.8	23.3
200 .....	7	64.8	15.0	20.5
100 .....	6	79.9	6.6	13.5

Source: Kuznets, "Quantitative aspects of the economic growth of nations. II. ..." (1957), table 10.

<sup>a</sup> Including unpaid family labour.

<sup>b</sup> Includes agriculture, fisheries, forestry.

<sup>c</sup> Includes mining, manufacturing and construction.

<sup>d</sup> Includes transportation and communication; trade; finance; professional, personal and business services and government.

*per capita* product, and the proportion of the labour force in agriculture (table XIV.25). From the results, he inferred that a clear negative correlation existed between differences in *per capita* income and the share of agriculture in the total labour force. The proportion in manufacturing showed a distinct positive correlation with income per head, while a positive, but weaker association appeared also to exist in the case of the services sectors.<sup>276</sup> A more recent study by Kuznets on the basis of similar data also suggested a negative association between the agricultural shares and income and a positive one between the proportions of the labour force in manufacturing and services and *per capita* product.<sup>277</sup>

131. It has been shown earlier in this chapter that significant shifts in the industrial structure of the labour force occur in the course of development. Nevertheless, despite this over-all association between the composition of the labour force and development, considerable variations in the levels, patterns and evolution of the distribution of the labour force among the economic sectors exist in individual cases. The proportions of the labour force in agriculture and other sectors in different countries and within countries varied considerably, Bean noted in a study earlier cited, despite similar levels of development.<sup>278</sup> Kuznets in analysing long-term trends in a number of countries, concluded that changes in the shares of the main sectors over time were far from uniform, especially where the services sector was concerned.<sup>279</sup>

132. The existence of a positive association between the degree of industrialization and the level of urbanization is generally accepted. Davis and Hertz found that the average proportion of the population living in cities of 100,000 or more inhabitants in those countries where more than 50 per cent of the occupied males were engaged in agriculture was only 9 per cent, compared with 27 per cent in countries where less than half of the male working population was occupied in agriculture. When data for 155 countries and territories were classified according to the percentage of active males in agriculture and the percentage of the population in cities of 100,000 and over, a close association between the two was evident (table XIV.26). The correlation coefficient (Pearson) between the degree of industrialization, as measured by the percentage of the male working force in the non-agricultural sectors, and that of urbanization was found to be 0.86.<sup>280</sup> An

<sup>276</sup> Kuznets, "Quantitative aspects of the economic growth of nations. II. . . ." (1957). This study also includes an analysis of the shares of different sectors in total product and comparisons of sectoral labour productivity. For other studies on these latter aspects see also Kuznets, *Modern Economic Growth* . . . (1966), pp. 86-153, 400-420; Chenery, "Patterns of industrial growth" (1960); United Nations, *A Study of Industrial Growth* (1963); Chenery and Taylor, "Development patterns . . ." (1968).

<sup>277</sup> Kuznets, *Modern Economic Growth* . . . (1966), pp. 409-417 and table 8.1. See also his *Economic Growth of Nations* . . . (1971), chap. 5, tables 28 and 29.

<sup>278</sup> Bean, "International industrialization . . ." (1946).

<sup>279</sup> Kuznets, "Quantitative aspects of the economic growth of nations. II. . . ." (1957).

<sup>280</sup> Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954). See also Hauser, "World and Asian urbanization . . ." (1957); Duncan, "Human ecology and population studies" (1959); Guyot, *Essai d'économie urbaine* (1968), pp. 251-253.

TABLE XIV.26. PROPORTION OF POPULATION IN CITIES OF 100,000 OR MORE INHABITANTS IN 155 COUNTRIES CLASSIFIED ACCORDING TO THE PERCENTAGE OF THE MALE LABOUR FORCE IN AGRICULTURE, 1950

Percentage of economically active males in agriculture	Number of countries	Percentage of total population in cities of 100,000 or more inhabitants
0-19 .....	11	32.3
20-29 .....	11	23.6
30-39 .....	7	23.2
40-49 .....	7	21.9
50-59 .....	16	17.7
60-69 .....	17	8.9
70 and over .....	86	6.3

SOURCE: Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954).

analysis by Schnore gave similar results. The correlation between the percentage of active males in non-agricultural activities and the level of urbanization in sixty-nine countries was 0.87 when the latter was defined to include cities of 100,000 and more inhabitants and 0.77 when urbanization was interpreted to include cities of 20,000 or more inhabitants.<sup>281</sup>

133. Estimates of urban population and the industrial distribution of the labour force for individual countries at different levels of development, or at different times, tend to confirm the over-all positive relationship between industrialization and urbanization.<sup>282</sup> Even so, the exact nature of the relation between the two is much less than clear-cut or simple. Significant differences in the industrial structure of the labour force are found between countries with similar levels of urbanization and between the now developing countries and the presently more developed countries in the past at comparable levels of urbanization. The lack of an invariable and functional relation is also implied in the assumption that, in many less developed countries, urbanization is proceeding at an excessive rate compared with industrialization, causing what is often referred to as over-urbanization.<sup>283</sup> Over-urbanization is thought to manifest itself in a number of ways. It may reveal itself in a tendency for urbanization to be much higher than might be expected on the basis of other indicators of development or than could be expected on the basis of the past experience of the presently developed countries, but it may also appear in a disproportionate growth of the urban population in comparison with the expansion of industrial employment or in an excessive increase in service activities.<sup>284</sup> Inferences concerning the existence of over-urbanization have, however, been

<sup>281</sup> Schnore, "The statistical measurement of urbanization . . ." (1961). See also Guyot, *Essai d'économie urbaine* (1968), pp. 225-229.

<sup>282</sup> United Nations, *Report on the World Social Situation* . . . (1957), tables 10 and 11, pp. 125, 127.

<sup>283</sup> See section A.

<sup>284</sup> Davis and Hertz Golden, "Urbanization and the development of pre-industrial areas" (1954); United Nations, *Report on the World Social Situation* . . . (1957), pp. 125-128; United Nations, "Economic causes and implications of urbanization . . ." (1957).

TABLE XIV.27. SHARES OF LABOUR FORCE IN NON-AGRICULTURAL ACTIVITIES AND PERCENTAGE OF POPULATION IN LOCALITIES OF 20,000 OR MORE INHABITANTS ACCORDING TO CLASSES OF *per capita* INCOME—FORTY-THREE COUNTRIES, EARLY 1950s

Range of <i>per capita</i> income, 1952-1954 (US dollars)	Average share of non-agricultural activities in total labour force <sup>a</sup>		Weighted average of proportions of population in localities of 20,000 or more inhabitants <sup>b</sup>		Ratio of weighted average of percentage of population in localities of 20,000 or more inhabitants and of average share of non-agricultural activities
	Number of countries	Percentage	Number of countries	Percentage	
150 or less .....	11	41.2	10	12.4	0.30
151 to 350 .....	12	49.7	15	27.9	0.56
351 to 775 .....	13	72.7	11	35.9	0.49
775 or more .....	7	85.6	8	47.4	0.55

SOURCE: Kuznets, "Consumption, industrialization and urbanization" (1966).

<sup>a</sup> Excluding unpaid family workers.

<sup>b</sup> Weighted by size of population.

TABLE XIV.28. ESTIMATED PERCENTAGE DISTRIBUTION OF LABOUR FORCE AND PERCENTAGE OF URBAN POPULATION BASED ON DATA FOR ABOUT 100 COUNTRIES, 1950-1965

Gross national product per capita (1964 US dollars)	Percentage distribution of labour force			Percentage of urban population
	Primary	Industrial	Services	
50 .....	75.3	4.1	20.6	4.1
100 .....	68.1	9.6	22.3	20.0
200 .....	58.7	16.6	26.7	33.8
300 .....	49.9	20.5	29.3	40.9
400 .....	43.6	23.4	31.7	45.5
600 .....	34.8	27.6	35.8	51.5
800 .....	28.6	30.7	39.2	55.3
1,000 .....	23.7	33.2	42.2	58.0
2,000 .....	8.3	40.1	51.6	65.1

SOURCE: Chenery, "Targets for development" (1971).

questioned. It has been noted that the assumption of a single, well-defined and invariable pattern of industrialization and urbanization is not necessarily justified. Sovani, in particular, has argued that this interrelation may vary according to the level of development. He found that the correlation between the percentage of urban population and that of the labour force in non-agricultural activities in seventeen more developed countries was relatively weak, the correlation coefficient being 0.40. However, for twenty-four other, predominantly less developed countries, the association was strong with a correlation coefficient of 0.87. A high and similar degree of correlation, with a coefficient of 0.84, was also found for thirteen presently developed countries towards the end of the nineteenth century, which led Sovani to conclude that the association between urbanization and industrialization is not stable, but varies for different levels of urbanization and development.<sup>285</sup>

134. The broad associations between development and industrialization, on the one hand, and industrialization and urbanization, on the other, also suggest the existence of a general relationship between the three. Evidence in

this respect is provided by data, compiled by Kuznets, on the shares of non-agricultural sectors in the total labour force and the population in localities of 20,000 inhabitants and over classified according to levels of *per capita* income (table XIV.27). Average shares of non-agricultural activities and of the proportion of town population vary, as the results indicate, positively with the level of *per capita* income.<sup>286</sup> Estimated values of *per capita* income, labour force structure and urbanization based on a multiple regression analysis of data for a large number of countries, presented by Chenery, indicate the extent to which industrialization and urbanization may vary with the level of *per capita* income<sup>287</sup> (table XIV.28). Nevertheless, although the findings establish the existence of an association between these different variables, ratios of the proportion of urban population and the shares of the non-agricultural labour force, calculated by Kuznets, vary in a less than systematic manner, thus indicating that the interrelation is not simple or stable and that patterns of industrialization and urbanization are not necessarily uniform (see again table XIV.28).

<sup>286</sup> Kuznets, "Consumption, industrialization and urbanization" (1966).

<sup>287</sup> Chenery, "Targets for development" (1971), table 1. The estimates cited there were taken from Chenery, Elkington and Sims, *A Uniform Analysis of Development Patterns* (1971) (multilith).

<sup>285</sup> Sovani, "The analysis of over-urbanization" (1964). See also Guyot, *Essai d'économie urbaine* (1968), pp. 251-254.

#### D. Population and economic growth in the past and present

135. It is a generally accepted fact that the emergence of modern economic growth in the presently more developed countries has been associated with new demographic trends and patterns. There is much less agreement, however, as to the nature of the relationships between population and economic growth during the initial phases of development. According to some authors, population growth was an important factor in setting in motion the process of development; others are of the view that population changes at that time occurred mainly in response to economic and social changes. The historical experience and relations of the presently more developed countries have acquired new relevance in recent decades as the presently developing countries are undergoing a process of rapid economic and demographic change.

##### 1. EARLY MODERN ECONOMIC GROWTH AND POPULATION IN THE PRESENTLY DEVELOPED COUNTRIES

136. The purpose of this section is to attempt to assess in very broad terms the significance of past patterns in the presently more developed nations for the countries now entering into this process. The first subsection presents a brief sketch of economic and population trends during the early phases of modern economic growth in the presently more developed countries. Because of the special significance of England as the first country to experience an industrial revolution, the first part of it is concerned with the role ascribed to population in this process. The second part discusses in more general terms the interrelations between economic and population growth during the initial period in some of the countries which subsequently embarked on the development process. The second subsection summarizes some of the literature which deals with the differences between the pre-industrial state in the presently more developed countries and the developing countries in recent decades.

##### (a) Population and the Industrial Revolution in England

137. The beginnings of modern economic growth have come to be associated with the start of the Industrial Revolution in England, which, as has been noted, affected not only manufacturing, but through fundamental changes in the technology and organization of production, changed radically the whole economic process and brought with it profound changes in the society and social structures.<sup>288</sup> The effective beginnings of this transformation are usually placed during the latter part of the eighteenth century, although some writers have pointed out that this process dated as far back as the middle of the sixteenth century,

<sup>288</sup> Mantoux, *The Industrial Revolution in the Eighteenth Century*... (1928, 1961 ed.), pp. 474-477; Ashton, *An Economic History of England*... (1955); Coleman, "Industrial growth and industrial revolutions" (1956); Deane, "The long-term trends..." (1961) and her *The First Industrial Revolution* (1965); Deane and Cole, *British Economic Growth*... (1962); Rostow, "Industrialization and economic growth" (1965). See also Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 126 ff.; Petersen, *Population* (1970), p. 402; Enke, *Economics for Development* (1963), p. 422.

and others have noted that the new order had been firmly established only by the middle of the nineteenth century.<sup>289</sup> Although recognizing that the conditions for the Industrial Revolution were created over a long period and that its completion took a considerable time, the majority of authors contend that the changes taking place around 1780 were such as to warrant the conclusion that the Industrial Revolution had its beginnings at that time.<sup>290</sup>

138. Since satisfactory estimates of production and income going back a long period in the past are scarce and often unreliable, inferences on England's economic growth during this period are to a great extent based on partial data or rough estimates. Many of the former relate to the growth of selected branches or products such as textiles, mining and metals which were of special importance for the country's development.<sup>291</sup> The available estimates suggest that a fairly rapid expansion may have occurred in the cotton industry and coal mining as early as the 1740s, but the fastest growth, it is asserted, in these and the iron industries took place in the last quarter of that century.<sup>292</sup> This is supported by Hoffmann's conclusion that 1780 was the approximate date when total industrial production increased for the first time at an annual rate in excess of 2 per cent.<sup>293</sup>

139. A number of writers have also stressed the importance of agricultural development during this period as a factor in economic growth.<sup>294</sup> Although data on agricultural production during the eighteenth century are virtually non-existent, a number of factors—such as the spread and intensification of cultivation associated with the enclosure movement, innovations and changes in the techniques of farming, including the introduction of new crops—are thought to have stimulated a significant

<sup>289</sup> Nef, "The progress of technology..." (1934) argued that the industrialization process started as far back as the sixteenth century. Ashworth, *A Short History of the International Economy*... (1952), pp. 19-23, 30-32, considered the middle of the nineteenth century as a crucial period in the industrialization process.

<sup>290</sup> Toynbee, *Lectures on the Industrial Revolution* (1884, 1913 ed.), pp. 1-7, spoke of the year 1760 as the eve of the Industrial Revolution. Among the writers who consider the starting point to be around 1780 are Ashton, *An Economic History of England*... (1955), p. 25; Hoffmann, *British Industry*... (1955), p. 30; Mantoux, *The Industrial Revolution in the Eighteenth Century*... (1928, 1961 ed.), pp. 25, 43, regarded the last third of the eighteenth century as a period of decisive change. Barre, *Economie politique*, vol. 1 (1961), p. 67, described the period from 1760 to 1850 as that in which the Industrial Revolution took place. For a discussion of these different points of view, see Deane, *The First Industrial Revolution* (1965), pp. 1-5.

<sup>291</sup> See section B of this chapter. Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 126, suggest that the lack of national income estimates for this period is not as serious a shortcoming as is often assumed, since at that time there were only a few important industries, and their growth, together with that of agriculture, provide, they argue, a sufficient indication of over-all economic trends.

<sup>292</sup> Deane and Cole, *British Economic Growth*... (1962), pp. 55-56; Cole and Deane, "The growth of national incomes" (1965).

<sup>293</sup> Hoffmann, *British Industry*... (1955), p. 30.

<sup>294</sup> Court, *A Concise Economic History of Britain*... (1954), pp. 19-41; Bairoch, *Révolution industrielle et sous-développement* (1963), p. 31; and his *Agriculture and the Industrial Revolution* (1969); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 126-127; Petersen, *Population* (1970), p. 406; Eversley, "Population, economy and society" (1965).

growth of agricultural production during this period.<sup>295</sup> Estimates of corn production, obtained through indirect methods by Deane and Cole, led them to conclude that until the 1770s output increased irregularly, but that from then on until the end of the century it increased steadily and accelerated further in the early nineteenth century.<sup>296</sup> One of the by-products of the progress in agriculture, according to a number of writers, was the effect it had on employment. The opening of new cultivated areas and the improved technology of production combined to create a more gainful employment of the agricultural labour force, but also released part of this labour to provide the needed industrial labour force.<sup>297</sup>

140. Tentative estimates of economic growth trends during the eighteenth century tend to confirm an upsurge during the latter part of that period. An assessment of over-all economic growth, based on statistics of international trade, was made by Deane and Cole who, although recognizing the difficulties involved in interpreting the type of data used, inferred the existence of several distinct phases in economic growth in the course of that century. The annual growth rate of net exports and imports was estimated to have been only about 0.5 per cent during the greater part of the first half of the century. The rate accelerated considerably after 1745, and even though it slowed down during the 1760s, its average for the quarter century from 1745 to 1771 came to 2.8 per cent. The final phase, from about 1770 to the early 1800s, was one of very rapid expansion with an annual growth rate of 4.9 per cent of net imports and exports.<sup>298</sup> On the basis of a number of indicators, Deane and Cole also derived rough estimates and indices of the growth of real output, which also provided evidence of an acceleration of growth in the late eighteenth century. According to these estimates, total and *per capita* income increased very slowly during the first decades of the century. A first spurt of growth occurred between 1745 and 1765 when total output is estimated to have increased by about 1.0 per cent annually and, although population growth also speeded up, *per capita* income gains were considerably higher than in the past. Between about 1765 and 1785 an acceleration in the rate of growth of population and a slowing down of the economy to a rate of growth of total product of about 0.7 per cent caused a virtual stagnation in the levels of *per capita* income. A crucial change took place, according to Deane and Cole, after 1785 when both total output and population started to grow much faster than ever before, but with the former increasing substantially more rapidly than population. Total output was estimated to have increased between 1785 and the

early 1800s at a rate close to 2 per cent annually while *per capita* income grew annually by nearly 1 per cent.<sup>299</sup>

141. As in the case of economic estimates, demographic data for England during the eighteenth century are scarce and the estimates that exist are either said to be inadequate to assess population trends during this period<sup>300</sup> or at the least are subject to a substantial margin of error.<sup>301</sup> It has also been pointed out, however, that despite their shortcomings, these data are consistent in that they indicate that an upward trend in English population growth started, although the initial increase may have been modest, around the middle of the eighteenth century.<sup>302</sup> While opinions as to the more specific patterns and the extent of the increase of population differ considerably, there appears to be substantial agreement on the fact that in the second half of the eighteenth century population expanded at a higher rate than in the first half of that century and the preceding ones.<sup>303</sup>

142. A considerable controversy has developed as to whether the speeding-up of population growth during this period must be attributed to a decline in the death rates or an increase in birth rates and, as to the former, what factors were instrumental in bringing about the decline in mortality.<sup>304</sup> The traditional explanation of the increase in population growth in England at that time was the fall in death rates.<sup>305</sup> This conclusion and the evidence on which it was based came to be questioned and an alternative explanation that attributed the increase in population to a rise in the birth rates was advanced.<sup>306</sup> The Industrial Revolution, according to this view, was accompanied by a number of economic and social changes conducive to a rise in fertility. The increasing demand for labour, the changes in the social structure and customs, increased mobility and internal migration, it is held, were

<sup>299</sup> Deane and Cole, *British Economic Growth* . . . (1962), pp. 47 ff. See also Cole and Deane, "The growth of national incomes" (1965); Deane, *The First Industrial Revolution* (1965), pp. 221-223; Kuznets, *Economic Growth of Nations* . . . (1971), table 1, p. 11.

<sup>300</sup> Habakkuk, "The economic history of modern Britain" (1958).

<sup>301</sup> Glass, "Population and population movements . . ." (1965), concluded in his discussion of the estimates of Rickman, Malthus, Finlaison, Farr, Brownlee, and Griffith that if the purpose was to estimate the approximate size of the population at different periods within a margin of 10 to 15 per cent, the figures are sufficiently near the truth to be accepted.

<sup>302</sup> Deane, *The First Industrial Revolution* (1965), p. 24; Cole and Deane, "The growth of national incomes" (1965).

<sup>303</sup> Petersen, *Population* (1961), p. 400; Deane, *The First Industrial Revolution* (1965), p. 28; Habakkuk, *Population Growth and Economic Development* . . . (1971), p. 26.

<sup>304</sup> For a general discussion of this controversy see Deane, *The First Industrial Revolution* (1965), pp. 24 ff.; Eversley, "Population, economy and society" (1965); Wrigley, *Population and History* (1969), pp. 145 ff.; Habakkuk, *Population Growth and Economic Development* . . . (1971), pp. 25-51.

<sup>305</sup> Griffith, *Population Problems of the Age of Malthus* (1926); Buer, *Health, Wealth and Population* . . . (1926); Clapham, *An Economic History of Modern Britain* . . . (1950), vol. 1, pp. 54-56; Ashton, *The Industrial Revolution* . . . (1948), pp. 1-22; Marshall, "The population problem during the industrial revolution . . ." (1929) stressed, however, also that birth rates in the period 1760 to 1830 were very high.

<sup>306</sup> Krause, "Changes in English fertility and mortality . . ." (1958). See also Habakkuk, "English population in the eighteenth century" (1953) and his "The economic history of modern Britain" (1958); Petersen, *Population* (1970), pp. 413 ff.

<sup>295</sup> Nicholls, "The place of agriculture . . ." (1964); Court, *A Concise Economic History of Britain* . . . (1954), pp. 20-23; Enke, *Economics for Development* (1963), p. 423.

<sup>296</sup> Deane and Cole, *British Economic Growth* . . . (1962), pp. 63-66.

<sup>297</sup> Chambers, "Enclosure and labour supply . . ." (1958); Court, *A Concise Economic History of Britain* . . . (1954), pp. 39-40; Nicholls, "The place of agriculture . . ." (1964).

<sup>298</sup> Deane and Cole, *British Economic Growth* . . . (1962), pp. 47 ff. See also Cole and Deane, "The growth of national incomes" (1965).



all factors which weakened the former restraints on early marriage and fertility, such as the widespread existence of apprenticeship, the predominance of the traditional rural society and so forth.<sup>307</sup>

143. Among those who have attributed the acceleration of population growth mainly to the decline in mortality, opinions differ as to the causes of the decrease. Traditionally, it was held that the fall in death rates was primarily the result of improvements in medicine and health<sup>308</sup> and the same view is also found in some more recent writings.<sup>309</sup> This interpretation was contested by others who argued that improvements in levels of living were the crucial factors in the reduction of mortality.<sup>310</sup> Sharp differences of opinion exist, however, concerning the effects of economic growth on the levels of living of the majority of people during this period. The view that the living conditions of the working class deteriorated during the early stages of the Industrial Revolution can be found in the writings of many authors, including Engels and Marx,<sup>311</sup> while the opposite view has been advanced by another group.<sup>312</sup> Another interpretation related to economic progress is that the decline in mortality during the initial phases of the Industrial Revolution responded to the disappearance of the "peaks" or surges in death rates which were characteristic of the pre-industrial period. Higher productivity in agriculture as well as a greater regularity of food supply, it has sometimes been argued, prevented the occurrence of the food crises which in previous periods often claimed large numbers of victims.<sup>313</sup> As in many other cases the evidence as to what was the net effect of the different factors involved on levels of living is contradictory and, on the whole, inconclusive.<sup>314</sup>

144. Although the extent and causes of the demographic change which occurred in eighteenth-century England are

<sup>307</sup> Habakkuk, "English population in the eighteenth century" (1953), his "The economic history of modern Britain" (1958); and his *Population Growth and Economic Development* ... (1971), pp. 35-48; Petersen, *Population* (1970), pp. 420-423.

<sup>308</sup> Griffith, *Population Problems of the Age of Malthus* (1926).

<sup>309</sup> Razzell, "Population change in eighteenth-century England..." (1965). See also Habakkuk, *Population Growth and Economic Development* ... (1971), pp. 34-35.

<sup>310</sup> McKeown and Brown, "Medical evidence ..." (1955); McKeown, "Medicine and world population" (1965). These writers based their conclusion not so much on positive findings as on the lack of evidence to the contrary.

<sup>311</sup> Engels, *The Condition of the Working Class in England* ... (1887); Hammond and Hammond, *The Rise of Modern Industry* (1937); Dobb, *Studies in the Development of Capitalism* (1947, 1963 ed.), pp. 272 ff.; Hobsbawm, "The British standard of living ..." (1957); Hobsbawm and Hartwell, "The standard of living during the Industrial Revolution ..." (1963).

<sup>312</sup> Ashton, "The standard of life of workers in England ..." (1949); Hartwell, "The rising standard of living ..." (1961); Hobsbawm and Hartwell, "The standard of living during the Industrial Revolution ..." (1963).

<sup>313</sup> Helleiner, "The vital revolution reconsidered" (1957); Tucker, "English pre-industrial population trends" (1963). See also section B of this chapter and chapter V, section G. For a critical review of this hypothesis in the case of England, see Habakkuk, "The economic history of modern Britain" (1958) and his *Population Growth and Economic Development* ... (1971), pp. 30-34.

<sup>314</sup> Deane, *The First Industrial Revolution* (1965), p. 252; Deane and Cole, *British Economic Growth* ... (1962).

still a subject of discussion, it is generally recognized that the new population trends which manifested themselves at about the same time as, but did not necessarily coincide with, the beginnings of the Industrial Revolution, were closely linked to this process of economic and social transformation. Population growth has come to be regarded as an integral part of these processes, even though general interpretations of the underlying interrelations between population and economic growth find only limited support.<sup>315</sup> Thus the hypothesis that industrialization and the Industrial Revolution by themselves directly caused the population increase is not generally accepted, nor is the view that population growth was the dominant factor in bringing about the complex of changes known as the Industrial Revolution.<sup>316</sup> Population and economic growth, it has been argued, were bound by an intricate mutual relationship: without the growth of output in the eighteenth century, population growth, as it occurred, could not have continued, but also without the increased population, which never reached levels high enough to jeopardize economic growth, the Industrial Revolution in England would have been retarded.<sup>317</sup>

#### (b) *The experience of the other countries of early development*

145. The available statistical data for the pre-industrial period in the countries of early development as well as indirect evidence suggest that during many centuries prior to the beginnings of the modern phase of economic growth, levels of living and population growth were mutually interdependent. According to many authors, cyclical fluctuations in population growth were characteristic for this period as the number of people expanded until it started to press on resources and then was reduced by famines, epidemics or wars.<sup>318</sup> However, differences

<sup>315</sup> Ashton, *The Industrial Revolution* ... (1948), pp. 2-3, argued that the outstanding feature of the social history of that time was the rapid growth of population; Eversley, "Population, economy and society" (1965); Cole and Deane, "The growth of national incomes" (1965); Deane, *The First Industrial Revolution* (1965), pp. 32-33.

<sup>316</sup> Court, *A Concise Economic History of Britain* ... (1954), p. 9; Habakkuk, "The economic history of modern Britain" (1958); and his "Population problems ..." (1963); Eversley, "Population, economy and society" (1965).

<sup>317</sup> Deane, *The First Industrial Revolution* (1965), pp. 33-35; Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 33-34; Habakkuk, "The economic history of modern Britain" (1958) and his *Population Growth and Economic Development* ... (1971), pp. 46-48; Chambers, "Industrialization as a factor ..." (1960); Wrigley, *Population and History* (1969), pp. 145 ff. On the fact that population growth in England during this period was comparatively low, making progress possible, despite a modest rate of economic growth, see Spengler, "Capital requirements and population growth ..." (1956).

<sup>318</sup> Sauvy, *L'Europe et sa population* (1953), pp. 17-18, and his *Malthus et les deux Marx* ... (1963), p. 29; Habakkuk, "Population problems ..." (1963) and his *Population Growth and Economic Development* ... (1971), pp. 10-24; Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 28-29; Deane, *The First Industrial Revolution* (1965), p. 21; Eversley, "Population, economy and society" (1965). Some historians, however, have questioned the validity of this essentially Malthusian scheme. On the lack of a direct relation between harvests and population pressure and mortality see, for instance, Habakkuk, "The economic history of modern Britain" (1958); Utterström, "Some population problems ..." (1954), and in more general terms Wrigley, *Population and History* (1969), pp. 63-64.

in the levels of economic achievement with respect to the rest of the world emerged at an early stage in a number of European countries and areas of European overseas settlement.

146. Following its start in England, the Industrial Revolution spread to western and northern Europe, the countries of European overseas settlement and, more recently, the Soviet Union, southern and eastern Europe and Japan. The process of rapid industrialization is estimated to have reached France and Belgium by 1850 and to have started in the United States at that time. It spread during the second half of the nineteenth century to Germany, the remainder of western and northern Europe and towards the end of the century to Canada, Russia, Argentina and possibly Japan.<sup>319</sup> Since embarking on the process of economic growth, the rates of increases of income in these countries were very high, according to Kuznets. In the older European countries total production increased at rates which implied coefficients of multiplication of 6 to 24 times in a century; in the overseas areas of settlement this coefficient ranged from 22 to 34; and in Japan he estimated that it was over 50.<sup>320</sup> For most of these countries reliable population data for the eighteenth century are scarce, but according to the estimates cited earlier in this chapter<sup>321</sup> population growth in the more developed regions from 1800 on was higher than in the preceding century and continued so during the rest of the nineteenth century. Many authors have drawn attention to this association between the accelerated increase of population and the rapid economic growth which was found in the majority of the presently more developed countries.<sup>322</sup> Nevertheless, it has also been noted that population trends in these countries varied considerably and that the association between population and economic growth was much less clear in the case of a number of individual countries. Whereas in most countries population growth was high, in historical perspective, in some, such as France, population increased relatively slowly, while in others, such as the United States, the increase was exceptionally rapid.<sup>323</sup>

147. While the existence of an over-all positive association between population and economic growth has come to be generally accepted, it has, as in the case of England, given rise to a considerable amount of speculation on the nature of the relationship between population and

economic growth during the early phases of development. In general, as noted before in this chapter, it has been argued that the main cause of the speeding-up of population growth was the fall in mortality caused primarily by improved economic and social conditions.<sup>324</sup> In more general terms the character of the relationships appears, however, to be less determined. Although the point of view that demographic growth was the main factor in economic growth during the periods of industrial revolutions has found little acceptance, the contention that population growth was a stimulating and, according to some, even a necessary condition for the rapid growth of output is still widely held. Population growth, it is argued, promoted economic growth in a number of ways: it created expanding markets and the opportunities for economies of scale; it provided the necessary labour force which made possible the large increase in production; and it favoured, since labour was plentiful, the accumulation of capital and subsequent development. Conversely, the view is often found that population growth during this period was conditioned by economic growth and development. Some authors emphasize in this connexion the progress in agriculture which, by increasing the production of food, permitted the population, which in earlier times was held back by subsistence crises, to increase rapidly. Others stress the process of industrialization with its increased demand for labour, higher wages and changes in the social structure—such as, for instance, those favouring earlier marriages—as having induced higher population growth.<sup>325</sup> Population growth and economic growth, it has been said, interacted upon each other so that population increase during this period was sustained.<sup>326</sup>

## 2. THE RELEVANCE OF PAST ECONOMIC AND POPULATION TRENDS FOR THE PRESENTLY LESS DEVELOPED COUNTRIES

148. Sustained economic growth and new patterns of demographic trends are a recent phenomenon for the majority of the developing countries. Even so, some of the most advanced among these nations may have experienced significant economic and demographic changes since as early as the late nineteenth or early twentieth century, and few, if any, of the others remained unaffected by the growth of the world economy. Nevertheless, under the prevailing conditions only very limited benefits accrued to these nations as a result of their often marginal involvement in the world economy and the relations with the more developed countries, which failed completely as a direct and immediate propellant for economic growth. The purpose of this subsection is to consider to what extent the present conditions and situation in the less developed countries, especially with respect to demographic and related factors,

<sup>319</sup> These tentative "take-off" estimates are given by Rostow, *The Stages of Economic Growth* ... (1960), table 1, p. 38. See also Cipolla, *The Economic History of World Population* (1962), p. 24; Seth, *Theory and Practice* ... (1967), p. 7.

<sup>320</sup> Kuznets, *Economic Growth of Nations* ... (1971), table 2, p. 24. See also Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 214-215, for data on economic growth in selected countries.

<sup>321</sup> See section B, table XIV.1.

<sup>322</sup> See section B of this chapter. See also Habakkuk, "The historical experience ..." (1955); Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 224; Reinhard and Armengaud, *Histoire générale de la population mondiale* (1961), p. 151; Bairoch, *Révolution industrielle et sous-développement* (1963), p. 29; Eversley, "Population, economy and society" (1965); Deane, *The First Industrial Revolution* (1965), p. 2.

<sup>323</sup> Habakkuk, "The historical experience ..." (1955); Buchanan and Ellis, *Approaches to Economic Development* (1955), p. 224; Eversley, "Population, economy and society" (1965).

<sup>324</sup> See section B of this chapter.

<sup>325</sup> Robinson, "Economic consequences of a decline in the population ..." (1951); Fromont, *Démographie économique* ... (1947), p. 121; Habakkuk, "Population problems ..." (1963) and his *Population Growth and Economic Development* ... (1971), pp. 47-48; Bairoch, *Révolution industrielle et sous-développement* (1963), pp. 26-27, 36; Kuznets, *Modern Economic Growth* ... (1966), p. 57; Eversley, "Population, economy and society" (1965).

<sup>326</sup> Habakkuk, *Population Growth and Economic Development* ... (1971), p. 48.

affect their capacity for development in comparison with the past in the presently more developed countries.

149. That conditions faced by the developing countries now differ greatly from those typical of the presently developed countries at the time they embarked on the process of modern economic growth has been generally recognized. There exists also a certain, though less than unanimous, conviction that in sum these differences make the outlook for development of the economically less advanced countries comparatively less promising. This is thought to be partly due to the more favourable position with respect to the underlying causes of economic growth in the presently more developed countries at the time they started to develop. Many of them had gone through a period of change and progress which extended over a number of centuries. As the outcome of political, social, cultural and geographical revolutions, they had already experienced some economic growth, were by contemporary standards comparatively advanced, had developed their economic organization to a fairly high degree and had created a substantial infrastructure at the start of their industrial revolutions.<sup>327</sup>

150. These factors found their expression in, among others, relatively high levels of *per capita* income in these countries. Differences in income have existed since early times, but during certain periods the countries of early development of western and northern Europe probably were considerably behind China, Italy, the Near East and the Far East in this respect.<sup>328</sup> At the time of the Industrial Revolution, however, the income per head in England and some European countries was probably considerably higher than in the rest of the world and most developing countries at present.<sup>329</sup> Kuznets, citing rough estimates made by Clark, noted that whereas the United Kingdom (excluding Northern Ireland), the United States and Sweden at the time of their take-off had in *per capita* terms an income equivalent to well above 300 international units, the corresponding figure was less than 140 for China in 1935 and around 240 for India in the 1940s.<sup>330</sup> In a later study he found that *per capita* income in the presently more developed countries at the beginning of their modern economic growth was, in all cases, with the notable exception of Japan, over 200 dollars (in 1965 prices) and in many instances substantially above that level.<sup>331</sup> Deane speculated that income per head in England and in some European countries in the eighteenth century

was closer to the levels of Argentina and Chile in recent times than to present day southern Asia or Africa.<sup>332</sup>

151. A number of underlying economic factors are thought to have facilitated and contributed as noted to the higher levels of income and their subsequent growth in the presently more developed countries. It has been asserted that at the beginnings of modern economic growth these countries were already economically more diversified than the developing countries at present. There existed a fairly well-developed exchange economy, the urban population represented probably a higher proportion than in the now developing countries and important differences existed with respect to the industrial structure of the labour force.<sup>333</sup> According to Kuznets, pre-modern agriculture may have accounted for around 65 per cent of the labour force and in some cases this figure was as low as 50 per cent in the developed countries as compared with 70 per cent and over in many developing countries.<sup>334</sup> Comparing the industrial structure of the labour force in nineteen developing countries in a recent period with that of Great Britain in 1831, Deane found that only five of the nineteen matched the share for all non-agricultural activities of the latter in 1831 and only one matched the proportion of the British labour force in mining, manufacturing and construction at the time.<sup>335</sup> The countries of early development were also in a more favourable position with respect to capital formation and productivity. Not only did higher levels of income make it easier to reserve a larger proportion for capital formation,<sup>336</sup> but, in addition, accumulation was rapid because wages could be kept down as contrasted to the situation in the presently developing countries, where capital formation at the cost of the worker's levels of living is in many instances considered socially unacceptable.<sup>337</sup> Finally, although even in absolute terms capital formation was low, economic progress could be comparatively rapid because existing techniques then, as opposed to at present, required only limited resources.<sup>338</sup> Because of its crucial role in economic development, special attention has been given to the role of technology. It is generally thought that, in principle, the developing countries can obtain great benefits from the large stock of knowledge and experience in technological and social inventions and innovations developed in the economically more advanced countries.<sup>339</sup> However, various authors have noted that,

<sup>332</sup> Deane, *The First Industrial Revolution* (1965), pp. 7-10.

<sup>333</sup> *Ibid.*, pp. 14-16.

<sup>334</sup> Kuznets, *Modern Economic Growth* ... (1966), pp. 110-111, and his *Economic Growth of Nations* ... (1971), pp. 249, 254-255.

<sup>335</sup> Deane, "The industrial revolution and economic growth ..." (1957).

<sup>336</sup> Higgins, *Economic Development* ... (1959), p. 243.

<sup>337</sup> Baltra, *Crecimiento económico de América Latina* (1961), pp. 19-25.

<sup>338</sup> Habakkuk, "The historical experience ..." (1955); Cairncross, *Factors in Economic Development* (1962), p. 46.

<sup>339</sup> Kuznets, "Present under-developed countries ..." (1960); Higgins, *Economic Development* ... (1959), p. 246; Davis, "Population and the further spread ..." (1950) noted, for instance, that since borrowing is easier than invention, those presently developed countries which started to industrialize later, such as the United States, Australia and Japan, made the transition much more rapidly than the countries of early development in northern and western Europe.

<sup>327</sup> Kuznets, "Under-developed countries ..." (1955); Habakkuk, "The historical experience ..." (1955); Higgins, *Economic Development* ... (1959), pp. 249-261; Ardant, *Le monde en friche* (1959), pp. 15-29; Cole and Deane, "The growth of national incomes" (1965).

<sup>328</sup> Kuznets, "Under-developed countries ..." (1955).

<sup>329</sup> *Ibid.* See also Kuznets, "Population, income and capital" (1955) and his "Quantitative aspects of the economic growth of nations. I. ..." (1956); Higgins, *Economic Development* ... (1959), pp. 242-243; Cole and Deane, "The growth of national income" (1965); Deane, *The First Industrial Revolution* (1965), pp. 6-7, 10; Easterlin, "Effects of population growth ..." (1967); Spengler, "Demographic factors ..." (1968).

<sup>330</sup> Kuznets, "Population, income and capital" (1955).

<sup>331</sup> Kuznets, *Economic Growth of Nations* ... (1971), table 2, p. 24.

apart from such problems as the lack of entrepreneurship and labour force skill and the limited import capacity for capital goods, the adoption by the developing countries of modern technology originating in the more developed ones is not without problems. Directed towards the need of the economically more advanced economies, modern techniques frequently are labour-saving and capital-intensive and thus not suited to the existing state with respect to factor proportions in the less developed countries.<sup>340</sup>

152. Among the factors which distinguish development in the past from that occurring now are the demographic and population characteristics. Demographic differences with respect to population size and density, population growth and its components are considered to have considerable implications for economic growth. Compared to the developing countries at present, the developed countries had in their pre-industrial stage relatively small populations: none of the developed countries, it has been noted, had a population much over 30 million at the beginning of their rapid economic development.<sup>341</sup> Not only was the population in the presently developed countries relatively small but their density was on the whole considerably lower than in many of the now developing countries, making for more favourable ratios of population to agricultural land and natural resources.<sup>342</sup> The significantly less favourable relation of population to agricultural and natural resources in the countries now in the process of development, especially in Asia, is thought to be reflected in the over-all density figure which is estimated to be three or more times higher in Asia than in most Western European countries at the beginning of modern economic growth.<sup>343</sup> Lower densities in the latter countries not only facilitated the agricultural revolution but also contributed to the sustained increase in agricultural production prior to that, thus creating the necessary conditions for the industrial revolution. Moreover, where land was scarce or where population began to press on resources, these countries had the frontiers of the New World and other areas of European settlement, which the less developed countries are now lacking.<sup>344</sup> Poverty in natural resources, it has been noted, is not an absolute obstacle to economic development, but in many developing countries, it is asserted, scarcity of natural resources not only affects the factor endowments adversely but may, in addition, create additional problems for capital accumulation.<sup>345</sup>

<sup>340</sup> Kuznets, "Present under-developed countries ..." (1960); Higgins, *Economic Development* ... (1959), pp. 247-249.

<sup>341</sup> Kuznets, "Under-developed countries ..." (1955); Higgins, *Economic Development* ... (1959), pp. 241-242.

<sup>342</sup> Kuznets, "Under-developed countries ..." (1955) and his "Present under-developed countries ..." (1960); Habakkuk, "The historical experience ..." (1955), and his *Population Growth and Economic Development* ... (1971), pp. 81-82; Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 123-124; Gill, *Economic Development* ... (1967), p. 87.

<sup>343</sup> Hoselitz, "Population pressure ..." (1958); Bairoch, *Révolution industrielle et sous-développement* (1963), p. 141.

<sup>344</sup> Higgins, *Economic Development* ... (1959), pp. 243-244.

<sup>345</sup> Spengler, "Capital requirements and population growth ..." (1956); Viner, "Stability and progress ..." (1958); Higgins, *Economic Development* ... (1959), pp. 257-258.

153. The fundamental demographic factor distinguishing the presently developed countries at the time of the beginnings of their modern economic growth from the countries now embarking on the process of development is the growth of population. The presently advanced countries, as has been noted, experienced their most rapid increase of population well after their take-off on to economic growth, and even then the rate of increase was relatively modest, except for the countries of overseas settlement. In contrast, in the presently developing countries the growth of population in recent decades has reached levels unprecedented in earlier history and much above those of Europe during the eighteenth or nineteenth century. Many writers agree that the higher population growth in the developing countries seriously affects their development outlook compared with that of the presently developed countries in the past.<sup>346</sup> Bairoch attributed the failure of the economically less advanced countries to develop their agriculture in part to the acceleration of population growth and the consequent pressure upon resources.<sup>347</sup> Spengler noted with respect to capital formation that although savings in pre-industrial England were low, *per capita* income increased because population increased also at a low rate, making possible, as other writers have noted, a "deepening" of capital.<sup>348</sup>

154. The differences in population growth reflect the widely divergent levels and trends of both fertility and mortality, as well as, for a number of countries, emigration. While the crude birth rate of the developing countries as a whole is still of the order of 40 per thousand population and even though rates as high as these were found during certain periods in the countries of overseas settlement, fertility in the countries of western and northern Europe was at the eve of the Industrial Revolution probably already considerably lower than that, being of the order of some 30 to 35 per thousand population.<sup>349</sup> Part of these differences, it is argued, reflect the difference in marriage patterns in Europe as compared with other regions as, in the former, economic considerations and social and institutional factors tended to raise the age of marriage and lower the proportion ever married.<sup>350</sup>

<sup>346</sup> Kuznets, "Under-developed countries ..." (1955); Higgins, *Economic Development* ... (1959), p. 242; Youngson, *Possibilities of Economic Progress* (1959), pp. 287-288; Enke, *Economics for Development* (1963), p. 429; Bairoch, *Révolution industrielle et sous-développement* (1963), p. 140; Habakkuk, "Population problems ..." (1963), and his *Population Growth and Economic Development* ... (1971), p. 87; Thompson and Lewis, *Population Problems* (1965), p. 445; Gill, *Economic Development* ... (1964), p. 87.

<sup>347</sup> Bairoch, *Révolution industrielle et sous-développement* (1963), p. 140. See also Higgins, *Economic Development* ... (1959), pp. 315-318.

<sup>348</sup> Spengler, "Capital requirements and population growth ..." (1956). See also Habakkuk "The historical experience ..." (1955); Youngson, *Possibilities of Economic Progress* (1959), pp. 287-288.

<sup>349</sup> Kuznets, "Under-developed countries ..." (1955), and his "Present under-developed countries ..." (1960). Davis, "The world demographic transition" (1945); Sauvy, *De Malthus à Mao Tsé-toung* ... (1958), pp. 69-70; Borrie, *The Growth and Control* ... (1970), pp. 9, 61-62. See also chapter IV, section A.

<sup>350</sup> Hajnal, "European marriage patterns ..." (1965); Krause, "Some neglected factors ..." (1959); Glass, "Fertility and population growth" (1966); Habakkuk, "Population problems ..." (1963), and his *Population Growth and Economic Development* ... (1971), pp. 10-12.

Despite the differences in crude birth rates and fertility, the major factor which accounts for the population growth differentials for the two groups of countries at comparative stages of development is mortality. Improvements in mortality conditions in the presently more developed countries proceeded, as has been noted before, at a very slow pace until well into the second half of the nineteenth century and for most of that period were linked to economic and social progress. In contrast, in the countries actually in the process of development, large gains in longevity became possible and were effected through the application of modern techniques in the fields of medicine and public sanitation.<sup>351</sup> In the absence of the opportunities for emigration on a sufficient scale, which existed in the case of the European countries,<sup>352</sup> the high and stable levels of fertility and the rapidly declining mortality imply that the developing countries have to face levels of population growth far in excess of those typical for most presently developed countries at the beginning of the period of modern economic growth.

155. The predominant view is that the differences, both demographic and non-demographic, setting apart the groups of more developed and less developed countries in their early stages of economic growth affect adversely the potential for development in the presently less developed countries. Nevertheless, it has also been noted that the historical experience of the presently developed nations is not necessarily a guide for the now developing countries. It is unlikely, it is asserted, that these countries will develop along the same historical lines as those of the countries of Europe and Northern America. New patterns of development may in fact already be emerging and rapid economic growth and development may be attained at a much earlier stage than was the case in the past.<sup>353</sup> It has also been argued, partly on the basis of the past experience of the presently developed countries and partly on the basis of recent tendencies in the developing countries, that present or future patterns of demographic change do not necessarily conform to those observed in the past. In this context, it has been asserted in particular that changes in mortality and fertility trends are found to be closely associated and that declines in the former in the developing countries may very well be followed by rapid decreases in fertility and in population growth rates to moderate or low levels.<sup>354</sup>

#### **E. Over-all view and some tentative conclusions**

156. As in the case of other aspects of the interrelations between population and economic growth and development, considerable progress has been made in recent

<sup>351</sup> On the greater ease of introducing new medical techniques than new economic ones in developing countries see Kuznets, "Present under-developed countries ..." (1960); Sauvy, *De Malthus à Mao Tsé-toung* ... (1958), p. 138.

<sup>352</sup> Kuznets, "Under-developed countries ..." (1955); Habakkuk, "Population problems ..." (1963); Enke, *Economics for Development* (1963), p. 429.

<sup>353</sup> Myrdal, *Beyond the Welfare State* ... (1960), pp. 102-103; Seth, *Theory and Practice* ... (1967), pp. 6-7; Deane, "The industrial revolution and economic growth ..." (1957).

<sup>354</sup> See Olin, "A note on historical birth ..." (1964); also Kirk, "A new demographic transition?" (1971).

years towards understanding the relationships between population and economic trends during the modern period. Even so, the empirical and comparative study of the interrelations between population and economic growth at the international level remains one of the least explored areas in the field of demographic-economic interrelations. Part of the explanation for this deficiency lies in the scarcity of adequate data. Another factor is the complexity of the issues involved, which severely limit the scope and conclusions of such studies. Nevertheless, within these limitations, studies of the type described may contribute significantly to a better insight into the demographic-economic interrelations and, ultimately, to a more satisfactory basis for policy decisions.

157. The outstanding characteristic of the historical and recent trends in the relations between population and economic growth is their variability. Over-all trends in population and the growth of income during the greater part of modern history suggest the existence of a broad positive association between the two, as population tended to grow faster in that group of countries which also experienced more rapid economic progress. However, recent trends suggest the reversal of this association: over the last three or four decades, population has been growing more rapidly, and at levels unprecedented in earlier history, in the group of economically less advanced countries, where levels and growth rates of income are well below those of the more developed countries. The variety in this respect is even more pronounced in the case of individual countries; throughout modern history high and low rates of population growth have been found to have been associated variously with both high and low rates of economic growth.

158. The lack of a systematic and universal relation between the growth of population and that of income may be in part explained by the different patterns of demographic evolution, as reflected in fertility and mortality trends, at different times and in different areas. Although it is generally held that the process of modernization involves a demographic transition from high to low or moderate birth and death rates, the speed and timing of mortality and fertility change have varied greatly under different conditions. In broad terms it may be said that the demographic transition in the group of presently developed countries was associated in a general, but unspecified, way with the process of economic and social development. However, the experience of individual countries in this group did differ substantially and put into doubt the existence of a generally valid relationship between fertility and mortality trends, on the one hand, and economic and social development, on the other. Recent experience in the developing countries has further undermined the assumption of a consistent relationship between the components of population growth and development. In these countries mortality has been declining at a very rapid rate not as a result of economic growth and social advancement, but as a consequence of the introduction and spread of measures in the field of public health, sanitation and medicine. Thus the over-all, although tenuous, association which in the past linked the demographic evolution and growth trends to economic and social development no longer exists, and rapid

population growth, below the limits where its magnitude would cause a subsistence crisis, has become to a large extent independent of the rate of economic progress.

159. The period of modern economic growth has also seen, as part of the process of economic development, a rapid evolution in the industrial structure of the labour force and the urban-rural distribution of the population. Economic growth in the presently developed countries was accompanied by a structural shift in the labour force from agriculture to non-agricultural sectors and a shift from rural to urban residence. Structural change and, especially, urban growth, which on the whole had been relatively slow in most of the developing countries in the past, started to accelerate in recent decades; their rate of economic growth also speeded up. Although these over-all trends tend to confirm the existence of a general interdependence between development, industrialization and urbanization, the experience of different groups of countries and individual countries has varied considerably. Especially with respect to recent trends in the less developed countries, it has been argued by some that there is an imbalance between the pace of economic growth, on the one hand, and the changes in the industrial and rural-urban distribution of the labour force, on the other. Some other findings suggest, however, that patterns of industrialization and urbanization may vary considerably between different stages of development and that the observed trends are a reflection of this fact.

160. In considering the development outlook of the economically less advanced countries, considerable attention has been given to the different situation and conditions faced by these countries from those which characterized the presently developed countries at the time when they were embarking on the process of modern economic growth. In the presently industrialized countries the basis for subsequent development was laid over many centuries, resulting in relatively high levels of income, an already relatively well diversified economy and other characteristics conducive to economic growth. Conditions are very different in the developing countries, many of which have only recently attained political independence. Apart from economic factors, the demographic characteristics of the presently developed countries at the time of their take-off were also unlike those encountered in the countries now in the process of development. For instance, the ratio between population and resources, especially if the countries of overseas settlement are considered, was then much more favourable in the presently developed countries than it is in the developing countries today. More important, however, is the fact that population growth in the developed countries reached its highest level only well after development started and even then the growth rates, on the whole, were moderate. In sharp contrast, in many developing countries more rapid economic growth in recent decades was accompanied by an upsurge in population growth, and rates of population increase reached levels unknown in the developed countries in the past.

161. The fundamental issue, which has dominated the discussion of the relationship between population and economic growth during the post-war period, is the effect of demographic trends in the developing countries on

economic growth. By means of analytical studies and projections, it has been shown that rapid population growth and the characteristics associated with it, especially the "young" age distribution, place a heavy burden on the economy and its resources. A rapid increase in numbers implies an accelerated expansion of virtually all needs, including consumption, education, health, housing and other facilities, only to maintain existing conditions of living. The satisfaction of these needs would absorb resources which under alternative conditions would have been available for increasing levels of living. At the same time, there is little reason to assume, as has been illustrated in a number of models, that rapid population growth would increase the productive capacity of the economy enough to compensate for the faster increase of population. The faster growth of the labour force, associated with rapid population growth, is likely, according to these models, to lead to a less than proportionate increase in production as its positive effects are counteracted by the increasing pressure of a growing and larger population on other, scarce resources. Under the *ceteris paribus* assumptions of most demographic-economic models, growth of income would be faster the slower the growth of population.

162. The review of recent trends in population and economic growth in the developing countries confirms in part these conclusions, but in other respects suggests somewhat different findings. Although inferences based on comparisons of growth trends in population and income are affected by the quality and availability of data, which in many instances are subject to a considerable and unknown margin of error, subject to these qualifications, some tentative conclusions regarding the relation between population and economic growth appear to be possible. Data on the growth of total product or income and population in the developing countries suggest, in the first place, that the high rates of growth of population characteristic of these countries have not prevented economic growth. Rates of growth of *per capita* product in these countries indicate, in fact, that, in an historical perspective, economic growth in the post-war period for the developing countries as a whole was rapid. In addition, the results suggest that the interrelation between the growth of income and that of population was not as close as is often assumed. No association was found to exist between the growth of total product in the less developed countries as a whole and the growth of total product in the more developed countries, despite the large differences in population growth rates between these two groups of countries. Likewise, within the group of developing countries both the growth of total and *per capita* product were apparently unrelated to population growth. This does not mean, however, that high population growth in the less developed countries did not affect their economic growth. Data on levels of population growth according to levels of *per capita* income showed that population growth, on the average, was considerably more rapid in those countries where levels of income were lower. In order for these less developed countries at least to keep pace with the more developed ones, their total product would have to increase much faster than that of the more developed countries. This, as noted, did not



happen and a comparison between growth of *per capita* product and population growth revealed that the increase in levels of *per capita* income in the group of low-income, less developed countries remained significantly behind that of the more developed countries. Higher population growth in the less developed countries was thus associated with a deterioration of levels of living in these countries relative to the more developed countries, with a consequent widening in the income-gap as well, given their more rapid population growth with a relative increase of poverty, since low-income countries represent an increasing proportion of the world's total population.

163. The lack of a clear-cut association between the growth of population and that of income has led several writers to speculate that, in comparison with other factors and determinants of economic growth, the effects of population growth are not so predominant as to

manifest themselves clearly under different conditions. This does not imply, it is asserted, that population variables are not important, but that the relations between population and economic growth are part of a whole complex of interrelations and interactions, which suggest that under different configurations of factors and conditions, the impact on economic factors may vary. Comparisons of trends in countries with widely differing conditions, such as present themselves between the more developed and less developed countries and also within the latter group, fail to reveal a significant statistical association between population and economic growth. What results there are suggest, however, that rapid population growth, while not having prevented the growth of income in less developed countries, has held back the increase of levels of income and, probably, the whole process of development in these countries to a considerable degree.



## Chapter XV

### DEMOGRAPHIC PROJECTIONS

1. In the political and social ferment in the wake of the Second World War, the emergence of new independent nations, the drive for the development of economically under-developed countries and the rebuilding of economies devastated by that war have combined to stimulate national planning and development on an unparalleled scale. This has stimulated a corresponding demand by national governments and planning agencies for all types of demographic projections—including projections of population totals, subgroups by area, age, economic activity, rural or urban residence, agricultural or non-agricultural classification, educational level, and projections of households and families.<sup>1</sup>

2. Apart from planning purposes, demographic projections are needed for a clearer understanding of demographic phenomena. The projections provide quantitative measures of the potentialities of the present demographic situation and of the demographic processes which are under way and those which are foreseen in the light of present experience.<sup>2</sup> Since the projections are prepared on the basis of assumed trends in the components of population growth, the results present the net outcome of the interactions among these trends. For instance, given certain fertility and mortality assumptions, the projection technique makes it possible to determine the effect of different sex-age structures on the numbers of births and deaths and hence on the growth of the population. Similarly, projections provide a means of studying the effects of changes in birth and death rates on the age structure, dependency ratios etc. Because of this essential role in demographic analysis, projections and demography are now almost inseparable.<sup>3</sup>

3. In addition to the “realistic” projections, which represent assessments of future demographic change, there are also “benchmark projections” and “analytical projections”. Benchmark projections are designed to illustrate the demographic consequences of certain events which are admittedly not expected to happen during the

period covered by the projections. One example is the “constant fertility” variant of the United Nations projections used to study what would happen to the population of countries, regions and the world if fertility remained at its initial level. The purpose is to draw attention to the consequences of the currently high levels of fertility in many countries. Other examples are projections which assume a constant rate of growth. Analytical projections are used to study the influence of changes in the components of growth on the structure of the population, regardless of the extent to which these changes are related to reality.<sup>4</sup>

4. This chapter is concerned with the realistic projections which are most commonly needed for planning, as well as for understanding possible demographic changes in the future. The distinction between these projections and demographic predictions or forecasts is now generally recognized, although it has not always been so. This distinction was expressed clearly in 1943 by Thompson and Whelpton when they said “It is to be emphasized that they are not predictions of future population size, nor are they to be assumed to indicate the probable sex and age structure. They are, strictly speaking, merely statements of what the size and the sex, age, color, and nativity composition of the population would be at specified future times if birth rates, death rates, and immigration were to follow certain specified trends.”<sup>5</sup> Even if one assumes that the available demographic statistics are perfect, demographers cannot predict with certainty the future size of the population of any given area, country or region, particularly for a period beyond the immediate few years ahead, since it is impossible to foretell precisely future developments that will affect the net balance of the numbers of births, deaths and migrants;<sup>6</sup> this is particularly so for the future number of births, which is generally the most variable and least predictable. The best that a demographer can do is to project the size and sex-age composition of a population on the basis of certain assumed levels for each of the

<sup>1</sup> A partial bibliography compiled by the United Nations of principal studies related to projections published from about 1950 to the end of 1964 lists approximately 380 items, which suggests the intensification of the work in demographic projections. See bibliography contained in United Nations, *General Principles for National Programmes . . .* (1965). However, this is far from a complete inventory of the actual amount of work bearing on population projections that was done during those fifteen years.

<sup>2</sup> “The consequences of these phenomena and processes, their future effect, are considerably more important” than their past trends. Rosset, “On the cognitive value of demographic forecasts” (1968), p. 278. See also Jeanneney, *Economie politique* (1959), p. 40.

<sup>3</sup> Sauvy, *La population, ses lois, ses équilibres* (1944), p. 3.

<sup>4</sup> The literature includes many examples where projections showing the effect of the persistence of certain unfavourable demographic conditions have stimulated counteraction. For the role played by the projections in changing the unfavourable demographic conditions of the 1930s in France and Great Britain, see respectively, Sauvy, *L'Europe et sa population* (1953), p. 67, and Grebenik, “The development of demography in Great Britain” (1959), p. 194.

<sup>5</sup> Thompson and Whelpton, *Estimates of Future Population of the United States, 1940-2000* (1943), pp. 3-4.

<sup>6</sup> For a discussion of the distinction between projections and forecasts, see Grauman, “Population estimates and projections” (1959); and Siegel, “Technological change and long-run forecasting” (1953), p. 146.

components of its growth; and such predictive relevance as the projections may have rests primarily on the degree of correspondence between assumptions built into the projections and the trends as they actually develop.

5. Therefore, although this is not universal, it is generally felt that the projections should be prepared in several variants. A one-variant projection is narrow in the sense that it takes into account only one of the many possible directions of change. Different variants, on the other hand, give a picture of the possibilities, and provide a range which it is hoped will encompass actual events. There is no rule, however, concerning the number of variants, since this number depends on the length of the projection period, the degree of possible variability in the components of growth, and the reliability of the base data. The provision of additional variants used to be a time- and effort-consuming process, but with the availability of electronic computers, this difficulty no longer exists.

6. While there is no dispute over the necessity of presenting the assumptions together with the projections, there is difference of opinion concerning whether relative degrees of likelihood should be assigned to the different projections. Thus, on the one hand, the variants are sometimes distinguished by letters A, B, C etc., with no recommendation concerning the order of plausibility since, in the opinion of the authors, this would violate the "projections" nature of the results and turn them into forecasts.<sup>7</sup> On the other hand, the United Nations presents three variants which are designated as "medium", "high" and "low". "The 'medium' estimates are intended to represent the future population trend that now appears most plausible in view of what is known of past experience and present circumstances . . . . The 'high' and 'low' variants are intended to represent upper and lower boundaries of a zone of greatest plausibility . . . . It must be emphasized, though, that future trends outside the limits of the 'high' and 'low' variants are by no means impossible."<sup>8</sup>

7. For the population projections to be of practical use in drawing up plans and in taking action, selection has to be made from among the variants; and since in many cases the user of the results is not a demographer, he will want the selection to be made for him by a competent person. The demographers who prepared the projections in national institutions or international organizations are often in a situation where it is necessary for them to "recommend" one of the variants which they have prepared. Such a recommendation is not considered to violate the "projections" nature of the figures by turning them into forecasts or predictions,<sup>9</sup> in so far as the

<sup>7</sup> United States, Bureau of the Census, "Projections of the population of the United States, by age, sex, and color to 1990 . . ." (1967).

<sup>8</sup> United Nations, *World Population Prospects as Assessed in 1963* (1966), p. 6.

<sup>9</sup> This view was challenged by Dorn: "Predictions, estimates, projections, forecasts; the fine academic distinction among these terms is lost upon the user of demographic statistics. So long as numbers which purport to be possible future populations are published they will be regarded as forecasts or predictions irrespective of what they are called by the demographers who prepare them." Dorn, "Pitfalls in population forecasts and projections" (1950), p. 326.

assumptions are given along with the projections and other variants are also provided so that the users can select another projection to replace the recommended one if they find it more appropriate to do so.

8. Built-in provision for future revisions is another essential requirement of good demographic projections.<sup>10</sup> The results are thus viewed as a system of successive approximations to a picture of the demographic situation in the future in the light of new, more accurate or more detailed data giving better information on the present and the past, indicating changing or emerging demographic trends.

9. In a general sense the material presented in every chapter of this study has relevance to the projection of population. The future changes in the size, composition and geographic distribution of population depends first of all, as a sheer matter of arithmetic, on trends in births, deaths and migration. These trends, in their turn, depend on the influence of changing economic, social, demographic and other circumstances, constituting the subject-matter of several chapters. Future population changes themselves, as has been variously observed, will modify many of these circumstances with the possibility of additional, secondary, effects on the population trends which, if important, may also have to be taken into account in the projections.

10. Specifically, this chapter is devoted mainly to a brief review of the evolution of demographic projections in historical perspective, the major recent efforts towards developing projections for the world to the year 2000, and the broad implications of the projected trends for economic and social development programmes. In addition to projections of total population and its sex-age structure, projections of the economically active population, urban and rural population, agricultural and non-agricultural population, and projections of population by some educational characteristics, and of households and families are also considered.

11. Since the focus of this chapter is on demographic projections on a world-wide and regional basis, much of the work discussed is inevitably that done by the United Nations and the specialized agencies where such work is largely centred. A comprehensive review and discussion of the work on demographic and related projections done in the different countries at national and subnational levels is, of course, not possible within the scope of a single chapter. It should be recognized, however, that the greatest significance and use of the results of projections is at the country level.

#### A. Demographic projections in historical perspective

12. The predominant problem of demographic projections has been and remains that of forming, on the basis of observations already made, assumptions concerning the future trends of change. As can be seen from the history, the formulation of these assumptions has often been influenced by two factors: the availability of data and prevailing population theories.

<sup>10</sup> United Nations, *General Principles for National Programmes . . .* (1965).

13. In a situation where no data on births, deaths or migrants were available, it is not surprising that the early projections dealt only with total population, and used very simple methods. Thus in the very early population projections for England, made by Gregory King towards the end of the seventeenth century, the argument on which the assumptions were based was along these lines: the population of the Kingdom had doubled in the previous 435 years, probably the next doubling would take place in 600 years, but then the next doubling in all probability would take place after another 1,200 or 1,300 years.<sup>11</sup> Actually in the pioneer days of the seventeenth and eighteenth centuries, extrapolation on the basis of the speed of doubling was the most common form of projection. In addition to King, Petty, Graunt and Benjamin Franklin all used this approach.<sup>12</sup>

14. Malthusian theory, which implies a geometric rate of growth of population (see chapter III), provided a means of estimating future population. Malthus himself calculated projections aimed at illustrating his theory and presented them as follows: "Let us call the population of this island eleven million, and suppose the present produce equal to the easy support of such a number. In the first twenty-five years the population would be twenty-two million, and the food being also doubled, the means of subsistence would be equal to the increase. In the next twenty-five years, the population would be forty-four million, and the means of subsistence only equal to the support of thirty-three million . . ." <sup>13</sup> It is to be noted, though, that Malthus was of the opinion that "no estimates of future population or depopulation, formed from any existing rate of increase or decrease, can be depended upon".<sup>14</sup> He attributed unsuccessful predictions mainly to the irregularity of epidemics, sickly seasons, famines and the associated changes in the number of births.<sup>15</sup>

15. The complete and regular censuses which began in the eighteenth and nineteenth centuries in some countries were necessary before the early guesses as to the future population could be replaced by more serious estimates. Enumerated population totals then provided a basis for extrapolation by means of mathematical formulas which express total population as a function of time, without taking any special account of fertility, mortality, migration or age distribution. The forecasts prepared during the early years of the nineteenth century assumed an indefinite increase in population at a geometric rate.<sup>16</sup> By the middle of the century, however, the

belief that population could continue to increase according to the Malthusian Law was being questioned, and projections based on a decrease in the rate of growth were prepared.<sup>17</sup> Later on, by the turn of the century, some persons trained in the more rigorous disciplines of mathematics began to offer mathematical alternatives to the Malthusian formula. Pritchett restated the general law of population growth as one that involves a constantly decreasing rate, and suggested a third degree polynomial in time as a means of estimation.<sup>18</sup> Bowley used least-square fittings of second and third degree parabolas.<sup>19</sup> It was shown by Wolfenden that the populations of the Canadian provinces could be estimated closely by such methods.<sup>20</sup> Pearl and Reed obtained improved results by adding a logarithmic component to the second degree parabola.<sup>21</sup> Bowley, moreover, obtained a close approximation of the population of England and Wales from 1801 to 1911 by means of the integral of what was then termed "the normal error function".<sup>22</sup> It was realized, however, that "there is no necessary relation between the goodness of fit of a curve to past observations and its reliability for forecasting purposes. A curve may fit the data for the past one hundred years with a high degree of accuracy, and yet fail to predict the situation for the next year or so."<sup>23</sup>

16. Curve fitting methods of this kind are generally satisfactory only for short-range predictions because they usually fail to allow sufficiently for the eventual slowing of growth rates. Several analytical expressions have thus been suggested which would permit the rates of growth to approach limiting values. These include Gompertz's,<sup>24</sup> Makeham's,<sup>25</sup> and several functions discussed by Knibbs.<sup>26</sup> The most famous of these curves is the logistic, which has two different types of theoretical foundation. Thus in Verhulst's development in 1838,<sup>27</sup> the logistic resulted from a physical concept of population growth, namely that the obstacles to population expansion increase in proportion to the ratio of the superabundant

<sup>11</sup> King, "Natural and political observations . . ." (1696; 1936 ed.), particularly pp. 24-27. King gives projections for the total population of the Kingdom at the turn of each century up to the year 2300 and of London up to the year 3000.

<sup>12</sup> See Glass, "Demographic prediction" (1968). Glass states that "there was a link here with attempts to justify the chronology of the Old Testament and to confirm that the world could have been repopulated by the descendants of the survivors of the Flood". *Ibid.*, p. 123.

<sup>13</sup> Malthus, *Principles of Population* (1798; 1958 ed.), p. 10.

<sup>14</sup> *Ibid.*, p. 311.

<sup>15</sup> Malthus, *Principles of Population* (1798; 1958 ed.), pp. 304-311.

<sup>16</sup> Dorn, "Pitfalls in population forecasts and projections" (1950), p. 315.

<sup>17</sup> One example is the projections prepared by Francis Bonyngne in his 1852 article on the future wealth of America, mentioned in *ibid.*, pp. 315-316.

<sup>18</sup> Pritchett, "A formula for predicting the population . . ." (1891).

<sup>19</sup> Bowley, "Discussion on Dr. Stevenson's paper" (1925), pp. 77-79.

<sup>20</sup> Wolfenden, "Written discussion" (1934), pp. 289-290.

<sup>21</sup> Pearl and Reed, "On the rate of growth of the population of the U.S. since 1790 . . ." (1920), pp. 276-280.

<sup>22</sup> Bowley, "Discussion on Dr. Stevenson's paper" (1925), pp. 77-79.

<sup>23</sup> Schultz, "The standard error of a forecast . . ." (1930), p. 56.

<sup>24</sup>  $kg^t$

<sup>25</sup>  $A + BC^t$ .

<sup>26</sup> These include  $n^{k+mt+nt^2}$ ,  $at^p + bt^q + ct^r + \dots$ , and  $At^me^{nt^p}$ . See Knibbs, "The mathematical theory of population . . ." (1917), pp. 26, 42 and 53.

<sup>27</sup> Verhulst, "Notice sur la loi que la population suit dans son accroissement" (1838); his "Recherches mathématiques sur la loi d'accroissement . . ." (1845); and his "Deuxième mémoire sur la loi d'accroissement de la population" (1847).

population to the total population.<sup>28</sup> On the other hand, the Pearl-Reed development in 1920 was conceived in biological rather than physical terms, assuming, as their experiments on the fruit-fly *Drosophila* showed, that populations tend to reach an upper limit beyond which they do not pass.<sup>29</sup> The logistic provided a tool for population projections whose nature was in harmony with national ideas about the broad pattern of population growth and which has the theoretical merit of describing diverse types of growth phenomena. The curve was then widely used in making projections of total population.<sup>30</sup> Pearl and Reed also showed that component logistics may be assumed in order to represent successive cycles of growth,<sup>31</sup> and adaptations of the logistic were widely used.<sup>32</sup> The utilization of the logistic in projections of human populations was criticized, however, as being too mechanistic and not allowing for voluntary control over fertility and the influence of social and economic factors on the components of growth.<sup>33</sup>

17. There has also been discussion of the standard error of the ensuing estimates, and it was shown that this error increased with time.<sup>34</sup> It was observed early in the 1950s that the population of several countries, particularly France, Italy, Japan, Norway and Sweden were already very near the ultimate levels predicted for them from the logistic fitted by Pearl and Reed in the early 1920s.<sup>35</sup>

18. Transition theory (see chapter III) also provided a basis for some population projections. Among numerous projections which have been calculated in relation to this framework of thought are those prepared by the United Nations in 1951, where the world was divided into three groups corresponding to the phases of transition, and the assumptions concerning future trends in the crude birth and death rates were made accordingly.<sup>36</sup> These phases

<sup>28</sup> Applying this formula to the population of France, Verhulst obtained the ultimate maximum of about 40 million. He commented on the enormous size of this figure, referring to the calamities which must necessarily be caused by such rapid increase of population. See his "Recherches mathématiques sur la loi d'accroissement..." (1845), pp. 37-38.

<sup>29</sup> Pearl and Reed, "On the rate of growth of the population of the U.S. since 1790..." (1920), pp. 280-288.

<sup>30</sup> See, for example, Pearl and Reed, "The growth of human population" (1924); Pearl, Reed and Kish, "The logistic curve and the census count of 1940" (1940); Paes Moraes, "Sobre o acerto duma logística à população portuguesa" (1945); Deneffe, *Die Berechnungen...* (1938).

<sup>31</sup> Pearl and Reed, "On the mathematical theory of population growth" (1923).

<sup>32</sup> See, for instance, Plessing, "Om den logistiske kurve og dens anvendelse..." (1962); Muhsam, "A note on migration and Verhulst's logistic curve" (1939); Rhodes, "A population growth curve for England and Wales" (1938); Vianelli, "Evoluzione economica e demografica negli schemi..." (1935); and his "A general dynamic demographic scheme and its application..." (1936).

<sup>33</sup> Thompson and Whelpton, "The population of the nation" (1934), p. 46; Wilson and Puffer, "Least squares and laws of population growth" (1933); Dor, "Analyse des phénomènes logistiques à l'aide..." (1948); and Grauman, "Population estimates and projections" (1959), pp. 550-551.

<sup>34</sup> Hotelling, "Differential equations subject to error..." (1927), p. 41; and Schultz, "The standard error of a forecast..." (1930).

<sup>35</sup> Myers, "Comparison of population projections with actual data" (1955), pp. 104-106.

<sup>36</sup> United Nations, "The past and future growth of world population..." (1951).

of transition are of course generally taken into account in formulating the assumptions concerning future fertility and mortality trends. This has been the case with all the projections of the United Nations ever since the projections of Europe and the USSR were prepared for the League of Nations.<sup>37</sup>

19. Another serious drawback in the use of a growth curve to represent the trend of total population is that the procedure completely disregards the structure of the population, particularly by sex and age, and the influence of this structure on the growth of the population. Undoubtedly the lack of data has been a reason for this neglect. As comparable data from censuses and vital registration became increasingly available in the 1920s and 1930s, the component method of projection came into use. Special mention should be made, however, of the earlier contributions of Farr and Cannan to this approach. Farr in 1873 used a component basis to project a population backwards into the eighteenth century.<sup>38</sup> Cannan in 1895 used a procedure which is essentially the component method to prepare projections for England and Wales and to show that the results are substantially different from those obtained by using a constant rate of growth.<sup>39</sup> The method was applied by Bowley in 1924-1926<sup>40</sup> and by Whelpton since 1928.<sup>41</sup>

20. Systematic attention was paid to demographic projections only with the development of the component approach. In fact, interest in projections by this method has exerted a unifying force in demography, since the method involves a joint application of knowledge concerning trends in the components of change, namely fertility, mortality and migration. The method naturally gives more insight into the way in which population changes and yields valuable results in the form of future estimates of birth and death rates, dependency ratios etc.

21. In simple terms, the method consists in applying assumptions concerning future trends in fertility, mortality and migration to the sex-age structure of the population in the base period of the projection. Each sex-age group is carried forward in time by means of assumed probabilities of survival; the births which are added to the population during the projection period are estimated by applying projected age-specific fertility rates to the projected numbers of females in the reproductive ages; and the estimated numbers of births are carried forward in time by means of projected probabilities of survival. The resulting sex-age structure in any future year is then adjusted by adding or subtracting the assumed numbers

<sup>37</sup> Notestein *et al.*, *The Future Population of Europe and the Soviet Union* (1944), chap. 1 and appendix 1.

<sup>38</sup> United Kingdom, Census Office, *Census of England and Wales, 1871* (1873), pp. xiii-xiv and 54-56 and Glass, "Demographic prediction" (1968), p. 124.

<sup>39</sup> Cannan, "The probability of a cessation of the growth..." (1895).

<sup>40</sup> Bowley, "Births and population in Great Britain" (1924); and his "Estimates of the working population of certain countries in 1931 and 1941" (1926).

<sup>41</sup> Whelpton, "Population of the United States, 1925 to 1975" (1928); and his "An empirical method of calculating future population" (1936).

of future migrants in each sex-age group.<sup>42</sup> Until recently the method was applied only to populations with sufficiently accurate vital registration and censuses, but the development of demographic techniques has made it possible to estimate the basic sex-age structure—and/or the initial levels of fertility and mortality for countries lacking good statistics—from a series of models, thus widening the scope of the use of the component method. The most recent projections prepared by the United Nations, namely those made in 1968, use this approach for many developing countries. The component method has recently been developed further into a simulation of human behaviour, that is, a procedure whereby a probability of marrying, giving birth, migrating, and dying within a given interval in the future is estimated for each member of the population.<sup>43</sup>

## B. Regional and world projections

### 1. DEVELOPMENT OF COUNTRY PROJECTIONS

22. In the late 1920s, projections of total population by sex and age began to flourish. These projections were closely related to the cultural, economic and political settings of the different countries. Thus, in the West, there was much interest in projections since it was realized that the continued decline of the birth rate would make an eventual decline in total population inevitable unless the trend was reversed. In the countries of Eastern and Southern Europe, on the other hand, increasing awareness of the pressure of rapidly increasing populations on limited agricultural and industrial resources stimulated a demand for projections of future population trends. Finally, several countries began a race for demographic armament for a war that all feared would come.<sup>44</sup> Fundamental roles in this upsurge of work on projections were played by Whelpton<sup>45</sup> and Sauvy.<sup>46</sup>

23. The simplest form of component projections assumed the continuation of the most recent probabilities of survival, and an annual number of births equal to

that of the base year.<sup>47</sup> A more common type of component projection held constant specific patterns of both fertility and mortality as of a certain date, frequently that of the base year.<sup>48</sup> Many of the projections based on such assumptions constituted only one variant (a benchmark projection) in a series of projections, the remainder of which involved assessments of possible future trends in mortality and fertility.

24. So far as mortality assumptions were concerned, the most recent life table of the country, or of some other country with similar circumstances, was used in many of the projections. Others assumed certain declines in mortality. Attempts to project the rate of decline observed in the recent past also have been made. Gini and Finetti<sup>49</sup> made one estimate for Italy in which they extrapolated the trends of various age groups with the mortality of New Zealand as the ultimate goal. Glass carried out a detailed analysis in which he used the generation method for the extrapolation of mortality rates.<sup>50</sup> In general, estimates of future fertility were either based on certain assumed ratios of decline in the age-specific fertility rates or on the extrapolation of past rates of change by various methods. Before the mid 1930s, few projections assumed a rise in fertility; a common assumption was that fertility would fall until a definite date after which it would remain stationary. Some of the early projections were based on estimates of trends in the number of marriages and the average number of children per marriage,<sup>51</sup> and some made assumptions concerning trends in the proportion married.<sup>52</sup> The problem of making reasonable estimates of future migration was so nearly insoluble in the pre-war period that most component projections ignored it completely. Where estimates were made they usually assumed a fixed number of migrants annually.

25. Many of the projections mentioned above were prepared in three or more variants, thus giving probable lower, middle and upper estimates. Thompson and

<sup>42</sup> A description of this method is given in United Nations, *Manual III: Methods for Population Projections by Sex and Age* (1956).

<sup>43</sup> Orcutt et al., eds., *Micro-Analysis of Socio-Economic Systems* ... (1961); Rivlin, "The use of computer simulation ..." (1963); Mackensen, "Regional computer projections by demographic types ..." (1967); Hyrenius, *New Techniques for Studying Demographic-Economic-Social Interrelations* (1965); Hyrenius, Adolfsen and Holmberg, *Demographic Models, Second Report (DM 2)* (1966); Hyrenius, Holmberg and Carlsson, *Demographic Models, DM 3* (1967); and Holmberg, *Demographic Models, DM 4* (1968).

<sup>44</sup> Taeuber, "The development of population predictions in Europe and the Americas" (1944).

<sup>45</sup> Whelpton, "Population of the United States, 1925 to 1975" (1928); and his "The future growth of the population of the United States" (1932); projections in Thompson and Whelpton, "The population of the nation" (1934), pp. 48-49; and Whelpton's projections in United States, National Resources Committee, *The Problems of a Changing Population* ... (1938).

<sup>46</sup> Sauvy, "La population française jusqu'en 1956 ..." (1928-1929); his "Calculs démographiques sur la population française jusqu'en 1980" (1932); and his "Perspectives statistiques sur la population, l'enseignement ..." (1937).

<sup>47</sup> See Jensen, "Horoscope of the population of Denmark" (1931); Germany, Statistisches Reichsamt, "Richtlinien zur Beurteilung des Bevölkerungsproblems Deutschlands ..." (1926); —, "Ausblick auf die zukünftige Bevölkerungsentwicklung ..." (1930).

<sup>48</sup> Among the numerous examples, mention can be made of the work of Ptoukha, "La population de l'Ukraine jusqu'en 1960" (1931); Gini, "Calcolo di previsione della popolazione italiana ..." (1931); Gini and Finetti, "Calcoli sullo sviluppo futuro ..." (1931); Charles, *The Effect of Present Trends in Fertility and Mortality* ... (1935); Glass, "The population problem and the future" (1937); and his "Estimates of future populations of various countries" (1943-1944); Norway, Statistiske Centralbyrå, *Folkemengdens bevegelse, 1921-1932* (1935), pp. 194-195; Wicksell and Quensel, "Prognoser över Sveriges folkmängd ..." (1938).

<sup>49</sup> Gini and Finetti, "Calcoli sullo sviluppo futuro ..." (1931).

<sup>50</sup> Glass, "The population problem and the future" (1937).

<sup>51</sup> Kahn, "Zur Erkenntnis der Bevölkerungsbewegung ..." (1931); and his *Der internationale Geburtenstreik, Umfang, Ursachen* ... (1930); Baudhuin, "L'avenir de la population belge" (1931); Creft, *Etude sur l'évolution des charges* ... (1937).

<sup>52</sup> Due to the late average age at marriage and the high proportions remaining unmarried, Wicksell and Quensel, "Prognoser över Sveriges folkmängd ..." (1938), made four alternative estimates for the Population Commission of Sweden to illustrate what would happen if population policies could be initiated that would result in decreasing the age of marriage and increasing the proportion married.

Whelpton<sup>53</sup> in 1934 presented twelve different sets of estimates for the United States, using various combinations of high, medium and low fertility and mortality with and without migration. As mentioned earlier, this multivariant feature has become very common in recent years.

26. Formidable problems faced technicians who wished to construct realistic projections by the component method once that method had matured. They involved assumptions as to the frequency and magnitude of essentially unpredictable events as well as affirmations of faith concerning the nature of the political, social and economic life of the future. The *a priori* assumption that future populations would develop as orderly extensions of the trends of interwar years became increasingly questionable,<sup>54</sup> particularly since there were new attitudes towards the number and spacing of children, age at marriage and tendency to marry,<sup>55</sup> and with the gradual realization that a fertility decline from the high levels experienced in developing countries can be expedited by family planning programmes. Demographers working in the field of projections also had to face the serious problem of the inadequacy and inaccuracy of the basic demographic statistics for the majority of the world's population. In spite of the hazards and the growing skepticism as to the possibility of accurate predictions—which reflects a growing maturity of demography—interest in demographic projections continued to increase due mainly to two factors: the need for projections in planning and the gradual progress achieved in research in the various fields of demography—particularly fertility analysis—which made possible the application of new approaches and the consideration of trends in more of the factors which influence fertility than was possible in the pre-war years.<sup>56</sup>

## 2. DEVELOPMENT OF REGIONAL AND WORLD PROJECTIONS

27. Projections are often prepared or assembled in comparable form for regions or groupings of countries. A set of population projections for the individual countries of Europe and the USSR, prepared for the League of Nations, represented the first comprehensive activity of an international organization in this area.<sup>57</sup> Later,

<sup>53</sup> Thompson and Whelpton, *Estimates of Future Population by States* (1934).

<sup>54</sup> Taeuber, "Literature on future populations 1943-1948" (1949), p. 2.

<sup>55</sup> The projections prepared for the British Royal Commission on Population dealt separately with the spread of childbearing by marriage duration, and the assumptions included changes in respect of each of the components. See United Kingdom, Royal Commission on Population, "Population projections for Great Britain 1947-2047" (1950), pp. 240-303.

<sup>56</sup> The following works contain bibliographies on population projections by sex and age: Glass, *Population Policies and Movements in Europe* ... (1940), pp. 468-472; Notestein *et al.*, *The Future Population of Europe and the Soviet Union* (1944), pp. 219-234; Taeuber, "Literature on future populations 1943-1948" (1949); United Nations, *General Principles for National Programmes* ... (1965), pp. 31-60.

<sup>57</sup> Notestein *et al.*, *The Future Population of Europe and the Soviet Union* (1944).

in the 1950s, the United Nations prepared a series of regional projections.<sup>58</sup> Other important contributions have been made by the Organisation for Economic Co-operation and Development,<sup>59</sup> the Institut national de la statistique et des études économiques (France),<sup>60</sup> and the United Nations Latin American Demographic Centre (CELADE).<sup>61</sup>

28. A number of estimates of future population of the world have been made by demographers. Pearl's logistic projection, prepared in 1936, implied a declining rate of growth which would result in a maximum of 2,645 million by the end of the twenty-first century.<sup>62</sup> Notestein in 1945 obtained a total of 3,300 million for the year 2000 by summing projections for the major areas.<sup>63</sup> This result suffered not only from inadequate data for large parts of the world, but also from an underestimation of the extent of mortality decline in the developing countries, and from a lack of anticipation of the reversal of the downward fertility trend in developed countries. A slightly greater rate of population increase was assumed by Clark in 1949; projecting the growth of world population at one per cent per annum, he estimated a total of 3,480 million people by 1990.<sup>64</sup> More recently Boyarsky, by dividing the world's population into twelve socio-economic groups and using the concept of a "hypothetical stationary population" to project the total population of each group, arrived at an estimated total population for the world in the year 2000 between 4,200 million and 5,000 million.<sup>65</sup> Another estimate of 4,500 million in the year 2000 was provided in 1966 by Bogue who assumed that the population growth rate of each region in the world was already declining in 1965 and would reach zero at the end of the century.<sup>66</sup>

29. The most intensive and systematic work on world and regional population projections has been carried forward since the 1950s by the United Nations, in collaboration in more recent years with various of its regional offices. The first set of world population projections prepared by the United Nations was published in 1951<sup>67</sup>

<sup>58</sup> United Nations, *The Population of Central America* ... (1954); ———, *The Population of South America, 1950-1980* (1955); ———, *The Population of South-East Asia* ... (1958); and ———, *The Population of Asia and the Far East, 1950-1980* (1960). See also Ducoff, *Human Resources of Central America* ... (1960).

<sup>59</sup> See, for instance, Organisation for Economic Co-operation and Development, *Demographic Trends 1965-1980* ... (1966).

<sup>60</sup> France, Institut national de la statistique et des études économiques, Service de Coopération, *Perspectives de population dans les pays africains* ... (1963).

<sup>61</sup> See, for instance, Centro Latinoamericano de Demografía, *Boletín Demográfico*, vol. 1 (1968).

<sup>62</sup> Pearl and Gould, "World population growth" (1936), p. 419.

<sup>63</sup> Notestein, "Population—the long view" (1945). See also in this connexion his comments in his "The population of the world in the year 2000" (1950).

<sup>64</sup> Clark, "The world's capacity to feed and clothe itself" (1949), p. 75.

<sup>65</sup> Boyarsky, "A contribution to the problem of the world population ..." (1967).

<sup>66</sup> Bogue as mentioned in Macura, "The long-range outlook ..." (1968), p. 20.

<sup>67</sup> United Nations, "The past and future growth of world population ..." (1951).



and covered the period 1950-1980. This set was prepared by projecting in three variants the birth and death rates (and hence the rates of growth) for three subdivisions of the world: regions with low fertility and mortality, regions where mortality had declined substantially and fertility in a lesser degree, and those where both fertility and mortality were high. This work was successively revised and extended with the advent of more adequate data and improved methodology. The second set of projections, prepared in 1954, had a similar approach.<sup>68</sup> In the 1958 revision, the component method was used and applied to regional models of age structure to derive regional projections by age for the period 1950-2000, in three variants. Medium variant country projections up to 1975 were then derived numerically from the regional totals.<sup>69</sup> Much more elaborate procedures were used in the fourth and fifth revisions, namely those undertaken in 1963<sup>70</sup> and 1968 respectively.<sup>71</sup>

30. In the 1963 revision, the world was divided into twenty-four geographical regions grouped into more developed and less developed areas on the basis of their demographic characteristics. For each of these twenty-four regions, the projections up to the year 2000 were prepared by the component method on the basis of the 1960 sex-age distribution. For this purpose, the United Nations model life tables were used in estimating the number of survivors, projected sex-age-adjusted birth rates were used to estimate the number of births, and in the regions where international migration was still sizable, an adjustment was made for this factor in the total population. In addition to the low, medium and high variants, a "continued fertility level" variant was calculated; this level could serve as a benchmark, indicating the implications of the absence of a fertility decline and also as a means of assessing approximately the extent to which each of the other variants is influenced by the assumed fertility declines. Projections of the total population for each country to the year 1980 were also provided in one variant.

31. The 1968 revision was carried out on a country-by-country basis. It was therefore necessary to evaluate and adjust the available data for many countries, and in some cases it was necessary to use a model sex-age structure. The revised projections also had the following main characteristics: (a) they were prepared for the developing countries in four variants: medium, high, low and constant fertility, and in one variant only for the developed countries; (b) they provided distributions by sex and five-year age groups; the results also were interpolated to derive estimates by single years of age between ages 5 and 24; (c) model life tables were used in projecting the numbers of survivors, and in estimating the numbers of births, age-specific fertility curves were used; (d) use was made of recent reliable national projections (available for most

of the developed countries and a few developing countries); (e) in addition to country projections for the period 1965-1985, regional and global projections were also prepared until the year 2000. The use of the electronic computer made it possible to produce the results in this detail, to calculate several implied measures such as birth and death rates, dependency ratios etc., and to produce the results in a form that would serve as a basis for preparing other projections, such as those for the economically active population, urban-rural population, agricultural and non-agricultural population, and the population enrolled in schools, and projections for households and families.

32. It can thus be seen that the United Nations projections have gone through a stage of marked uncertainty and much painstaking research.<sup>72</sup> For instance, the first three rounds, namely those of 1951, 1954 and 1958, gave as a "high" estimate of the world population for 1980 the figures 3,640, 3,990 and 4,280 million consecutively. The high variant of the 1958 revision was lower than the medium variants for 1980 as assessed in 1963 and 1968—4,330 and 4,460 respectively. Commenting on the various revisions, Macura observed that the gradual acquisition of new information and improvement in methods had usually resulted in higher estimates of future population.<sup>73</sup>

### 3. WORLD POPULATION PROSPECTS AS RECENTLY ASSESSED

33. The discussion below is based on the results of the United Nations projections to the end of the century prepared in 1968.<sup>74</sup> While the results of these projections are available in far greater detail than any other global projections, this is not to say, of course, that they are more accurate than others in the sense that they have a higher probability than others of being closer to reality in the future. It may be said, however, that Bogue's "fertility control approach which assumes that about 1965 the birth rate of all regions of the world was already declining at a faster rate than the death rate" is too optimistic.<sup>75</sup> It is also to be noted that Boyarsky's "social system and economic development" estimate for the world in the year 2000 is close to that of Bogue,<sup>76</sup> and therefore appears also to be too low.

34. The projections clearly illustrate the demographic implications of the unprecedented growth in world

<sup>72</sup> See in this regard Grauman, "Success and failure in population forecasts" (1967).

<sup>73</sup> Macura, "The long-range outlook ..." (1968).

<sup>74</sup> United Nations, *World Population Prospects as Assessed in 1968*, to be issued as a United Nations publication.

<sup>75</sup> See Durand, "Comments on Macura" (1968), pp. 43-45.

<sup>76</sup> Notestein argued that the fertility assumption for China in the United Nations 1963 projections is too low and that the rate of improvement in the projected level of mortality is too slow. In his opinion it would be more reasonable to postulate an annual growth rate for Mainland East Asia between 1960 and 2000 equal to South Asia's 2.3 per cent instead of the 1.2 per cent implicit in the medium variant of the United Nations projections. This would lead to an upward adjustment of 500 to 600 million in the projected figures for the year 2000 for Mainland East Asia, the less developed regions and the world. See Notestein, "Population growth and its control" (1969), pp. 14-15.

<sup>68</sup> United Nations, "Framework for future population estimates ..." (1955).

<sup>69</sup> United Nations, *The Future Growth of World Population* (1958).

<sup>70</sup> United Nations, *World Population Prospects as Assessed in 1963* (1966).

<sup>71</sup> United Nations, *World Population Prospects as Assessed in 1968*, to be issued as a United Nations publication.



TABLE XV.1. TOTAL POPULATION ESTIMATES AND ANNUAL RATES OF INCREASE FOR MAJOR AREAS  
AND REGIONS OF THE WORLD, 1965-2000  
(Medium variant)

Major areas and regions	Total population (thousands)					Average annual rate of increase (per cent)				
	1965	1970	1980	1990	2000	1965- 1970	1970- 1975	1980- 1985	1990- 1995	1995- 2000
World total .....	3,289,002	3,631,798	4,456,688	5,438,169	6,493,642	2.0	2.0	2.0	1.8	1.7
Developing regions .....	2,251,510	2,541,501	3,246,637	4,101,670	5,040,114	2.4	2.5	2.4	2.1	2.0
More developed regions ....	1,037,492	1,090,297	1,210,051	1,336,499	1,453,528	1.0	1.0	1.0	0.9	0.8
Africa .....	303,150	344,484	456,721	615,826	817,751	2.6	2.8	3.0	2.9	2.8
Western Africa .....	89,546	101,272	133,406	180,059	240,158	2.5	2.7	3.0	3.0	2.8
Eastern Africa .....	86,448	97,882	128,757	173,639	233,245	2.5	2.7	2.9	3.0	2.9
Middle Africa .....	32,318	35,893	45,785	60,449	80,214	2.1	2.4	2.7	2.9	2.8
Northern Africa .....	74,520	86,606	119,385	163,230	214,404	3.0	3.2	3.2	2.9	2.6
Southern Africa .....	20,318	22,832	29,387	38,450	49,730	2.3	2.5	2.7	2.6	2.5
Asia (excluding the USSR) ..	1,832,923	2,055,775	2,581,068	3,177,162	3,778,218	2.3	2.3	2.2	1.8	1.6
East Asia .....	851,877	929,932	1,095,354	1,265,343	1,424,377	1.8	1.7	1.5	1.2	1.1
Mainland region .....	700,076	765,386	901,351	1,042,864	1,176,176	1.8	1.7	1.5	1.3	1.1
Japan .....	97,950	103,499	116,347	125,330	132,760	1.1	1.2	0.8	0.6	0.6
Other East Asia .....	53,851	61,046	77,656	97,148	115,442	2.5	2.4	2.4	1.8	1.6
South Asia .....	981,046	1,125,843	1,485,714	1,911,819	2,353,841	2.8	2.8	2.6	2.2	2.0
Middle South Asia ....	664,868	761,809	1,001,046	1,279,761	1,564,963	2.7	2.8	2.5	2.1	1.9
South-East Asia .....	249,349	286,925	380,367	491,775	607,709	2.8	2.9	2.7	2.2	2.0
South-West Asia .....	66,829	77,109	104,302	140,283	181,169	2.9	3.0	3.1	2.7	2.4
Europe (excluding the USSR)	444,642	462,120	497,061	532,636	568,358	0.8	0.7	0.7	0.7	0.6
Western Europe .....	143,143	148,619	158,214	168,679	179,266	0.8	0.6	0.6	0.6	0.6
Southern Europe .....	122,750	128,466	140,059	151,605	162,674	0.9	0.9	0.8	0.7	0.7
Eastern Europe .....	100,060	104,082	112,392	119,607	127,277	0.8	0.8	0.7	0.7	0.6
Northern Europe .....	78,689	80,953	86,396	92,745	99,141	0.6	0.6	0.7	0.7	0.7
Latin America .....	245,884	283,253	377,172	499,771	652,337	2.8	2.9	2.8	2.7	2.6
Tropical South America ..	129,854	150,660	203,591	272,495	358,447	3.0	3.0	2.9	2.8	2.7
Middle America (mainland)	56,961	67,430	94,706	132,387	180,476	3.4	3.4	3.4	3.2	3.0
Temperate South America.	36,000	39,378	46,731	54,783	63,266	1.8	1.7	1.6	1.5	1.4
Caribbean .....	23,068	25,785	32,145	40,107	50,148	2.2	2.2	2.2	2.2	2.2
Northern America .....	214,329	227,572	260,651	299,133	333,435	1.2	1.3	1.5	1.1	1.0
Oceania .....	17,520	19,370	24,025	29,639	35,173	2.0	2.1	2.2	1.8	1.6
Australia and New Zealand	14,015	15,374	18,785	22,659	26,214	1.9	2.0	2.0	1.5	1.4
Melanesia .....	2,452	2,767	3,583	4,743	6,107	2.4	2.6	2.8	2.6	2.4
Polynesia and Micronesia .	1,053	1,229	1,657	2,237	2,853	3.1	3.1	3.1	2.6	2.3
USSR .....	230,556	242,612	270,634	302,011	329,508	1.0	1.0	1.2	0.9	0.8

SOURCE: United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

Note: The totals for the world, developing and more developed regions have been adjusted to take into account discrepancies between international immigration and emigration assumptions.

population brought about by reductions in mortality accompanied by little change in the high levels of fertility in most of the world's developing regions. Thus, the total world population, which was increasing at an average annual rate of only about 0.5 per cent throughout the nineteenth century, and 0.8 per cent in the first half of the twentieth century, was found to be suddenly increasing during the decade of the 1950s at the rate of 1.8 per cent per annum, in spite of declining rates of growth in the developed areas. The rate of growth of the world's population rose still higher during the 1960s and was estimated at about 2.0 per cent annually around 1970.

35. According to the medium variant, the total world population may continue to grow at a virtually constant rate of about 2.0 per cent annually until 1985. A downward trend would then start, ending with a value equal

to 1.7 per cent at the end of the century. In absolute numbers, the world population may increase from 3,300 million in 1965 to 3,600 million in 1970, 4,500 million in 1980, 5,400 million in 1990 and 6,500 million in 2000 (table XV.1). The population of the less developed regions is expected to increase during this period from 2,300 million in 1965 to 2,500 million in 1970, 3,300 million in 1980, 4,100 million in 1990 and 5,000 million in 2000.

36. Should the medium assumptions turn out to be true, the more developed regions, which had a total population of 1,037 million in 1965, would add 4 or 5 per cent to this total in each quinquennium. On the other hand, in the less developed regions, there would be a gain of about 13 per cent in each quinquennium up to 1985, and then a slight decrease to 10 per cent in the last quin-

quennium of the century. As a result of these differing growth rates, the population in the developing regions by the turn of the century is expected to be about three and a half times the projected figure for the developed regions in that year, while the ratio in 1965 was only a little over two to one (2.2 to 1).

37. Among the world's major areas, the largest addition to the population during the period under consideration is expected in South Asia, which now contains almost one third of the world's population. India, Indonesia and Pakistan are the main contributors to this total. India's population may increase from 487 million in 1965 to 1,084 million in 2000 (an increase of 123 per cent in 35 years). In the same years, Pakistan's population may increase by 187 per cent, from 116 to 334 million, and Indonesia's population by 143 per cent, from 105 million to 255 million. The area as a whole may consequently by the end of the century have an increase of 1,372 million persons. If the projections are correct, this would be one half of the total increase in all the developing countries combined, or 43 per cent of the increase in world population.

38. The next major area of importance with respect to additions of population numbers is East Asia where, although the pace of growth is expected to be moderate, the absolute increase will be very high. The bulk of the increment in this area's population is due to the expected growth of China's population, which is projected to increase from 700 million in 1965 to 1,176 million in 2000. Sizeable increases in total population are also expected in Latin America—from 246 million to 652 million—and in Africa—from 303 million to 818 million—during the same period.

39. The decade of the 1970s may be confronted with a higher rate of growth in world population than ever before experienced in the history of man, and one higher than is likely to be encountered again in the future. According to the medium projections, this growth rate will approximate 2.0 to 2.1 per cent annually during the decade. It will be 1.0 to 1.1 per cent annually in the developed regions, but 2.4 to 2.5 per cent in the less developed regions.

40. Among the major areas of the world, rates of growth are currently highest in Latin America and South Asia. Latin America is expected to maintain its very high rate of 2.8 to 2.9 per cent annually until about 1985—a result of its relatively low mortality compared to other developing areas. Then, as fertility decline becomes faster than mortality decline, the rate is expected to gradually decrease to 2.6 by the end of the century. In South Asia, where current high growth rates are mainly a reflection of very high fertility levels, a gradual decrease is expected, from 2.8 per cent around 1970 to 2.0 per cent around 2000. In contrast with the expected pattern of constant or declining growth rates in the other less developed regions, Africa is expected to show a rising growth rate trend during most of the period. The annual population growth rate in this major area, which was estimated at 2.6 per cent in 1965-1970, may rise to about 3.0 per cent by 1985, at which time the rate would be one of the highest in the world. It is only during the decade

of the 1990s that, according to the projections, the growth rate may decrease until it reaches 2.8.

41. In the major areas of the more developed regions of the world, annual population growth rates in the period 1965 to 1970 ranged from a low of 0.8 per cent in Europe to 2.0 per cent in Oceania, the latter rate being influenced by immigration into Australia and New Zealand, as well as by high fertility among the populations making up the remainder of this region. According to national projections of the developed countries, rates of population growth are shown to rise somewhat until about 1985 and then decline in North America, the Union of Soviet Socialist Republics, and in Australia and New Zealand; in Europe, on the other hand, the current rate is expected to continue declining slightly (table XV.1). The slight increases foreseen in the former areas will result for the most part from changes in population structure, as the only rise in fertility assumed is in the USSR.

42. Table XV.2 shows the vital rates implied in the medium projections for the world and its twenty-four regions. So far as the developed regions are concerned, little change is foreseen in either the crude birth rate or the crude death rate, the two rates remaining near 18-19 and 9 per 1,000, respectively. The slight increase in the implied birth rate from 18.6 in 1965-1970 to 19.5 in 1980-1985 is mainly due to changes in age structure favourable to higher crude birth rates. The slight increase shown in the crude death rate—from 9.1 to 9.6 per 1,000—is entirely due to the continued aging of the population, since further increases in expectation of life at birth are expected during this period (table XV.3).

43. Except for Eastern Europe, where a slight drop in gross reproduction rates was foreseen (table XV.3), fertility was expected to remain constant in the other regions of Europe until around 1985; the rise of one point in the crude birth rate of Northern Europe reflects changes likely to occur in the age structure of the population, rather than any expected increase in fertility. Increases of 2 to 3 points per 1,000 in crude birth rates appear in the projections for Northern America, the Union of Soviet Socialist Republics and Australia and New Zealand, but with the exception of the Union of Soviet Socialist Republics, where national projections are based on an assumed small increase in the gross reproduction rate, these trends arise from the changing age structure. Although expectation of life at birth in the Union of Soviet Socialist Republics is expected to rise from its present level of about 70 years to 72 years by 1980-1985, the increasing proportion of older persons in the population may bring the crude death rate up one point—from 8 to 9 per 1,000. Between 1985 and 2000, a slight fertility decline is generally assumed.

44. Tables XV.2 and XV.3 show that substantial increases in life expectancy and declines in the crude death rate are foreseen in all the less developed regions. On average in these regions, a gain of 15 years is assumed during the projection period in expectation of life at birth (from 50 to 65 years), while the crude death rate may decline from 16 to 8 per 1,000. All major areas are expected to share in these gains, although the pace of

TABLE XV.2. CRUDE BIRTH AND DEATH RATES FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-2000  
(Medium variant)

Major areas and regions	Crude birth rate					Crude death rate				
	1965-1970	1970-1975	1980-1985	1990-1995	1995-2000	1965-1970	1970-1975	1980-1985	1990-1995	1995-2000
World total	33.8	33.2	30.9	27.0	25.1	14.0	12.8	10.5	8.7	8.1
Developing regions	40.6	39.0	34.9	29.9	27.3	16.1	14.3	10.9	8.5	7.6
More developed regions	18.6	18.9	19.5	17.8	17.5	9.1	9.2	9.4	9.4	9.6
Africa	46.8	46.6	45.2	41.2	37.9	21.3	19.2	15.4	12.0	10.4
Western Africa	48.8	48.7	47.9	44.0	40.7	24.3	22.1	18.3	14.5	12.7
Eastern Africa	46.6	46.4	45.5	42.9	39.8	21.8	19.8	16.1	12.7	11.1
Middle Africa	45.3	45.8	45.7	43.6	40.8	24.3	22.2	18.4	14.8	13.0
Northern Africa	46.9	46.5	42.9	36.3	32.6	16.9	14.8	10.9	7.8	6.6
Southern Africa	40.7	40.4	39.7	36.9	34.3	17.4	15.8	13.0	10.5	9.3
Asia (excluding the USSR)										
East Asia	31.5	29.1	25.1	20.9	19.4	14.0	12.3	10.0	8.5	8.1
Mainland region	33.1	30.2	25.9	21.4	19.7	15.3	13.4	10.6	8.8	8.2
Japan	18.0	18.6	15.9	14.9	15.5	7.0	6.6	7.5	9.0	9.8
Other East Asia	34.7	32.5	30.1	23.6	21.7	9.7	8.4	6.6	5.5	5.4
South Asia	44.3	42.9	36.9	30.0	26.7	16.8	14.8	10.9	8.1	7.1
Middle South Asia	44.4	42.9	36.6	29.6	26.2	17.2	15.1	11.2	8.3	7.3
South-East Asia	44.2	42.6	36.9	30.1	26.7	16.1	14.1	10.4	7.7	6.8
South-West Asia	43.6	43.0	39.9	33.9	30.6	15.6	13.8	10.4	7.5	6.6
Europe (excluding the USSR)	18.0	17.9	17.9	17.2	16.9	10.2	10.3	10.6	10.3	10.5
Western Europe	17.5	17.1	17.4	16.8	16.4	11.0	11.1	11.3	10.5	10.8
Southern Europe	19.4	19.1	18.9	17.8	17.5	9.3	9.3	9.8	10.1	10.2
Eastern Europe	17.3	17.4	16.8	16.4	16.3	9.5	9.6	10.2	9.9	10.4
Northern Europe	17.6	18.0	18.6	17.7	17.5	11.1	11.1	11.0	10.8	10.7
Latin America	38.4	37.6	35.5	32.8	31.5	10.0	8.9	7.0	5.8	5.4
Tropical South America	39.8	38.9	36.3	33.3	32.0	10.0	8.8	6.8	5.4	5.1
Middle America (mainland)	43.7	42.7	40.2	37.0	34.6	10.1	8.7	6.6	5.0	4.6
Temperate South America	26.3	25.5	24.1	22.2	21.5	9.1	8.8	8.3	7.9	7.9
Caribbean	35.0	33.8	32.3	30.9	30.2	10.9	9.9	8.5	7.5	7.2
Northern America	19.3	20.3	22.1	19.0	18.3	9.5	9.4	9.2	8.9	8.8
Oceania	24.5	25.6	26.3	23.2	21.9	10.0	9.3	8.5	7.8	7.6
Australia and New Zealand	20.2	21.7	22.6	19.8	19.1	8.7	8.3	8.1	7.8	7.9
Melanesia	41.7	41.4	40.1	35.4	31.7	17.6	15.7	12.2	9.0	7.7
Polynesia and Micronesia	39.7	38.0	36.4	30.6	27.2	8.8	7.5	5.8	4.7	4.5
USSR	17.9	18.5	20.4	18.1	17.5	7.7	8.0	8.7	9.0	9.2

SOURCE: United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

improvement is expected to be somewhat slower in Latin America, where mortality was already at a relatively low level in the late 1960s. In that region, life expectancy at birth, which is estimated to have reached 60 years in the late 1960s, is expected to advance to about 71 years by the end of the century. The largest gains in life expectancy are expected to be registered in South Asia and East Asia, where mortality levels were still moderately high around 1970, and in Africa, where the highest levels of mortality prevail. In South Asia, life expectancy at birth may rise from 49 to 66 years during the projection period, in East Asia from 52 to 68 years, and in Africa from 43 to 59 years. According to these assumptions, only by the 1980s would Africa attain the mortality level existing in Asia in 1970.

45. Significant differences in probable fertility trends are also apparent among the major areas constituting the less developed regions. On the one hand, fertility—as measured by the gross reproduction rate—is likely

to remain relatively unchanged until about 1985 in the African region taken as a whole, as probable small declines in North Africa may be offset by opposing trends in parts of Middle Africa, where it is believed that improvements in public health may cause a rise in fertility. Fertility declines prior to 1985 have been assumed for only a few countries in sub-Saharan Africa which have adopted policies for population control. In contrast to the stability shown in the projected gross reproduction rates (table XV.3), the crude birth rate for Africa is shown to decline from 47 per 1,000 in 1965-1970 to 45 per 1,000 in 1980-1985 (table XV.2), but this trend would result from changes in age structure associated with declines in mortality. After 1985, some decline in fertility, which would reduce the gross reproduction rate from 3.1 to 2.5, is assumed for the remainder of the projection period. According to these assumptions, the birth rate of Africa would become 38 per 1,000 at the end of the century.

TABLE XV.3. GROSS REPRODUCTION RATES AND LIFE EXPECTANCIES AT BIRTH FOR MAJOR AREAS  
AND REGIONS OF THE WORLD, 1965-2000  
(Medium variant)

Major areas and regions	Gross reproduction rate					Life expectancy at birth (both sexes)				
	1965-1970	1970-1975	1980-1985	1990-1995	1995-2000	1965-1970	1970-1975	1980-1985	1990-1995	1995-2000
World total .....	2.3	2.2	2.0	1.7	1.6	53.1	55.5	60.4	64.6	66.5
Developing regions .....	2.7	2.6	2.3	1.9	1.7	49.6	52.4	58.0	63.0	65.3
More developed regions .....	1.3	1.3	1.3	1.2	1.2	70.4	71.2	72.2	72.9	73.2
Africa .....	3.1	3.1	3.1	2.8	2.5	43.3	45.9	51.2	56.1	58.5
Western Africa .....	3.2	3.2	3.2	3.0	2.7	39.2	41.8	46.8	51.8	54.3
Eastern Africa .....	3.1	3.1	3.1	2.9	2.7	42.3	44.9	50.0	54.9	57.5
Middle Africa .....	2.9	2.9	3.0	2.9	2.7	39.3	41.8	46.9	51.9	54.4
Northern Africa .....	3.2	3.2	3.0	2.5	2.1	49.8	52.8	58.8	64.4	66.9
Southern Africa .....	2.7	2.7	2.8	2.6	2.3	48.0	50.4	55.1	59.7	61.9
Asia (excluding the USSR) .....										
East Asia .....	2.0	1.8	1.5	1.3	1.2	52.2	55.2	60.8	65.9	68.2
Mainland region .....	2.1	1.9	1.6	1.3	1.2	50.1	53.1	59.1	64.8	67.3
Japan .....	1.0	1.0	1.1	1.1	1.1	70.9	72.9	74.1	74.1	74.1
Other East Asia .....	2.5	2.3	1.9	1.4	1.3	59.9	62.6	67.5	71.1	72.3
South Asia .....	3.0	3.0	2.5	1.9	1.6	48.8	51.8	57.8	63.3	65.8
Middle South Asia .....	3.0	3.0	2.5	1.9	1.6	48.3	51.3	57.2	62.8	65.4
South-East Asia .....	3.0	3.0	2.5	1.9	1.7	49.7	52.7	58.8	64.1	66.4
South-West Asia .....	3.1	3.1	2.8	2.3	2.0	51.4	54.3	59.9	65.1	67.3
Europe (excluding the USSR) .....	1.3	1.3	1.2	1.2	1.2	70.9	71.7	72.9	73.5	73.7
Western Europe .....	1.3	1.3	1.3	1.2	1.2	71.7	72.4	73.4	73.9	73.9
Southern Europe .....	1.3	1.3	1.3	1.2	1.2	69.8	70.7	71.8	72.7	73.1
Eastern Europe .....	1.2	1.1	1.1	1.2	1.2	70.6	71.6	73.1	73.9	73.9
Northern Europe .....	1.3	1.3	1.3	1.2	1.2	71.9	72.6	73.6	73.9	73.9
Latin America .....	2.7	2.6	2.4	2.2	2.0	60.2	62.5	66.7	69.9	71.1
Tropical South America .....	2.8	2.7	2.4	2.2	2.1	59.7	62.2	66.6	70.0	71.2
Middle America (mainland) .....	3.1	3.1	2.8	2.5	2.3	60.3	62.7	66.9	70.3	71.6
Temperate South America .....	1.8	1.7	1.6	1.4	1.4	64.6	66.2	68.9	70.8	71.6
Caribbean .....	2.4	2.3	2.1	2.0	2.0	58.5	60.2	63.6	66.4	67.5
Northern America .....	1.4	1.3	1.3	1.2	1.2	70.5	70.8	71.3	71.9	72.2
Oceania .....	1.7	1.7	1.7	1.5	1.4	64.8	66.2	68.6	70.5	71.3
Australia and New Zealand .....	1.4	1.4	1.4	1.3	1.3	71.8	72.1	72.8	73.6	73.7
Melanesia .....	2.9	2.9	2.8	2.4	2.1	47.3	50.3	56.3	62.1	64.8
Polynesia and Micronesia .....	2.9	2.6	2.4	2.0	1.8	61.4	63.9	68.2	71.3	72.3
USSR .....	1.2	1.2	1.3	1.3	1.3	70.3	70.9	72.0	73.0	73.5

SOURCE: United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

46. In Latin America a moderate decline in fertility is foreseen in the projections, bringing the gross reproduction rate for the region as a whole down from 2.7 to 2.0. The largest drop is expected in Tropical South America and Central America, while a smaller decline is likely in Temperate South America, where fertility is already rather low (table XV.3). In contrast to the moderate fertility declines assumed for Latin America, fairly sizable decreases are foreseen for South Asia and East Asia. In the former, the gross reproduction rate is assumed to fall from 3.0 at present to 1.6 in 1995-2000, and in the latter, from 2.1 to 1.2. The existence of family planning programmes in a number of countries, and the fact that fertility has already begun to decline in certain countries in these regions, have been factors in the assumptions of more rapid fertility decline. As shown in table XV.2, corresponding declines in the crude birth rate could be expected to accompany such changes in the gross reproduction rate.

47. Between now and 1985, the anticipated virtual equality of the declines in the death rate (from 16 per 1,000 in 1965-1970 to 11 per 1,000 in 1980-1985) and the birth rate (from 41 per 1,000 in 1965-1970 to 35 per 1,000 in 1980-1985) in the less developed regions would maintain a nearly constant rate of population growth of 2.4 to 2.5 per cent per annum throughout the period. After 1985, as the decline in the birth rate becomes faster, the projections imply that the rate of growth would gradually decrease to about 2.0 by the end of the century.

48. Not only changes in total population size, but also changes in the age structure of population have important implications for the planning of economic and social development. The striking contrast between the age structure of the population in the more developed and less developed regions is seen in table XV.4. Whereas children under 15 years of age constitute 28 per cent of total population in the developed regions, they make up 42 per cent of the total in the less developed parts of the

TABLE XV.4. PERCENTAGE AGE DISTRIBUTION OF THE POPULATION IN MAJOR AREAS OF THE WORLD,  
1965, 1985 AND 2000  
(Medium variant)

Major areas	1965			1985			2000		
	Under 15 years	15-64 years	65 years and over	Under 15 years	15-64 years	65 years and over	Under 15 years	15-64 years	65 years and over
World total .....	37.4	57.6	5.0	36.3	58.2	5.5	32.9	61.0	6.1
Developing regions .....	41.6	55.1	3.3	39.8	56.4	3.8	35.1	60.3	4.6
More developed regions .....	28.1	63.0	8.9	26.2	63.4	10.4	24.9	63.7	11.4
Africa .....	43.5	53.7	2.8	45.0	52.0	3.0	43.0	53.7	3.3
East Asia .....	36.9	59.0	4.1	31.7	63.0	5.3	27.0	66.0	7.0
South Asia .....	43.0	54.0	3.0	42.0	54.6	3.4	35.3	60.5	4.2
Europe (excluding the USSR) ....	25.4	64.1	10.5	24.9	63.3	11.8	24.1	63.4	12.5
Latin America .....	42.5	53.9	3.6	41.4	54.5	4.1	39.1	56.5	4.4
Northern America .....	31.0	59.8	9.2	28.6	61.6	9.8	26.4	64.2	9.4
Oceania .....	32.8	59.9	7.3	32.4	60.1	7.5	30.3	62.3	7.4
USSR .....	30.5	62.1	7.4	26.3	64.3	9.4	25.2	63.1	11.7

SOURCE: United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

world. The more industrialized countries have an economic advantage over the less developed countries in that 63 per cent of their population is of working age, while the comparable proportion for the less developed countries is only 55 per cent. Also distinctly different is the proportion of elderly persons (65 years of age and over) in the population—9 per cent in the developed countries and only 3 per cent in the developing countries.

49. According to the medium projections, not very much change is expected to take place in the age structure of either major group of regions between 1965 and 1985. In the less developed groups, the percentage of children may decline slightly—from 42 to 40 per cent, with a slight increase in each of the other broad age groups. Whereas assumed declines in fertility cause the proportion of children to decrease, falling mortality, which has its greatest effect at the young ages, tends to partially offset this trend.

50. Africa, which has the highest proportion of children and the lowest proportion in the working ages at present, is the only major developing area where the short range projected trend of structural change in population is unfavourable—in the sense that the proportion of children is likely to increase (from about 43.5 at the beginning of the period to 45 in 1985) and the proportion of the economically active population is likely to decrease (from 54 to 52). The largest structural change in this period is predicted for East Asia, where the proportion of children in the population will decline from 37 to 32 per cent, according to the projections. South Asia, despite a substantial decline in fertility, shows only a small drop in the proportion of children in the population—from 43 to 42 per cent.

51. As fertility declines faster, more sizable changes may take place between 1985 and the end of the century. The projections for the less developed countries as a whole imply that during this period the percentage of children may decrease from 40 to 35 and the percentage at ages 15-64 years may increase from 56 to 60. It may be noted in table XV.4 that in the year 2000 the projected African age structure is virtually identical with its 1965

structure. An impressive change during the last 15 years of the present century is indicated for South Asia where, according to the projections, the percentage of children would drop from 42 to 35 and the percentage aged 15-64 would increase from 55 to 61. It is also to be noted that in none of the major developing areas except East Asia would the proportion of the old aged population (65 and above) reach as high as 5 per cent within the remainder of this century.

52. In the more developed regions, the percentage of children is expected to decrease further between 1965 and 2000—from 28 to 25, while the proportion in the ages of economic activity may remain virtually constant at about 63-64 per cent. On the other hand, the aging of the population, which is a main demographic problem in these regions, is expected to continue, the percentage in the age group 65 years and above rising from 8.9 in 1965 to 10.4 in 1985 to 11.4 in 2000. Aging of the population is most conspicuous in Europe, where the percentages aged 65 and over are 10.5 in 1965 and may reach 12.5 by the year 2000.

53. The anticipated future changes in the numbers in various functional age groups that are of particular relevance for development planning are shown in table XV.5. The importance of demographic factors in planning is evident from the fact that both the size and the growth of these functional groups are determined by the previous sex-age structure of the population and by fertility, mortality and migration experience.

54. Most noteworthy is the growth anticipated in the working-age population 15-64 years old, with its important implications for employment and capital requirements. In the less developed regions this stratum is expected to increase, according to the medium variant projections, by 145 per cent between the years 1965 and 2000. This increase, which amounts to about 1,800 million persons, constitutes an additional demand for employment and occupational training which has to be given serious consideration by the planners, together with the problems of the underemployment and unemployment of the existing labour force. On the other hand, the pro-

TABLE XV.5. EXPECTED CHANGES IN THE MAIN FUNCTIONAL AGE GROUPS FOR THE WORLD,  
DEVELOPING AND MORE DEVELOPED REGIONS, 1965-2000  
(Medium variant)

	World total	Developing regions	More developed regions	Africa	East Asia	South Asia	Europe (exclud- ing the USSR)	Latin America	Northern America	Oceania	USSR
Total population (millions)											
1965 .....	3,289	2,252	1,037	303	852	981	445	246	214	18	231
2000 .....	6,494	5,040	1,454	818	1,424	2,354	568	652	333	35	330
Increase 1965-2000											
Number (millions) .....	3,205	2,788	417	515	572	1,373	123	406	119	17	99
Per cent .....	97.4	123.9	40.1	169.8	67.2	139.9	27.8	165.3	55.6	100.8	42.9
Pre-school population (0-4 years) (mil- lions)											
1965 .....	457	358	99	54	110	165	39	41	23	2	23
2000 .....	742	620	122	131	129	283	46	94	29	4	28
Increase 1965-2000											
Number (millions) .....	285	262	23	77	19	118	7	53	6	2	5
Per cent .....	62.5	73.2	23.8	144.6	17.4	71.1	19.3	131.4	29.8	76.0	18.6
School-age population (5-14 years) (millions)											
1965 .....	771	578	193	78	204	256	74	64	44	4	47
2000 .....	1,391	1,152	239	220	255	548	90	161	58	7	55
Increase 1965-2000											
Number (millions) .....	620	574	46	142	51	292	16	97	14	3	8
Per cent .....	80.4	99.1	24.1	182.1	24.9	114.1	22.0	151.9	33.4	91.2	17.2
Working-age population (15-64 years) (millions)											
1965 .....	1,895	1,242	654	163	503	530	285	132	128	10	143
2000 .....	3,964	3,038	926	439	941	1,424	360	369	214	22	208
Increase 1965-2000											
Number (millions) .....	2,069	1,796	272	276	438	894	75	237	86	12	65
Per cent .....	109.2	144.7	41.8	169.9	87.1	168.5	26.4	178.6	67.1	108.8	45.3
Old-age population (65 years and over) (millions)											
1965 .....	166	73	93	9	35	29	46	9	20	1	17
2000 .....	396	231	166	27	99	99	71	29	31	3	39
Increase 1965-2000											
Number (millions) .....	230	158	73	18	64	70	25	20	11	2	22
Per cent .....	138.6	213.9	79.0	212.7	185.9	236.7	53.2	218.2	59.6	102.6	127.4
Females of reproductive age (15-44 years) (millions)											
1965 .....	706	480	227	65	192	204	94	52	43	4	53
2000 .....	1,459	1,153	306	176	329	547	117	143	74	8	69
Increase 1965-2000											
Number (millions) .....	753	673	79	111	137	343	23	91	31	4	16
Per cent .....	106.7	140.3	35.2	172.2	71.6	168.3	24.2	177.6	72.2	117.5	29.6

SOURCE: United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

Note: The totals for the world, developing and more developed regions in the year 2000 have been adjusted to take into account the discrepancies between international immigration and emigration assumptions.

jections indicate that this group would increase by only 42 per cent in the developed countries within the same period.

55. Equally important is the growth of the school-age population between ages 5 and 14. If the assumptions of the medium variant turn out to be true, this group would, by the year 2000, virtually double its 1965 total in the developing regions. Considerable regional variations may occur in the growth of this group; whereas the number of school-age population may increase no more than one fourth in East Asia, the corresponding figures for Africa and Latin America may approximate 180 and 150 per cent, respectively. The educational needs arising from these anticipated increases, which amount to about 570 million in the developing regions as a whole, will have to be studied carefully, together with the questions of achieving full enrolment and of improving the quality of the present education. It will be noted in table XV.5 that in the developed countries the increase in the size of this group anticipated in the projections is only 46 million in the thirty-five years under consideration.

56. The most rapid growth is implied in the projections of the old-age group (65 years and over), in the less developed as well as the more developed regions. It should be noted, however, that although the growth of this group is particularly rapid in the less developed regions (more than 200 per cent during the projection period), it constitutes only 5 or 6 per cent of the total population increase. On the other hand, the increase of about 80 per cent in the size of this age group in the more developed regions is particularly significant since it constitutes about 18 per cent of the total population increase.

57. Special interest attaches to trends in the female population of reproductive age. In the developing regions as a whole, the number in this group, according to the medium variant, can be expected to increase by 140 per cent between 1965 and the year 2000, and in Africa, South Asia and Latin America, increases of about 170 per cent were likely. Such rapid growth in the numbers of women in the fertile ages implies that there will be large increases in the absolute numbers of births, even if fertility rates decline. In contrast to the high growth rates foreseen for this group in developing regions, the average increase during the same period was expected to be only about 35 per cent in the developed regions.

58. The above data support the common view that world population trends for many years to come will be decisively influenced by trends in the developing regions. The crux of the population problem which will face the world in the coming years lies in the association of persistent poverty, illiteracy, underemployment and technological retardation with rapid growth of numbers in these regions. Available information also shows how difficult it is to achieve rapid economic development and bring about significant changes in the structure of the population under conditions of rapid population growth. Under such circumstances, those aspects of economic development and population structure and distribution which normally tend to induce a change in reproductive behaviour and reduce fertility may have only limited effect. However, a much more fruitful solu-

tion would lie in combining rapid economic growth and structural changes in the population with a rapid decline in fertility. Structural changes and changes in reproductive patterns may be mutually supporting and may speed up the demographic transition in the developing countries.<sup>77</sup>

59. Demographers, economists, sociologists, and the members of other disciplines cannot yet claim to have defined unequivocally the basic causal relationships in the disquieting association of poverty and retardation with unremitting rapid growth of numbers in the developing regions. Nor can they claim to have clarified what this association portends for the future of the economically disadvantaged nations and the world as a whole. Some of the implications, though, can be spelled out clearly enough. One which deserves particular mention is a need for increased international sharing of resources because of disproportions in population growth between the "have" and the "have-not" nations, and from opposite disproportions in the growth of income and wealth.<sup>78</sup> Above all, the unity of the world in respect to future population trends should be emphasized; a unity which, although comprised of many diversities,<sup>79</sup> still represents the destiny which the whole world must share.<sup>80</sup>

### C. Types of specialized demographic projections

60. In planning for social and economic development, neither population nor any socio-economic factor is regarded as an independent variable. Demographic changes partly determine social and economic changes, and the latter, in their turn, influence the population changes. In this complex of interacting factors, which constitutes the development process, it is very difficult to know explicitly the mutual relationships between numerous variables. This methodological problem, together with the lack of data in the necessary detail, is a serious handicap in the integration of demographic projections with other socio-economic projections into a comprehensive national plan. Attempts are already being made,<sup>81</sup> and the work in this field is enhanced by the recent development of simulation models.

<sup>77</sup> For a detailed elaboration which takes into consideration available projections of the economically active population, urban-rural population and agricultural and non-agricultural population see Macura, "Demographic prospects for the next thirty years" (1971).

<sup>78</sup> Durand, "A long-range view of world population growth" (1967), pp. 7-8.

<sup>79</sup> For a discussion of these diversities see: Macura and El-Badry, "Diversity or uniformity of demographic problems ..." (1968).

<sup>80</sup> Macura, "Demographic prospects for the next thirty years" (1971), p. 42.

<sup>81</sup> See, for example, Orcutt *et al.*, *Micro-Analysis of Socio-Economic Systems* ... (1961); Hyrenius, *New Techniques for Studying Demographic-Economic-Social Interrelations* (1965). For a summary of the results of an attempt to prepare comprehensive projections of the population by sex and age groups and by economic structure, as well as projections of households, see Yugoslavia, Institut Društvenih Nauka, *Demografska kretanja i projekcije* ... (1968).



61. In spite of the serious handicaps, independent work started in the late 1950s on projections of population by its socio-economic characteristics. Theoretically, the number of social and economic groupings of the population can be very large, depending on the size and composition of the national population and its geographic, residential, cultural, ethnic and economic diversity. In practice, however, a limited number of categories of population have come to be nearly universally recognized as of special importance in demographic and socio-economic analyses, and consequently in the collection and tabulation of census and population sample survey data.<sup>82</sup> These categories include classification of the population (a) by economic activity (or labour force) status, and for the economically active, their occupation and industry attachment; (b) by rural and urban residence, and within the urban, by city-size classes; (c) by agricultural and non-agricultural livelihood; and (d) by educational attainment, school attendance or literacy status. Attention has lately been given to projections of households and families in view of their importance as living units, consumption units and, in some cases, also production units.

62. Labour force, rural-urban, school enrolment, or projections of other socio-economic categories all involve projecting a part or section of the population of a country rather than the total population. This gives rise to rather distinctive conceptional and methodological problems. Definitional aspects become very important in determining the size and limits of the group or category being measured and projected. Comparability over time of the definitions used within a country affects the measurement of past and future trends, and problems of international comparability arise if definitions of the population group or category differ among countries. Secondly, the size and composition of the population group changes not only through births and deaths occurring within the group, but also by the entry or departure of persons into or from that group through acquiring or losing the group's definitional characteristics. Thus, for example, changes in the urban and rural population of a given country are produced not only by births and deaths occurring within these population sectors, but also, and very importantly, by internal migration between these sectors, by reclassification of previously rural localities into urban (as a result of population growth and achievement of urban size as administratively defined), or by annexation of hitherto rural areas within the administrative limits of a given city. Similarly, changes in the labour force of a country are produced not only by the size of the cohorts first entering the labour force (which are affected by past birth and age-specific death rates as well as current labour force participation rates), but also by withdrawals or retirements from and re-entries into

the labour force as well as losses to the labour force occasioned by deaths.<sup>83</sup>

63. The remainder of this section contains a brief summary of the methodology used in preparing projections of the types discussed above. Some of the major findings of available projections on a world and regional basis are also presented.

# 1. LABOUR FORCE

64. With the emphasis on planning for economic development which appeared in the period following the Second World War, the need for manpower projections became increasingly evident. Both projections of manpower supply, which are concerned with the numbers of persons likely to be available for work at future dates, and projections of manpower demand, which relate to the number of jobs likely to be offered in different sectors of the economy, are important in this connexion. Only manpower supply projections, which are based on the projections of total population by sex and age, are discussed here. Projections of manpower demand are not demographic projections but are based on expected trends in production and worker productivity; they are less widely available than supply projections, since the detailed types of data required in their preparation are frequently lacking.<sup>84</sup>

65. Some of the early efforts to provide projections of manpower trends consisted of no more than projections of population in the working ages, which were taken as the equivalent of the labour force.<sup>85</sup> Since nearly all

<sup>83</sup> For a discussion of conceptual problems associated with these types of projections, including brief guidelines as to data required and useful classifications of characteristics, see United Nations, *General Principles for National Programmes ...* (1965). See also Muhsam, "Projections of urban and rural population, economically active population ..." (1967).

<sup>84</sup> On the methodology of both manpower supply and demand projections, see United Nations, *Manual V: Methods of Projecting the Economically Active Population* (1971); Johnston, "The integration of supply and demand projections of labour force" (1969); Vimont, *La population active ...* (1960), deuxième partie; Bloch and Praderie, *La population active dans les pays développés* (1966), chap. 12. On the methodology for preparing manpower demand projections, see also Vimont, "La prévision de la demande de main d'œuvre" (1969); and his "La prévision des besoins en main d'œuvre ..." (1967); United States, Bureau of Labor Statistics, *The Forecasting of Manpower Requirements* (1963); Urquidí, "Problemas relativos a la previsión ..." (1967). For examples of projections of manpower demand, see Netherlands, Centraal Planbureau, *Een verkenning der economische toekomst-mogelijkheden van Nederland ...* (1955); ———, *De Nederlandse economie in 1970 ...* (1966); France, Commissariat général au Plan, *L'équilibre économique en 1961 ...* (1957), pp. 91-96; United Arab Republic, Institute of National Planning, *Manpower Planning in the United Arab Republic* (1966); Puerto Rico, Committee on Human Resources, *Puerto Rico's Manpower Needs and Supply* (1957); Organisation for Economic Co-operation and Development, *Education, Human Resources and Development in Argentina* (1967), chap. 20; ———, Mediterranean Regional Project, *Country Reports: Greece* (1965), pp. 44-47; Beckerman et al., *The British Economy in 1975* (1965), chap. 7; United States, Bureau of Labor Statistics, *Patterns of U.S. Economic Growth ...* (1970); Rogiers, "Les prévisions de la population active et de l'emploi ..." (1965); Scoville, "The occupational structure of employment ..." (1969).

<sup>85</sup> Such was the case with the early projections compiled by the Organisation for European Economic Co-operation which defined working-age population as consisting of males 15-64 years and

(Continued on next page)

<sup>82</sup> See, for example, United Nations, *Principles and Recommendations for National Population Censuses* (1958); and ———, *Principles and Recommendations for the 1970 Population Censuses* (1969).

men between the ages of 25 and 54 years of age participate in economic activities in all countries, whatever their level of development, trends in the numbers in this age group closely parallel those of economically active males of the same ages. Activity rates for men above and below these ages, however, and of women throughout the working ages, fall considerably short of the potential; they vary greatly among countries and change over time. In many countries also, participation by persons above or below normal working ages in economic activities is far from negligible. Trends in the working-age population alone are therefore inadequate to reflect likely future changes in the labour force.

66. The technique for projecting the labour force which has gradually come into general use involves the projection of trends in sex-age-specific activity rates and the application of these rates to the projected population in each sex-age group. In the simplest variation of this method, it is assumed that the sex-age-specific activity rates remain constant in the future at the levels observed in a recent census or survey; thus, all the changes shown in the labour force are due to the growth and changing sex and age composition of the population.<sup>86</sup> It has been observed, however, that in actuality these activity rates rarely remain constant, but rather follow certain typical patterns, at least in the case of males. It has, therefore, become increasingly common in preparing projections to allow for future changes in activity rates. Sometimes changes observed in age-specific activity rates between two dates in the past have been extrapolated by mathematical formulae.<sup>87</sup> Where comparable trend data are not available, target activity rates for the terminal date of the projection have sometimes been borrowed from another country, or group of countries, at a higher level of development, or from a more developed region within the country for which the projection is being prepared.<sup>88</sup> In some cases assumptions as to future changes in activity rates of particular age groups have been based on such factors as projected school attendance trends, prospective social measures affecting retirement, and in the case of women—judgements concerning probable changes in marital status and fertility or in social customs and

attitudes.<sup>89</sup> For certain countries quite refined projections have been prepared, including separate projections of the female labour force by marital status, and for women with and without young children.<sup>90</sup> Projections of the labour force have sometimes been made separately for urban and rural areas, in view of the markedly different patterns of labour force participation in these areas.<sup>91</sup>

67. More complex techniques of projecting activity rates by cohorts have been applied in some projections.<sup>92</sup> According to this method, age-specific activity rates for

<sup>89</sup> For example, the adoption of legislation establishing an additional obligatory school year, and new regulations concerning age at retirement, were among the factors taken into consideration in setting assumptions concerning future activity rates in projections prepared for Austria for the period to 1980. See Hansluwka, "Vorausberechnung der berufstätigen Bevölkerung Österreichs ..." (1964). In France, activity rates for persons under 25 years of age have been derived after first projecting trends of school attendance at each age. Calot *et al.*, *Projections démographiques pour la France* ... (1970), p. 36. See also France, Premier Ministre, *Les besoins en emplois nouveaux* ... (1961), pp. 17-20; Rogiers, "Les prévisions de la population active et de l'emploi ..." (1965). In projecting the female non-agricultural labour force in Poland it was assumed that the effects of factors tending to increase activity rates (for example, improvements in professional qualifications and a decline in fertility) would more than offset those tending to reduce participation (for example, a rise in school attendance and increase in the proportion married). Frenkel and Józefowicz, "Z badań nad prognozą ..." (1965). Other projections which allow for changing activity rates in certain sex-age groups in response to envisaged trends in socio-economic variables include: Tilak, "The future manpower situation in India ..." (1963); Bolle, "Bevölkerung und Arbeitskräftepotential ..." (1965); Organisation for Economic Co-operation and Development, *Demographic Trends 1965-1980* ... (1966); Bourgeois-Pichat, "Perspectives sur la population active européenne" (1953); and Fourastié, "La croissance des classes jeunes ..." (1956).

<sup>90</sup> For example, in preparing recent projections for the United States, trends in activity rates have been projected separately by marital status, and for married women with and without young children. See Travis, "The U.S. labor force: projections to 1985" (1970); Cooper and Johnston, "Labor force projections for 1970-80" (1965). In some other projections, constant activity rates have been assumed for different marital status categories. See New Zealand, Department of Statistics, *New Zealand Population and Labour Force Projections* ... (1968).

<sup>91</sup> This method was used in projecting the female labour force of the Philippines, and both the male and female labour force in the main working ages in Chile. See, respectively, United Nations, *Population Growth and Manpower* ... (1960); Sadie, "Población y mano de obra de Chile ..." (1969), pp. 39-40. For other applications see Jones, "A projection of the labour force in Malaya" (1967); and Chellawani, "Population trends and labour force in India ..." (1958). Trends in activity rates have sometimes been projected separately for more developed and less developed regions of a country. See the labour force projections for Czechoslovakia in Srb and Kučera, "Obyvatelstvo v produkčním ..." (1957).

<sup>92</sup> Cohort methods have been used, for example, in projecting the female labour force of the United Kingdom, the United States, the married female labour force of Australia, certain age groups of the female labour force in France, and the agricultural labour force in France. See, respectively, Beckerman and Sutherland, "Married women at work in 1972" (1963); Beckerman, "The future growth of national product" (1965); Durand, *The Labor Force of the United States* ... (1948); Australia, Commonwealth Treasury, *Projections of the Work-Force* ... (1965); Calot *et al.*, *Projections démographiques pour la France* (1970), pp. 38-39; and Febvay, "La population agricole française ..." (1956); Pressat, "La population agricole en France ..." (1957). Tabah has applied matrix calculation as a technical aid in projecting the labour force when a large number of variables which affect labour force size are to be taken into account. See his "Représentations matricielles de perspectives de population active" (1968).

(Footnote 85 continued)

females 15-59 years. Organisation for European Economic Co-operation, *Demographic Trends in Western Europe, 1951-1971* ... (1956).

<sup>86</sup> For examples of projections based on constant activity rates, see: Organisation for European Economic Co-operation, *Demographic Trends, 1956-1976, in Western Europe and in the United States* (1961); Netherlands, Centraal Bureau voor de Statistiek, "Berekeningen omtrent ..." (1961); Tunkelo, "Aktiivinen väestö vuosina 1951-71" (1957); Camisa, "Aspectos demográficos de la población económicamente activa ..." (1970); Strömmer, *Väestönkehitys ja työvoimavarat* ... (1959), pp. 70-72.

<sup>87</sup> See, for example, Durand, *The Labor Force in the United States* ... (1948), pp. 237-250; Bancroft, *The American Labor Force* ... (1958), pp. 176-182.

<sup>88</sup> See, for example, Livi Bacci and Pilloton, *Popolazione e forze di lavoro* ... (1968); Ducoff, *Human Resources of Central America* ... (1960), pp. 46-47; Elizaga, *Proyección de la población masculina* ... (1963), p. 5.

future dates are calculated from observed or estimated activity rates for the same cohort at an earlier date, with the amount of change in the activity rate of the cohort usually being estimated on the basis of past trends. Thus, the method has the advantage of taking into account the previous history of labour force participation of each cohort; this technique may be particularly useful for projecting female activity rates, since the likelihood of a woman's being in the labour force at an older age is related to her activity status at younger ages.<sup>93</sup>

68. Although they are not very common, further refinements have sometimes been made in projections of labour supply to take into account the interaction between activity rates and the general state of the economy, or the prospective demand for labour. In some developing countries where the supply of labour is expected to greatly exceed demand, conditions of unemployment and underemployment may discourage some marginal groups in the potential labour force from seeking work. On the other hand, in some developed countries where manpower shortages are foreseen for the future, the existence of plentiful job opportunities may stimulate an increase in activity rates among certain groups in the population. Labour force projections prepared for Belgium and the United States of America, for example, have taken into account expected trends in employment in the different sectors of the economy, and the assumptions regarding the participation rates of certain segments of the population have been modified in the light of the projections of labour demand.<sup>94</sup> In some socialist countries of Eastern Europe, special studies have been made of the characteristics of the inactive population so as to assess the reserves which might be drawn into the labour force to meet manpower demands.<sup>95</sup>

69. Until recently labour force projections were prepared mainly for individual countries to meet specific planning needs of governments. The last decade, however, has seen the development of a number of labour force projections for geographical groupings of countries, for major regions, and finally for the world as a whole.<sup>96</sup> The latter projections, while necessarily somewhat crude, call attention to outstanding features of manpower trends in major parts of the world and are useful for broad analyses of manpower problems. The most comprehensive of such projections have been those recently developed by the International Labour Office for the world and twenty-four geographical regions to the year 1985.<sup>97</sup> The

population projections used as a basis for the labour force projections are the United Nations medium projections as assessed in 1968.<sup>98</sup>

70. The projections of the labour force were based on estimated sex-age-specific activity rates for each country for 1950 and 1960. For countries lacking such data, values were estimated on the basis of patterns existing in the same geographical region or in selected countries in other regions having similar demographic, economic and social conditions. For projecting the activity rates to 1985, models were developed, based on analyses of labour force structure and activity rates in various countries at different points in time and at different stages of economic development. Thus, it was assumed that the activity rates for a particular country in the future would follow patterns of change observed in other countries at similar stages of their development.<sup>99</sup>

71. As shown in table XV.6, the world's total labour force was estimated at about 1,380 million persons in 1965; it may have risen to over 1,500 million by 1970 and may approach 2,000 million by 1985. In the fifteen-year period between 1970 and 1985, nearly 500 million persons are expected to be added to the world's labour force, according to these projections. The great bulk of this increase will be accounted for by the growth of population in the working ages. Expected changes in activity rates, which have less impact, will tend to reduce labour force numbers, as seen below. The validity of the labour force projections is thus greatly dependent on the projections of total population in the working ages.<sup>100</sup>

72. Of the projected increase of about 460 million in the world's labour force between 1970 and 1985, 375 million, or more than four fifths, is expected in the developing regions. The proportion of total labour force growth accruing to the developing regions is expected to show a rising trend, from 79 per cent in 1970-1975, to 83 per cent in 1975-1980, and 84 per cent in 1980-1985. This trend is explained by the fact that rates of labour force growth are expected to rise slightly in the developing regions and to decline slightly in the more developed regions.

73. The 1970s, designated as the Second United Nations Development Decade, may see an expansion of 285 million in the world's labour force—231 million in the developing regions, and 54 million in the more developed regions. Of these expected additions, 178 million are in Asia, 33 million in Africa, 26 million in Latin America, 18 million in the USSR, 15 million in North America,

and some principal regions to the year 1975 appeared in International Labour Office, "Projections of population and labour force" (1961).

<sup>98</sup> United Nations, *World Population Prospects as Assessed in 1968* (to be issued as a United Nations publication).

<sup>99</sup> International Labour Office, *Labour Force Projections ...* (1971), part V, pp. 4-6. For a more detailed description of the methodology see ———, *Labour Force Projections ...* (1971), part VI.

<sup>100</sup> It may be noted that short-run projections of working age population depend only on mortality trends (except where migration is an important consideration), since the age groups concerned are the survivors of cohorts already born at the time of preparation of the projections. Projections for longer periods in the future are more subject to error, since they are affected by the assumptions of future fertility trends which are more difficult to estimate.

<sup>93</sup> For arguments supporting a cohort approach to projecting the economically active female population, see Dubrulle and Gontier, "Les désirs d'activité professionnelle des femmes mariées chargées de famille" (1969).

<sup>94</sup> See Hébert, "Perspectives de population active pour 1965" (1956); Cooper and Johnston, "Labor force projections for 1970-80" (1965).

<sup>95</sup> See, for example, László, "A foglalkoztatottság ..." (1966).

<sup>96</sup> See, for example, Bolle, "Bevölkerung und Arbeitskräftepotential ..." (1965); United Nations, *Economic Survey of Europe in 1968 ...* (1969), chap. 3; Ducoff, *Human Resources of Central America ...* (1960); Ortega, *Proyección de la población económicamente activa de los países de América Central* (1967).

<sup>97</sup> International Labour Office, *Labour Force Projections ...* (1971). See also Ypsilantis, "World and regional estimates ..." (1969). Earlier International Labour Office projections for the world

TABLE XV.6. PROJECTIONS OF THE LABOUR FORCE FOR MAJOR AREAS OF THE WORLD: 1965-1985

Major area	Labour force (thousands)					Average annual rate of increase (per cent)			
	1965	1970	1975	1980	1985	1965- 1970	1970- 1975	1975- 1980	1980- 1985
World total .....	1,382,117	1,500,777	1,637,528	1,785,390	1,957,353	1.7	1.8	1.7	1.9
Developing regions .....	919,130	1,012,975	1,121,437	1,243,112	1,388,396	2.0	2.1	2.1	2.2
More developed regions .....	462,986	487,802	516,090	542,278	568,958	1.0	1.1	1.0	1.0
Africa .....	119,580	132,479	147,574	165,379	187,283	2.1	2.2	2.3	2.5
Asia (excluding the USSR) ...	780,653	856,542	942,006	1,035,363	1,145,675	1.9	1.9	1.9	2.0
East Asia .....	393,983	427,912	463,667	497,859	535,592	1.7	1.6	1.4	1.5
South Asia .....	386,670	428,631	478,339	537,504	610,083	2.1	2.2	2.4	2.6
Europe (excluding the USSR) ..	197,531	202,634	208,961	214,674	223,163	0.5	0.6	0.5	0.8
Latin America .....	78,395	88,155	99,982	113,554	129,746	2.4	2.6	2.6	2.7
Northern America .....	82,556	89,666	97,354	105,150	113,137	1.7	1.7	1.6	1.5
Oceania .....	7,181	8,001	8,923	9,894	10,952	2.2	2.2	2.1	2.0
USSR .....	116,220	123,298	132,728	141,377	147,398	1.2	1.5	1.3	0.8

SOURCE: International Labour Office, *Labour Force Projections* ... (1971), parts I-V, table 4.

12 million in Europe and 2 million in Oceania. Such figures give a rough indication of the numbers of new employment opportunities which will be required to absorb additions to the labour force.

74. While these increases in labour force numbers appear very great, it is to be noted that the growth in the labour force has been lagging behind the growth in population. Thus, whereas the world's total population is estimated to have been increasing at about 2.0 per cent annually during the latter half of the 1960s,<sup>101</sup> the corresponding rate for the labour force was only 1.7 per cent. If the declines in fertility which have been assumed to begin in many developing regions in the 1970s occur, the changes in age structure which follow will result in a narrowing of the gap between the rate of labour force and total population growth. Thus, the projections show the total population growth rate for the world as a whole stabilized at 2.0 per cent in the period to 1985, while the rate of growth of the labour force would rise to 1.9 per cent annually by 1980-1985.

75. The world pattern, as described, largely reflects the main features of trends in the less developed regions, where the labour force growth rate is shown to rise from 2.0 per cent annually in 1965-1970, to 2.1 per cent in 1975-1980, and 2.2 per cent in 1980-1985. On the other hand, the total population growth rate in these regions shows a slight decline from 2.5 per cent annually in 1970-1975 to 2.4 per cent during 1980-1985. A decline in the labour force growth rate can be expected only some fifteen years after the onset of fertility decline, when the smaller birth cohorts reach working age.

76. In contrast to the high rates of growth shown for the developing regions, the labour force is expected to grow at only about 1.0 per cent annually in the developed regions—a trend closely paralleling that of the total population. The very low rate of growth of Europe's labour force—0.5 to 0.6 per cent in 1970-1980 is particularly striking.

77. Table XV.7 shows the projected trend of the male and female age-specific activity rates in the developing

TABLE XV.7. PROJECTIONS OF AGE-SPECIFIC ACTIVITY RATES FOR MALES AND FEMALES, FOR THE WORLD'S DEVELOPING AND MORE DEVELOPED REGIONS: 1960-1980

Region, sex and age (years)	1960	1970	1980
Developing regions			
Males all ages .....	55.0	52.9	51.3
10-14 .....	26.3	20.1	15.1
15-19 .....	71.3	64.1	56.6
20-24 .....	90.5	88.2	85.8
25-44 .....	97.1	96.7	96.2
45-54 .....	96.0	95.2	94.4
55-64 .....	88.5	86.2	83.5
65 and over .....	64.6	57.2	49.3
Females all ages .....	28.3	26.4	24.7
10-14 .....	16.7	14.1	11.2
15-19 .....	42.9	37.8	32.4
20-24 .....	48.3	44.7	41.6
25-44 .....	49.1	46.6	44.2
45-54 .....	47.8	45.9	44.7
55-64 .....	36.4	35.1	33.8
65 and over .....	19.6	17.9	16.0
More developed regions			
Males all ages .....	58.2	57.1	56.6
10-14 .....	4.2	2.5	1.5
15-19 .....	59.7	50.5	44.1
20-24 .....	88.8	85.9	83.1
25-44 .....	96.4	96.4	96.4
45-54 .....	94.2	93.6	93.0
55-64 .....	82.9	80.7	79.0
65 and over .....	34.7	27.2	21.4
Females all ages .....	32.8	33.1	33.6
10-14 .....	3.3	2.0	1.1
15-19 .....	49.5	42.2	36.7
20-24 .....	61.7	61.0	62.1
25-44 .....	50.8	53.4	55.3
45-54 .....	49.3	52.2	56.3
55-64 .....	34.1	35.5	36.8
65 and over .....	14.4	12.8	10.5

SOURCE: International Labour Office, *Labour Force Projections* ... (1971), part V, table 5.

<sup>101</sup> See table XV.1.

and more developed regions of the world. A downward trend in activity rates is shown for school-age youths and for older workers of both sexes. The age groups mainly affected are those under 20 and 65 years and over in both the developing and developed regions. The projected decline in activity rates for young persons anticipates the greater emphasis on education in national development policies, including the extension of compulsory education and longer average duration of schooling at all levels in response to the growing demand for better educated and more highly trained workers. The projected decrease in activity rates of the older workers, on the other hand, anticipates a continued expansion of social security coverage and retirement schemes, as well as declines in the relative importance of agriculture in the course of economic development.

78. For women between 25 and 54 years of age, projected trends in activity rates differ in the developing and more developed regions. In the latter, a further modest rise in activity rates is shown, whereas a decline appears in the activity rates in the developing regions, apparently resulting from the expected continuation of the shift away from agricultural employment and the consequent curtailment in the numbers of unpaid family workers.

## 2. URBAN AND RURAL POPULATION

79. The demand for urban and rural population projections has become progressively more intense in recent years. Economists, sociologists, business firms, public administrators, and planners find increasing need for urban and rural projections in theoretical analyses of economic and social development as well as in a wide diversity of practical applications.<sup>102</sup> Urban and rural projections are essential for the efficient planning of future investments by both governments and enterprises. Very often such projections are required in considerable detail at subnational levels. A review is made below of some of the types of methods and assumptions which have been used in developing urban and rural projections. Finally, some United Nations projections of urban and rural population in world regions and major areas are provided to illustrate broad trends which may be expected in both the developing and the developed regions.

80. The techniques currently used to project urban and rural population may be classified as either demographic or extrapolatory.<sup>103</sup> In demographic approaches, explicit consideration is given to the three components of demographic change (fertility, mortality and migration) in both urban and rural sectors. Since the calculations are usually made by individual sex and age groups, the final presentation of results will generally include sex and age detail for both the urban and the rural population at

future dates. In extrapolatory approaches, the basic calculations are more often made on the basis of data for total urban and rural population and the results include only urban and rural totals at future dates. However, various prorating techniques have come into use by which sex and age compositions can be derived from the projected urban and rural totals.<sup>104</sup> A fourth source of change, the reclassification of rural localities as urban, as discussed above, must also be considered.

81. In demographic approaches, the estimation of total population is often aggregative; that is, the urban and rural population are projected independently and the total population is then obtained as the sum of the projected urban and rural populations. Sometimes, however, it may happen that information pertaining to the rural sector is insufficient for the purposes of projections. In such cases, the urban population may be projected by demographic techniques and the rural population obtained by subtraction of the urban population from a previous projection of the total population.

82. In extrapolatory projections, the approach is usually distributive rather than aggregative. A previous projection of total population is accepted at the outset as given, and the projection of urban and rural population is derived from a projection of the future distribution of the total population between its urban and rural segments. Such projections may be based upon assumptions relating to the future rise in the percentage of urban population or on assumptions relating to the relative growth rates of the total population and its urban and rural sectors. In these approaches, the underlying factors of fertility, mortality, migration and urban reclassification are not explicitly considered.

83. Projections of urban and rural population by demographic techniques have been based on a variety of assumptions concerning future trends in each of the demographic components of change.<sup>105</sup> The most sophisticated approach is the cohort-component (cohort-survival) method. This technique is used in countries where sufficient data are available, though there are wide differences in the formulation of assumptions with regard to fertility, mortality, and migration.<sup>106</sup> Urban-rural differentials with respect to both fertility and mortality are generally greater in the developing countries than in the more developed countries. In many developed countries where low over-all mortality rates prevail, the error stemming

<sup>104</sup> See, for example, Grauman, "Population estimates and projections" (1959), pp. 567-569; United Nations, *Population Growth and Manpower* ... (1960); Benítez Zenteno and Cabrera Acevedo, *Proyecciones de la población de México 1960-1980* (1966); and Cataldi, D., *La situación demográfica del Uruguay* ... (1964).

<sup>102</sup> For example, it has been suggested that the distinction between urban and rural areas is so fundamental in population projections that it would be desirable to retain the urban-rural classification, whenever possible, not only in projections of total population but also in projections of labour force, school-age population and school attendance, population by educational level, and households and families. United Nations, *General Principles for National Programmes* ... (1965), pp. 4-5.

<sup>103</sup> A survey of techniques in current use is available in Siegel, "Some principles and methods of projections ..." (1967).

<sup>105</sup> The following are examples of projections made by demographic techniques: Hartman, *Alueellinen väestö* ... (1964); Roberts, "Provisional assessment of growth ..." (1963); Greece, Hypourgeion Syntonismion, *Demographikai exeliseis en Helladi* ... (1962); Pallós, "Területek népességének távlati alakulása ..." (1966); Podyachikh, "Population projections in which allowance ..." (1967); United States of America, Bureau of the Census, *Projections of the Population of Metropolitan Areas: 1975* (1969); Silverio, *Proyecciones de la población urbana y rural de Venezuela* ... (1964); and various other monographs in Series C of the Centro Latinoamericano de Demografía.

<sup>106</sup> Conference of European Statisticians, *Methods and Uses of Projections of Urban and Rural Populations* ... (1971), pp. 5-6.

from the use of the average national mortality pattern in both the urban and the rural component projections is relatively small<sup>107</sup> and such an approach can often be justified.<sup>108</sup> Rather little is known about urban-rural mortality differentials in the developing countries. The studies reviewed in chapter V, section E, suggest that, on balance, mortality is likely to be somewhat higher in rural than in urban areas, owing mainly to the greater concentration of medical facilities and health services in the latter.<sup>109</sup> Moreover, in rural areas characterized by dispersed or very small village settlements, the peasant may be unable to take proper precautions with regard to drinking water and sanitation. In isolated areas, the peasant population may be subjected to the ravages of sickness and disease caused by drinking foul water and the absence of sanitation facilities.<sup>110</sup>

84. In developed countries, as shown in chapter IV, section F, fertility has generally been found to be higher in rural than in urban areas, although the differences have narrowed since the Second World War. Evidence concerning urban and rural differentials in the developing regions is less clear and there is need for controlled studies using comparable standards of measurement. In Latin America, at least, it has been rather well confirmed that rural fertility is higher than urban fertility by any standard of measurement.<sup>111</sup>

85. The problem of developing projection assumptions with regard to fertility has been approached in several ways. Although rather complex experimental techniques have been tried in some European countries where data are good,<sup>112</sup> relatively less complicated methods have more often been utilized in actual practice. One of the procedures followed in estimating expected fertility trends is to develop projection assumptions by comparing the past trends of rural and urban populations with the over-all fertility trends of the country. This can be done

<sup>107</sup> See, for example, evidence reviewed in chapter V, section E.

<sup>108</sup> This approach has previously been used in some European projections. *Ibid.* It has also been used in projections for the United States of America. See United States, Bureau of the Census, *Projections of the Population of Metropolitan Areas: 1975* (1969). In recent Soviet projections, however, separate sets of survival ratios were applied in the urban and rural projections. Pobedina, "The use of electronic computers for population projections" (1967).

<sup>109</sup> In addition to the sources cited in chapter V, see also Arriaga, "Components of city growth ..." (1968), pp. 244, 250. In many developing countries under-registration of deaths may be more severe in rural than in urban areas.

<sup>110</sup> Dickinson, *The Population Problem of Southern Italy ...* (1955), p. 24. See also the discussion in Benko, "Rural planning in Poland" (1966), pp. 370-381, concerning the difficulties encountered in providing services and utilities, including water supply and sanitation, to small rural villages.

<sup>111</sup> Carleton, "Fertility trends and differentials in Latin America" (1965).

<sup>112</sup> Such as extrapolation of urban and rural age-specific rates by means of analytical trends or graphic methods; age-specific rates derived from levels of gross reproduction rates projected separately for urban and rural areas; or derivation of assumed age-specific fertility rates on the basis of detailed analyses of past and present fertility patterns and levels in urban and rural areas. Sometimes survey data concerning the intentions of married couples with regard to the future number of children which they desire or expect are taken into consideration. See Conference of European Statisticians, *Methods and Uses of Projections of Urban and Rural Populations ...* (1971), p. 7.

by means of the general fertility rate,<sup>113</sup> but somewhat better results were obtained in European countries with the use of age-specific rates.<sup>114</sup> The convergence or divergence of the trends can provide valuable information in predicting future urban-rural fertility differentials, especially if coupled with careful socio-economic analysis.

86. Special problems arise in connexion with the fertility behaviour of rural-to-urban migrants, particularly in areas where the level of rural-to-urban migration is rather high.<sup>115</sup> In recent projections for the Soviet Union, it was assumed that the fertility of rural-to-urban migrants would be similar to the fertility of the existing urban population, which was generally lower than the fertility of the rural population in the same area.<sup>116</sup> The projected total population computed under these assumptions was appreciably lower than it might have been according to a distributive projection. However, it was later observed in the Soviet Union that the birth rate among rural-to-urban migrants is actually higher than it is for native urban residents. Moreover, it was found that a substantial part of the natural increase in the urban population is provided by migrants from rural areas.<sup>117</sup> No general conclusions were drawn from the studies reviewed in chapter VI, section B, as to how the fertility of rural-urban migrants is likely to differ from that of the native urban population. Some of these studies showed higher fertility among migrants than among natives; others showed lower fertility among the migrants; and still others showed no significant difference. It is clear that the selection of projection assumptions with regard to the fertility of rural-to-urban migrants calls for careful evaluation of available evidence in the light of the unique circumstances prevailing in any individual country. There is need for more controlled studies which take into consideration possible differences in the age-specific fertility patterns of rural-to-urban migrants and urban natives and also fertility differences by length of stay in cities. Some further discussion of these issues appears in chapter VI, section C.

87. Where knowledge of detailed urban-rural mortality and fertility differences is lacking, it has sometimes been assumed that the crude rate of natural increase (the

<sup>113</sup> Such an approach was followed in United States projections for metropolitan areas. The general fertility rate was determined for each area by comparison with the national rate. It was then assumed that the factors producing fertility differentials between the areas would gradually disappear within fifty years, and that by the year 2010, each area's general fertility rate would be equal to the national rate. Starting with each area-national ratio in 1960 and assuming the ratio will reach unity by 2010, the ratios for the intermediate years to 1975 were obtained by linear interpolation. United States of America, Bureau of the Census, *Projections of the Population of Metropolitan Areas: 1975* (1969), pp. 7-8.

<sup>114</sup> Both approaches have been used in Europe. See Conference of European Statisticians, *Methods and Uses of Projections of Urban and Rural Populations ...* (1971), p. 7.

<sup>115</sup> *Ibid.*, pp. 14-16.

<sup>116</sup> Podyachikh, "Population projections in which allowance ..." (1967). Also Pobedina, "The use of electronic computers for population projections" (1967). It was also assumed in the calculations that when a community is reclassified from the rural to the urban category its reproduction rate changes at the same time from rural to urban.

<sup>117</sup> Perevedentsev, "Migratsiia naseleniia ..." (1970), p. 34.



excess of the crude birth rate over the crude death rate) may be approximately equal in both urban and rural areas.<sup>118</sup> This approach was taken in recent projections of urban and rural population in Morocco and Tunisia.<sup>119</sup> Some supporting evidence with regard to this issue can be found in chapter VI, section C.

88. The question of migration assumptions is the most difficult problem with regard to urban and rural projections. Age composition is an obvious consideration, as the motivations which underlie rural-to-urban migration are related to occupational, educational, and other socio-economic factors which are selective by age. But the particular nature of the age-selective process varies greatly among areas and also within a single area over time. There is also the very great problem of distinguishing between permanent and temporary rural-to-urban migration, and the definition of the permanent and temporary categories varies from country to country. In view of the difficulties in forecasting the number and composition of migrants, the assumptions taken with regard to migration for urban-rural projections are often rather mechanical.<sup>120</sup> Net rural-to-urban migration trends are sometimes assumed to remain stable at a given level, which is usually that of an average level at the starting date of the projection period. This approach may be appropriate in some countries where levels of urbanization are not as yet high. In countries where recent data show a diminishing trend of rural-to-urban migration, these trends are sometimes projected into the future. In this approach, the age composition of migrants is usually assumed to be constant. In other countries, especially in those countries where the level of urbanization is already high, the net rural-to-urban migration rates are assumed to decrease, gradually approaching the zero level.<sup>121</sup>

89. Where statistics are deficient, it is sometimes not unreasonable to assume that the number of future migrants from rural to urban areas will be in a constant ratio to the level of natural increase in rural areas. In other words, rural population excesses resulting from annual additions through natural increase may be offset in some degree by a compensating pattern of annual departures by rural inhabitants to urban settlements. Such an approach was used in projections for Tunisia.<sup>122</sup> A few examples of the ratio between rural out-migration and rural natural increase in different areas are discussed in chapter VI, section C.

<sup>118</sup> A discussion of the relative contributions of natural increase and migration to urban growth appears in chapter VI, section C.

<sup>119</sup> See Dubois, "Essai de perspective démographique pour le Royaume du Maroc" (1959); and Seklani, "Villes et campagnes en Tunisie ..." (1960).

<sup>120</sup> Conference of European Statisticians, *Methods and Uses of Projections of Urban and Rural Populations* ... (1971), p. 12.

<sup>121</sup> Such approaches have been used upon occasion in European countries, Conference of European Statisticians, *Methods and Uses of Projections of Urban and Rural Populations* ... (1971), p. 12. Migration assumptions based on past trends have been used in United States projections. See United States of America, Bureau of the Census, *Projection of the Population of Metropolitan Areas: 1975* (1969).

<sup>122</sup> Seklani, "Villes et campagnes en Tunisie ..." (1960), pp. 507-511. Alternative projections were made by projecting two different ratio constants.

90. In centrally planned economies, the level of urban migration can be estimated by reference to the number of planned or expected job opportunities in cities. Recent projections of urban and rural population for the Soviet Union have been based upon regional development plans. The volume of migration for the period covered by the projections was determined by the planning agencies on the basis of the plans for the distribution of productive investments and the plans for supplying the corresponding manpower.<sup>123</sup> By contrast, in developing countries where the scope of planning is still limited, the flow of migrants to cities often far exceeds the actual number of urban employment opportunities.

91. In contrast to the demographic projection approaches discussed thus far, the extrapolatory approaches do not utilize separate assumptions concerning fertility, mortality and migration.<sup>124</sup> The ratio method is one of the most frequently used extrapolatory techniques.<sup>125</sup> In this approach, the percentage of urban population is projected to increase according to some schedule which may be derived by extrapolation of past trends or by analogy with the experience of other countries. The rural population is then obtained as a residual. If projections of labour force engaged in agriculture are available, it is sometimes possible to project the percentage of rural population by assuming some relationship between the percentage of population residing in rural areas and the percentage dependent on agriculture. The urban population is then obtained as a residual.<sup>126</sup>

92. A variety of growth rate assumptions may be used as a basis for simple extrapolatory projections of urban and rural population. Depending on circumstances prevailing in individual countries, there may be reason to believe that fairly accurate projections can be obtained by assuming a constant rate of growth of urban population based on past experience, with the rural population obtained as a residual; or conversely, by assuming a

<sup>123</sup> Podyachikh, "Population projections in which allowance ..." (1967).

<sup>124</sup> Extrapolatory techniques were used, for example, in the following sources: Benítez Zenteno and Cabrera Acevedo, *Proyecciones de la población de México 1960-1980* (1966); Chasteland, *Projections de la population de Téhéran* (1966); Etherington, "Projected changes in urban and rural population in Kenya ..." (1965); United Nations, Economic Commission for Latin America, *Statistical Bulletin for Latin America*, vol. 2, no. 2 (1965), pp. 9, 199-200; Centro Latinoamericano de Demografía, *Boletín demográfico*, año 2, vol. 3 (1969), pp. 3, 8-9; Hama, "Kinki 6-fuken ni okeru ku-shi-cho-son ..." (1967); and his "Nihon jinko no zoka ..." (1970); Pickard, *Metropolitanization of the United States* (1959); Gómez Barrantes, *Estimaciones de población para Costa Rica* ... (1967); United Nations, *Population Growth and Manpower* ... (1960); ———, *World Housing Conditions and Estimated* ... (1965); United Nations, Economic Commission for Asia and the Far East, "Population growth and problems of employment ..." (1961); Venezuela, Oficina de Análisis Demográfico, *Proyección de la población urbana y rural de Venezuela* ... (1964).

<sup>125</sup> Applications of the ratio method in urban and rural projections can be found in the following sources: Davis, *World Urbanization 1950-1970, vol. 1: Basic Data* ... (1969); Gómez Barrantes, *Estimaciones de población para Costa Rica* ... (1967); Zobel, *Proyecciones de población para la República de Guatemala* ... (1967).

<sup>126</sup> This approach was used in United Nations, *Population Growth and Manpower* ... (1960); and Ducoff, *Human Resources of Central America* ... (1960).



TABLE XV.8. PROJECTED URBAN AND RURAL POPULATION FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-1985  
(Millions)

Major areas and regions	Urban					Rural				
	1965	1970	1975	1980	1985	1965	1970	1975	1980	1985
World total .....	1,161	1,358	1,596	1,876	2,198	2,128	2,277	2,432	2,592	2,750
Developing regions .....	527	659	826	1,029	1,270	1,725	1,885	2,055	2,229	2,403
More developed regions .....	634	699	770	847	928	404	391	378	363	347
Africa .....	61	77	98	125	160	243	268	297	331	370
Western Africa .....	16	20	26	34	44	74	81	90	99	110
Eastern Africa .....	7	10	13	18	24	79	88	99	111	125
Middle Africa .....	4	6	8	10	14	28	30	33	35	38
Northern Africa .....	24	30	38	48	60	50	56	63	71	80
Southern Africa .....	9	10	12	15	17	11	12	14	15	16
Asia (excluding the USSR) .....	411	505	630	774	943	1,422	1,548	1,677	1,806	1,931
East Asia .....	221	275	339	414	500	631	655	672	681	682
Mainland region .....	152	193	241	299	366	548	573	591	603	607
Japan <sup>a</sup> .....	47	55	64	74	83	51	48	46	42	38
Other East Asia .....	21	27	34	42	51	32	34	35	36	36
South Asia .....	190	233	291	360	443	791	893	1,005	1,125	1,249
Middle South Asia .....	119	144	179	221	270	546	618	696	780	866
South-East Asia .....	48	60	75	94	116	201	227	256	286	318
South-West Asia .....	23	29	36	45	57	44	48	53	59	65
Europe (excluding the USSR) .....	272	294	317	341	366	173	168	163	156	149
Western Europe .....	103	111	118	125	133	41	38	35	33	30
Southern Europe .....	59	65	72	80	87	64	63	62	61	59
Eastern Europe .....	51	56	62	68	73	49	48	46	45	43
Northern Europe .....	59	62	65	68	72	20	19	19	18	18
Latin America .....	129	159	196	240	291	117	124	131	138	144
Tropical South America .....	66	84	106	132	163	64	67	69	72	73
Middle America (mainland) .....	27	35	44	55	68	30	33	36	40	44
Temperate South America .....	26	30	34	38	42	10	10	9	9	9
Caribbean .....	9	11	13	15	18	14	15	16	17	18
Northern America .....	154	169	186	204	225	60	58	57	56	55
Oceania .....	11.7	13.1	14.8	16.8	18.9	5.9	6.2	6.7	7.3	7.9
Australia and New Zealand .....	11.4	12.8	14.4	16.3	18.2	2.6	2.6	2.5	2.5	2.5
Melanesia .....	0.1	0.1	0.1	0.1	0.2	2.4	2.7	3.0	3.5	4.0
Polynesia and Micronesia .....	0.2	0.2	0.3	0.4	0.5	0.9	1.0	1.1	1.3	1.4
USSR .....	123	139	155	174	194	107	104	100	97	93

SOURCE: Based on United Nations, *Monthly Bulletin of Statistics*, November 1971 (1971), table B.I.

<sup>a</sup> Urban population defined as that of "densely inhabited districts" according to the census.

constant rate of rural population growth and obtaining the urban population as a residual. Recent projections in Kenya have been made by assuming a constant urban growth rate.<sup>127</sup> The constant rural growth rate technique was followed in recent projections for Mexico and for many other Latin American countries.<sup>128</sup>

93. Recent United Nations projections of urban and rural population to the year 1985 are shown in table XV.8.<sup>129</sup> According to these projections, the world will

<sup>127</sup> Etherington, "Projected changes in urban and rural population in Kenya ..." (1965).

<sup>128</sup> Benítez Zenteno and Cabrera Acevedo, *Proyecciones de la población de México 1960-1980* (1966); United Nations, Economic Commission for Latin America, *Statistical Bulletin for Latin America*, vol. 2, no. 2 (1965), pp. 9, 199-200; Centro Latinoamericano de Demografía, *Boletín demográfico*, año 2, vol. 3 (1969), pp. 3, 8-9.

<sup>129</sup> A modification of the growth rate techniques was used in these projections. It was assumed that the difference between the urban growth rate and the rural growth rate would remain constant. For many countries the growth rate difference of the base period (1950-1960 and 1960-1965 depending on the available data) was

be about 44 per cent urban by the year 1985 (table XV.9). There will, of course, remain large differences in the level of urbanization among major areas of the world. Europe, Latin America, Northern America, Japan and the USSR will probably all be more than two thirds urban. Australia-New Zealand will be nearly 90 per cent urban. By contrast, Africa and Asia will be only about one third urban.

94. Although the level of urbanization in Africa and Asia is still quite low, these areas will, nevertheless, contain substantial urban populations. Asia alone may contain an urban population of close to 1,000 million, or more than 40 per cent of the world's urban population in 1985. By that date Asia's urban population is projected to be nearly as great as the urban population of the entire world in 1960.

projected into the future. In other countries an alternative growth rate difference was assumed on the basis of comparison with other countries. For earlier United Nations projections of urban and rural population see United Nations, *Growth of the World's Urban and Rural Population ...* (1969).

TABLE XV.9. PROJECTED PERCENTAGE OF URBAN POPULATION  
FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-1985

Major areas and regions	1965	1970	1975	1980	1985
World total .....	35	37	40	42	44
Developing regions .....	23	26	29	32	35
More developed regions .....	61	64	67	70	73
Africa .....	20	22	25	27	30
Western Africa .....	18	20	23	26	29
Eastern Africa .....	8	10	12	14	16
Middle Africa .....	14	16	20	23	27
Northern Africa .....	32	35	38	40	43
Southern Africa .....	44	46	48	50	52
Asia (excluding the USSR) .....	22	25	27	30	33
East Asia .....	26	30	34	38	42
Mainland region .....	22	25	29	33	37
Japan <sup>a</sup> .....	48	53	58	64	68
Other East Asia .....	40	44	49	54	59
South Asia .....	19	21	22	24	26
Middle South Asia .....	18	19	20	22	24
South-East Asia .....	19	21	23	25	27
South-West Asia .....	34	37	40	44	47
Europe (excluding the USSR) .....	61	64	66	69	71
Western Europe .....	72	74	77	79	81
Southern Europe .....	48	51	54	57	60
Eastern Europe .....	51	54	57	60	63
Northern Europe .....	75	76	78	79	80
Latin America .....	52	56	60	64	67
Tropical South America .....	51	56	60	65	69
Middle America (mainland) .....	48	51	55	58	61
Temperate South America .....	73	76	79	81	83
Caribbean .....	39	42	44	47	49
Northern America .....	72	74	76	78	80
Oceania .....	67	68	69	70	71
Australia and New Zealand .....	82	83	85	86	88
Melanesia .....	3	3	3	4	4
Polynesia and Micronesia .....	18	20	22	24	27
USSR .....	53	57	61	64	68

SOURCE: Based on United Nations, *Monthly Bulletin of Statistics*, November 1971 (1971), table B-II.

<sup>a</sup> Urban population defined as that of "densely inhabited districts" according to the census.

95. The highest growth rates of urban population have been calculated for Africa, Asia, and Latin America. Annual rates of urban growth between 4 and 5 per cent per year are expected for Asia and Latin America throughout the projection period and rates around 5 per cent are expected for Africa. By contrast, the annual rates of urban growth expected during the various decades of the projection period are only about 2 per cent for Northern America and 1.5 per cent for Europe.

96. The share of the world's rural population that will probably be claimed by Africa and Asia is even more overwhelming than the very large share of urban population in these areas. Whereas Africa and Asia together may contain about half of the world's urban population by 1985, these areas will probably contain more than 80 per cent of the world's rural population. The rural population in Africa and Asia is expected to continue growing by substantial amounts, while absolute declines are expected in the rural population of Europe, the USSR, Northern America and Japan in all decades of the projection period.

### 3. AGRICULTURAL POPULATION<sup>130</sup>

97. Since agriculture constitutes the largest sector of the economy in most developing countries, estimates and projections of the agricultural population are essential for the preparation of development plans. Such data are needed specifically for calculating the *per capita* gross domestic product arising from agriculture—an important indicator of the degree of agricultural development. Moreover, these data provide the basis for calculating requirements for food and other agricultural commodities in the agricultural segment of the population, and hence, for deriving estimates of the marketable surplus of agricultural products.

98. Most European countries obtain information in their population censuses on the population dependent on the different branches of economic activity, and thus

<sup>130</sup> Unless otherwise noted, the discussion in this section is drawn from Food and Agriculture Organization of the United Nations, "Methods and assumptions for projections of agricultural population" (1969).

TABLE XV.10. PROJECTIONS OF POPULATION DEPENDENT ON AGRICULTURE FOR MAJOR AREAS OF THE WORLD: 1965-1985

Major area	Population dependent on agriculture (thousands)					Agricultural population as percentage of total population				
	1965	1970	1975	1980	1985	1965	1970	1975	1980	1985
World total	1,780,901	1,860,038	1,942,891	2,021,793	2,088,613	54.1	51.2	48.3	45.4	42.3
Developing regions	1,549,229	1,653,209	1,762,291	1,867,027	1,958,436	68.8	65.0	61.3	57.5	53.5
More developed regions	231,672	206,829	180,600	154,766	130,177	22.3	19.0	15.7	12.8	10.2
Africa	218,359	239,278	263,345	290,034	318,416	72.0	69.5	66.6	63.5	60.1
Asia (excluding the USSR)	1,251,404	1,324,398	1,400,489	1,470,580	1,527,443	68.3	64.4	60.7	57.0	53.1
East Asia	553,833	561,222	570,684	578,051	581,301	65.0	60.4	56.4	52.8	49.2
South Asia	697,571	763,176	829,805	892,529	946,142	71.1	67.8	64.0	60.1	55.9
Europe (excluding the USSR)	99,234	89,013	78,070	67,029	56,284	22.3	19.3	16.3	13.5	10.9
Latin America	110,547	117,895	124,626	130,619	135,214	45.0	41.6	38.1	34.6	31.1
Northern America	11,696	9,967	8,214	7,087	6,539	5.5	4.4	3.4	2.7	2.3
Oceania	4,148	4,282	4,419	4,522	4,637	23.7	22.1	20.5	18.8	17.3
USSR	85,513	77,272	67,781	57,916	47,995	37.1	31.8	26.5	21.4	16.7

SOURCE: Data provided by the Food and Agriculture Organization of the United Nations. For a different regional classification of these projections, see Schulte, Naiken and Bruni, "Projections of world agricultural population" (1972).

Note: The totals for the world, developing and more developed regions have been adjusted to take into account discrepancies between international immigration and emigration assumptions.

obtain a direct measure of the agricultural population, consisting of persons economically active in agriculture and their dependants.<sup>131</sup> Such census data are, however, much less frequently available for countries in other continents.

99. Owing to the paucity of data on the agricultural population, it is often necessary, before preparing projections of agricultural population, to estimate the size of this population in the base year. This step is particularly required in preparing world and regional projections, since estimates prepared on a common base are needed for all countries, including those for which census data are lacking or deficient.

100. There are three principal means of obtaining such estimates: (a) from the information on farm population collected in agricultural censuses; (b) based on the ratio of agricultural labour force to the total labour force; and (c) based on observed variations of the ratio between agricultural and rural population in certain countries at different stages of economic development.

101. With respect to the first method, the few data available on both farm population and agricultural population suggest that, for the developed countries at least, there are considerable differences between the two. On the other hand, these differences appeared to be somewhat less for the few developing countries for which comparisons could be made. In applying the second method, it is usually assumed that the ratio of agricultural population to total population is equal or nearly equal to the ratio of the agricultural labour force to the total labour force. These two ratios will, of course, be equal if the dependency ratio in the agricultural sector is equal to that in the non-agricultural sector. Available data indicate that the difference between these two dependency ratios is not large, particularly in developing countries. The third method derives from the observation that the ratio of agricultural population to rural population is

inversely related to the level of economic development, as measured by *per capita* income. Data for a limited number of countries suggest that this ratio tends to fall between 20 and 50 per cent in high-income countries, 70 to 100 per cent in low-income countries and 50 to 70 per cent in countries at an intermediate income level.

102. One obvious method of projecting the agricultural population involves the extrapolation of past trends, but there are only a few countries for which the needed data are available in reliable form. Furthermore, such a procedure implies that future economic development in the agricultural sector will follow the same pattern as in the past, an assumption not consistent with the increased efforts of governments toward economic development.

103. A second method is to base the projections of agricultural population on past trends in the rural population, which are available for a larger number of countries. Simple extrapolation of past trends in the rural population can be expected to lead to over-estimates, however, since rural population may grow somewhat less rapidly than in the past, and the ratio of agricultural to rural population is likely to decrease with economic development. The Food and Agriculture Organization of the United Nations (FAO) has attempted to work out correction ratios which could be applied, based on analyses of observed decreases in the rate of growth of rural population, and in the ratio of agricultural to rural population, in countries that have already experienced such trends.

104. A method which FAO has used extensively is that of linking the projections of agricultural population with those of the agricultural labour force, since, as noted above, the ratio of the agricultural population to the total population appears to be closely correlated with the ratio of agricultural labour force to total labour force. Therefore, projections of the latter ratio may provide a reasonable basis for projecting the agricultural population. This method has been used in preparing a recent set of projections of agricultural population, the results of which for the world and major regions are summarized in table

<sup>131</sup> For a discussion of some of the problems of measuring the agricultural population see Dovring, "Labor force composition..." (1964), p. 34.

XV.10.<sup>132</sup> The projections of agricultural population were closely linked with projections of the economically active population in agriculture prepared by the International Labour Office.

105. The preparation of agricultural population projections on a national basis has been confined to a few developed countries. Some of these projections have been derived by more refined techniques than those discussed above, based on probable future trends in factors which influence the size and distribution of the agricultural population, for example, taking into account labour requirements by the size of holdings in relation to cultivation patterns and techniques of agricultural production.<sup>133</sup> The world-wide set of projections prepared by FAO, however, has necessarily had to rely on simpler techniques.

106. Table XV.10 presents projections of agricultural population for the major areas of the world from 1965 to 1985.<sup>134</sup> The table indicates the anticipated downward trend in the percentage of the agricultural population, particularly in the more developed regions. More important, however, is the anticipated increase in the total agricultural population in the less developed countries which is expected to take place despite the downward trend in its percentage of total population. According to the projections, the less developed regions can expect their agricultural population to increase by 214 million, or 13 per cent, during the decade of the 1970s, while the more developed regions would have a decrease of 27 per cent during the same period. This increase in the less developed regions, though considerably slower than that of their total population, derives its significance from the fact that it will take place in the sector of the population that is poorest, least educated, and living under the least advantageous health conditions.

#### 4. EDUCATION

107. In addition to estimates of future school-age population which are provided by projections of total population by sex and age, the development of educational planning, in recent years particularly, has indicated the need for more detailed and comprehensive educational projections which include school enrolment and output

by level and type of education and projections of total population by educational attainment.

108. Various countries have made projections of educational enrolment and output, either within the framework of educational planning or in other contexts such as comprehensive and regional development plans and human resources plans. Very detailed educational projections are made in countries with centrally planned economies.<sup>135</sup> Projections of enrolment and output are also common phenomena in other developed countries.<sup>136</sup> In some developing countries work of this type has gradually been expanding.<sup>137</sup> Projections of school-age population and school attendance are part of a comprehensive study on population and manpower growth in the Philippines (1957-1977).<sup>138</sup> A similar study also was made for Central America and Mexico.<sup>139</sup> Projections for various Latin American countries prepared at the Latin American Demographic Centre (CELADE) concentrate mainly on the school-age population and enrolment in the first and second levels of education, though for some countries projections of university graduates, requirements for teachers and classrooms, and expenditures per pupil are also included.<sup>140</sup>

109. A frequent approach in enrolment projections is to extrapolate past trends in enrolment rates and apply the projected rates to a projected sex-age distribution of the population.<sup>141</sup> In some instances, enrolment rates have been projected on the basis of analytic studies relating changes in enrolment rates to changes in other socio-economic variables. Changes in socio-economic composition may be allowed for, to some extent, by separate projections of rates for the component categories, such as urban and rural population.<sup>142</sup>

110. There are several regional experiments in educational planning which include a variety of projections. One is the African Educational Development Programme sponsored by the African Governments and UNESCO.<sup>143</sup>

<sup>135</sup> Nozhko, *Methods of Estimating the Demand for Specialists* ... (1964).

<sup>136</sup> Belgium, Conseil National de la Politique Scientifique, *Rapport sur la croissance des populations étudiantes* (1961); Borrie and Dedman, *University Enrolments in Australia* ... (1957); Watson, Quazi and Kleist, *Ontario Secondary School Enrollment Projections* ... (1970); Pressat, "Croissance des effectifs scolaires ..." (1958); United States of America, Bureau of the Census, *Summary Demographic Projections* (1968).

<sup>137</sup> See, for instance, Nadarajah, *Projections of the School-Going Population of Ceylon* ... (1961); Khan, "A demographic approach to educational planning in Pakistan" (1969); Amine-Zadeh, "Impact de la croissance démographique en Iran ..." (1967).

<sup>138</sup> United Nations, *Population Growth and Manpower* ... (1960).

<sup>139</sup> Ducoff, *Human Resources of Central America* ... (1960).

<sup>140</sup> For examples of different kinds of projections see Peláez and García, *Panamá* ... (1965); Gutiérrez Roldán, *Proyección de la población de Chile* ... (1963); Mellon, *La enseñanza primaria en la República Dominicana* ... (1966); and Centro Latinoamericano de Demografía, *República de Guatemala, Volumen 1* ... (1965), pp. 47-67. Some of the projections were prepared separately for urban and rural areas.

<sup>141</sup> See, for instance, UNESCO, *Projections à long-terme de l'éducation au Laos* (1965).

<sup>142</sup> United Nations, Economic Commission for Latin America, *Some Aspects of Population Growth in Colombia* (1962).

<sup>143</sup> United Nations, Economic Commission for Africa and UNESCO, *Final Report, Conference of African States* ... (1961).

<sup>132</sup> Food and Agriculture Organization of the United Nations, data to be published.

<sup>133</sup> Projections of the agricultural population of Sweden to 1980 have been based on some of these considerations. See Norborg, *Jordbruksbefolkningen i Sverige* ... (1968), pp. 228-229. For recent projections of the agricultural population of France see Locoh, "La population des ménages agricoles ..." (1970); for earlier projections of the male agricultural population see Febvay, "La population agricole française ..." (1956). Projections of the agricultural labour force, which often serve as a basis for projections of agricultural population, have been prepared, for example, by Pressat, "La population agricole en France ..." (1957).

<sup>134</sup> Earlier projections of agricultural population to 1985 for specific developing regions appear in Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan* ... (1970), p. 23; for projections to the year 2000 for some of these regions see Organisation for Economic Co-operation and Development, *The Food Problem of Developing Countries* (1968), p. 70. Concerning future prospects of agricultural population in developing regions, see also Dovring, "The share of agriculture in a growing population" (1959).

TABLE XV.11. PROJECTIONS OF SCHOOL ENROLMENT IN THE ECAFE REGION, <sup>a</sup> 1964-1980

Level of education	1964	1970	1975	1980
<i>Thousands</i>				
First level (grades I-VII) .....	103,769	141,672	179,420	225,154
Grades I-V .....	90,767	121,470	149,583	181,411
Grades VI-VII .....	13,002	20,202	29,837	43,743
Second level (grades VIII-XII) .....	14,436	23,202	34,011	50,272
Lower stage (grades VIII-X) .....	10,919	17,733	26,175	39,811
General .....	9,197	13,787	18,850	28,760
Vocational .....	1,722	3,946	7,325	11,051
Upper stage (grades XI-XII) .....	3,517	5,469	7,836	10,461
General .....	1,935	3,032	4,418	6,105
Technical and vocational .....	1,048	1,826	2,959	4,037
Teacher training .....	534	611	459	319
Third level (grades XIII +) .....	1,925	3,136	4,436	5,454
Teacher training (XIII-XIV) .....	68	179	185	164
Technical course (XIII-XIV) .....	47	171	402	701
Science and other (XIII +) .....	751	1,252	1,851	2,278
Arts and other (XIII +) .....	1,059	1,534	1,998	2,311
<i>Enrolment ratios<sup>b</sup></i>				
First level (grades I-VII) .....	60.7	70.3	79.7	90.3
Grades I-V .....	71.5	81.6	90.4	99.5
Second level (grades VIII-XII) .....	15.1	19.5	24.8	32.6
Third level (grades XIII +) .....	3.0	3.9	4.6	5.0

SOURCE: UNESCO, *An Asian Model of Educational Development* ... (1966), table 19.

<sup>a</sup> Countries participating in the "Karachi Plan" (see text). Included are Afghanistan, Burma, Cambodia, Ceylon, China (Taiwan), India, Indonesia, Iran, Republic of Korea, Laos, Malaysia, Mongolia, Nepal, Pakistan, the Philippines, the Republic of Viet-Nam, Singapore and Thailand.

<sup>b</sup> Enrolment as a percentage of corresponding age groups, that is, first level, ages 6 to 12; second level, ages 13 to 17; third level, ages 18 to 21.

A similar programme initiated in Asia<sup>144</sup> (referred to as the "Karachi Plan") stimulated studies and educational projections which resulted in the preparation by UNESCO of the comprehensive study known as the "Asian model".<sup>145</sup> It attempted to visualize in quantitative terms the prospects of educational development until 1980, to illustrate the interrelationship of the main factors involved in educational development, and, finally, to draw attention to the important implications for educational development that become evident when specific data are examined systematically and quantitatively. The model covers a wide variety of aspects of educational developments. Besides projections of school enrolment and output (by grades), teacher stock and requirements, and enrolment in teacher-training institutions, it deals also with literacy and adult education and the financial implication of this projection. Countries participating in the Karachi Plan were divided into three groups, taking into account their actual and projected demographic, educational, economic and social conditions. School enrolment projections for the combined groups of countries are shown in table XV.11.

111. Projections of population by educational achievement or categories relevant to manpower requirements are confined mainly to developed countries. An example is the projection of educational levels of the Italian

population, worked out by SVIMEZ (Associazione per lo Sviluppo dell'Industria nel Mezzogiorno). The study gives a set of demographic projections related to anticipated growth of the economy and education. Among other aspects the projection covers (a) population by sex and age; (b) labour force by sex and age; (c) occupational structure of the labour force and (d) student population and educational output.<sup>146</sup>

112. Elaborate educational projections have also been made by the Organisation for Economic Co-operation and Development (OECD). These projections are part of the comprehensive studies and projections aimed at assessment of future requirements in manpower in relation to anticipated economic development. One OECD regional study was the Mediterranean Regional Project, which included educational projections for 1960-1975 for the six countries of Greece, Italy, Portugal, Spain, Turkey and Yugoslavia.<sup>147</sup>

113. As is evident even from this brief review, considerable progress has been achieved in the development and application of methods for making educational projections. In this process the work of UNESCO has played an important role of leadership in developing

<sup>144</sup> UNESCO, *Final Report, Meeting of Ministers* ... (1963).

<sup>145</sup> UNESCO, *An Asian Model of Educational Development* ... (1966).

<sup>146</sup> Associazione per lo Sviluppo dell'Industria nel Mezzogiorno, *Trained Manpower Requirements for the Economic Development in Italy* ... (1961).

<sup>147</sup> Organisation for Economic Co-operation and Development, *Mediterranean Regional Project, Country Reports: An Experiment in Planning* ... (1965).

methodological manuals,<sup>148</sup> and in the preparation of country and regional studies.

114. Educational planning will undoubtedly increase the demand for educational projections in forthcoming years and there is clearly a need to further develop methodology in this field. Among the questions calling for research are those pertaining to the influence upon enrolment of the labour force status and the family status of the individual and the relationship between rates of enrolment in higher education and the educational and occupational status of parents.<sup>149</sup>

115. There is also a need for developing the cohort approach to enrolment projections, which would give entries and separations along with the projected enrolment, by age and sex. The development of accession and withdrawal probabilities and of "tables of school life" should facilitate the application of this method. The future distribution of the population by educational attainment is obviously correlated with the future occupational pattern and it will be useful, therefore, to pursue the study of educational and training requirements for workers belonging to different occupations.<sup>150</sup>

116. It is widely accepted that educational projections cannot be merely extrapolations of past trends, but that they need to reflect changes resulting from new requirements and educational goals. While, as mentioned above, this makes the task of preparing educational projections much more complex, it contributes to making such projections more viable and responsive to the real and emerging conditions in both the developing and developed countries.

## 5. HOUSEHOLDS AND FAMILIES

117. A growing number of countries have found it desirable to have projections of the number of households or families, since they, rather than individuals, are the primary units of consumption, and information on their numbers and characteristics has great relevance for many kinds of economic and social planning. Examples include the fields of housing and social welfare. Around 1970, projections of households or families had been prepared for at least twenty-three countries.<sup>151</sup> In the United States of America, for example, the first series of household projections were prepared in 1937,<sup>152</sup> and new

projections have regularly been made whenever new data from a census or national sample survey became available.

118. For fifteen of the twenty-three countries, household projections have been prepared by the "headship rate" method,<sup>153</sup> while for the remaining eight countries, either simple mathematical extrapolation,<sup>154</sup> or highly complex methods—for example, employing various multi-decremental life tables—have been used.<sup>155</sup> The "headship rate" method is the one most widely used in developed countries having the required statistical data. As explained in chapter X, the "headship rate" denotes a ratio of the number of heads of households or families, classified by sex, age and sometimes by marital status, to the corresponding categories of population. In projections based on this method, headship rates for the population categories mentioned above are often assumed to remain constant,<sup>156</sup> although it is realized that for many regions, changing rates would present a more realistic picture of future trends.<sup>157</sup> To obtain the household or family projections, projected headship rates are applied to the population projections by sex and age, and in some cases by marital status.

119. The United Nations has prepared provisional projections of households by the headship rate method for the world and 24 regions for the period 1965-1985. These projections are summarized in table XV.12. The future levels of headship rates were estimated by developing regional models based on data from countries within the region or from countries outside the region having a similar demographic situation, and by multiple regression analyses between sex-age-specific headship rates and economic and social factors—mainly, the pro-

<sup>148</sup> The most recent manual is United Nations/UNESCO, *Estimating Future School Enrolment in Developing Countries* ... (1966). This manual contains detailed methodological case studies estimating future school enrolment for Colombia, 1961-1981, for the Philippines, 1965-1980, and for the Sudan, 1962-1971, as well as examples of projections made in various more developed countries. Earlier publications on methodology include: Jacoby, *Methods of School Enrolment Projection* (1959); Goldstein and Swerdloff, *Methods of Long-Term Projections of Requirements for and Supply of Qualified Manpower* (1967); UNESCO, International Institute for Educational Planning, *Manpower Aspects of Educational Planning* ... (1968).

<sup>149</sup> See, for instance, Conger, "College and university enrolment projections" (1962).

<sup>150</sup> Tilak, "Some problems in projecting the economically active population" (1967).

<sup>151</sup> United Nations, *Manual VII: Manual on Methods of Projecting Households and Families* (1973).

<sup>152</sup> United States, National Resources Committee, *The Problems of a Changing Population* ... (1938).

<sup>153</sup> The following are examples of projections based on the "headship rate" method. United States of America, Bureau of the Census, *Illustrative Projections of the Number of Households* ... (1958); Pressat, "Un essai de perspectives de ménages" (1959); Cullingworth, *Housing Needs and Planning Policy* (1960); the Netherlands, Central Directorate of Housing and Building, *Monograph on the Housing Situation in the Netherlands* (1964); Tamásy, "Projections of families in Hungary ..." (1967); Japan, Institute of Population Problems, *Zenkoku todofuken-betsu setaisu no shorai suikei* ... (1966).

<sup>154</sup> For examples of projections based on simple mathematical extrapolation, see Dousa, "Problémy zjstovani perspektivni skladby domacnosti" (1959); Sentić and Breznik, "Demografska kretanja i projekcije u Jugoslaviji" (1964).

<sup>155</sup> For a discussion of some of the more complex methods see Brown, "Analysis of a hypothetical stationary population ..." (1957); Glass and Davidson, "Household structure and housing needs" (1951); Illing, *Population, Family, Household and Labour Force Growth to 1980* (1967).

<sup>156</sup> Examples of such projections include: United States of America, National Resources Committee, *The Problems of a Changing Population* ... (1938), p. 25; Calot, "Perspectives du nombre des ménages ..." (1964); Walkden, "The estimation of future numbers of private households ..." (1961); Belgium, Institut National du Logement, *Estimation des besoins en logements* ... (1965).

<sup>157</sup> The following projections have assumed changing headship rates: United States of America, Bureau of the Census, *Illustrative Projections of the Number of Households* ... (1958); Cullingworth, *Housing Needs and Planning Policy* (1960); Japan, Institute of Population Problems, *Zenkoku todofuken-betsu setaisu no shorai suikei* ... (1966); Schubnell, "Statistical ascertainment of households and families in the census ..." (1969); Calot et al., *Projections démographiques pour la France* ... (1970).

TABLE XV.12. PROJECTIONS OF THE NUMBER OF HOUSEHOLDS FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1965-1985

Major areas and regions	Total number of households (thousands)					Average size of households (persons)				
	1965	1970	1975	1980	1985	1965	1970	1975	1980	1985
World total .....	724,780	812,957	916,837	1,036,669	1,173,508	4.54	4.47	4.39	4.29	4.20
Developing regions .....	431,653	492,587	565,319	652,767	757,543	5.22	5.16	5.08	4.97	4.82
More developed regions ....	293,127	320,370	351,518	383,902	415,965	3.54	3.40	3.26	3.15	3.06
Africa .....	60,749	69,227	79,249	91,147	105,453	4.99	4.97	4.99	5.01	5.03
Western Africa .....	18,123	20,558	23,438	26,846	30,871	4.94	4.93	4.94	4.97	5.02
Eastern Africa .....	17,532	19,885	22,671	26,004	29,947	4.93	4.92	4.93	4.95	4.98
Middle Africa .....	6,605	7,384	8,306	9,349	10,576	4.89	4.86	4.86	4.90	4.96
Northern Africa .....	14,456	16,805	19,599	23,009	27,277	5.15	5.15	5.18	5.19	5.14
Southern Africa .....	4,033	4,595	5,235	5,939	6,782	5.04	5.07	5.13	5.24	5.34
Asia .....										
East Asia .....	167,703	191,282	219,501	250,618	285,247	5.08	4.86	4.61	4.37	4.14
Mainland region .....	134,498	151,915	172,524	195,945	223,142	5.21	5.04	4.83	4.60	4.36
Japan .....	23,981	28,297	33,388	37,704	41,541	4.08	3.66	3.29	3.09	2.92
Other East Asia .....	9,224	11,070	13,589	16,969	20,564	5.84	5.51	5.07	4.58	4.25
South Asia .....	186,914	213,645	245,239	284,345	332,373	5.25	5.27	5.28	5.23	5.09
Middle South Asia .....	126,563	143,436	163,436	188,157	218,189	5.25	5.31	5.36	5.32	5.21
South-East Asia .....	48,287	55,435	64,465	75,917	89,604	5.16	5.18	5.13	5.01	4.85
South-West Asia .....	12,064	14,774	17,338	20,271	24,580	5.54	5.22	5.17	5.15	4.94
Europe .....	134,682	144,244	153,872	163,829	173,561	3.30	3.20	3.12	3.03	2.97
Western Europe .....	47,264	50,040	52,710	55,450	58,170	3.03	2.97	2.91	2.85	2.81
Southern Europe .....	31,175	34,011	37,046	40,182	43,413	3.94	3.78	3.62	3.49	3.36
Eastern Europe .....	30,245	32,989	35,474	38,240	40,584	3.31	3.16	3.05	2.94	2.86
Northern Europe .....	25,998	27,204	28,642	29,957	31,394	3.03	2.98	2.92	2.88	2.87
Latin America .....	48,274	55,547	64,441	75,091	87,856	5.09	5.10	5.07	5.02	4.95
Tropical South America ..	24,356	28,377	33,303	39,232	46,336	5.33	5.31	5.26	5.19	5.10
Middle America (mainland)	10,128	11,856	14,039	16,738	20,114	5.62	5.69	5.69	5.66	5.57
Temperate South America.	8,586	9,488	10,511	11,661	12,946	4.19	4.15	4.08	4.01	3.92
Caribbean .....	5,204	5,826	6,588	7,460	8,460	4.43	4.43	4.37	4.31	4.24
Northern America .....	62,357	68,219	74,875	82,295	89,688	3.44	3.34	3.24	3.17	3.13
Oceania .....	4,391	5,046	5,754	6,559	7,377	3.99	3.84	3.75	3.66	3.63
Australia and New Zealand	3,811	4,375	4,966	5,628	6,276	3.68	3.51	3.42	3.34	3.31
Melanesia .....	414	489	539	624	729	5.92	5.89	5.84	5.74	5.65
Polynesia and Micronesia .	166	202	249	307	372	6.33	6.07	5.75	5.39	5.19
USSR .....	59,710	65,747	73,906	82,785	91,953	3.86	3.69	3.46	3.27	3.12

SOURCE: *Demographic Aspects of Households and Families* (to be issued as a United Nations publication).

portion of the male labour force engaged in non-agricultural activities, *per capita* income, labour force participation rates and marital status composition. In general, the projected headship rates are shown to increase moderately over time.

120. According to the medium variant projections, as shown in table XV.12, the number of households in the world as a whole, estimated at 725 million in 1965, will increase to 1,174 million by 1985, an increase of 62 per cent. This is faster than the rate of increase of the population, since a declining trend in average size of household is projected. Thus, whereas the average household is estimated to have had 4.54 persons in 1965, this figure is expected to gradually decrease, and to reach 4.20 by 1985.

121. Average household size is shown to decrease in the future in most of the major regions as a result of the expected world-wide fertility decline. However, the projections show an increase in average household size in some regions of Africa, as well as in South Asia up to

1975. In Africa this increase results from the fact that fertility is not expected to decline in most regions until after in the century. Moreover, the anticipated continuous declines in mortality in all regions can offset the effects of fertility decline when the latter is not of great magnitude.

122. The table also shows that there is likely to be a trend towards a convergence of average household size in the different regions. By 1985 the range of projected averages is narrower than it was initially in 1965. This is mainly a reflection of the trend towards convergence with respect to fertility, mortality and nuclearization of the family (see chapter X).

123. Despite the larger average household size in the developing regions, which means that the number of households relative to the population is lower than in the developed regions, the sheer magnitude of the growing numbers of households in the developing regions is impressive. The absolute number of households is expected to grow much faster in the developing than in the developed regions, and consequently the share of the world's



households in the former regions will increase—from an estimated 60 per cent in 1965 to about 65 per cent in 1985. The expansion in the number of households is expected to amount to 15 to 16 per cent during each five-year period from 1970 to 1985. It is easy to foresee how prevailing housing shortages may be further aggravated by such growth.

124. In addition to projections of the total number of households, demands have been growing for more detailed types of projections by household composition. These include projections of households of different sizes, that is, projections of one-person, two-person households etc. Such projections are useful for planning in such areas as housing, social development, the production and distribution of consumer durable goods, and the like. Such planning is likely to become even more important in the future. Few such projections have been prepared thus far, however, owing to the paucity of pertinent data and the inadequacies of existing methodology.<sup>158</sup> Projections of this kind thus remain essentially at an experimental stage and await the development of more elaborate techniques.

#### 6. THE NEED FOR A CO-ORDINATED SYSTEM OF DEMOGRAPHIC PROJECTIONS

125. The broad view of the field of demographic projections considered in this section points out the mutual interrelations that exist between the dynamic factors producing changes in the over-all size and sex-age composition of a country's population and the changes occurring within specific socio-economic sectors of that population.

126. As has been observed, the principal influence by far in changes in the size of the labour force is exerted by changes in the size and sex-age composition of the total population. Changes in the size of the population of school-age is, of course, an important factor in the changes in school enrolment, although many factors of a legal, economic or political policy nature intervene to determine the actual size of the student population at various levels of education. Conversely, the differential patterns and trends in fertility and mortality as between the rural and urban components of a country's population are a determinant of the changes that occur in the size and sex-age composition of a country's total population. There are also interdependencies of varying degrees between some of the above-discussed socio-economic categories of population. For example, changes in school enrolment for grades above a certain level, or changes in the average number of years of school completed by school-age youths can produce certain corresponding changes in

their labour force participation rates and therefore in the size of the labour force. Likewise, changes in marriage rates or in the average age of marriage exert an influence either on labour force participation rates or school attendance rates, in addition to the effect on family or household formation and ultimately on changes in fertility rates. There are also certain reciprocal relationships between the agricultural population, the rural population and the economically active population.

127. These and other interrelationships among the sectoral components or socio-economic categories of the population point up the need for a co-ordinated system of demographic projections that are reconcilable with a common set of total population projections by sex and age.<sup>159</sup> In addition, there is, of course, the necessity of maintaining consistency among projections of the labour force, school enrolment and families or households which are based on total population projections by sex and age in combination with appropriate participation and headship rates specific for sex and age. Projections of the population dependent on agriculture should be internally consistent with corresponding projections of the agricultural labour force on the one hand, and with the rural population on the other.

128. The usefulness of a co-ordinated system of demographic projections which reflects the effects of the strictly demographic variables on population size and sex-age composition and the effects of economic and social factors on occupational structure, urban-rural distribution, educational level etc. is illustrated in a recent study by Macura. Utilizing available projections of population in functional age groups and of population structures, in terms of broad economic sectors and urban-rural distribution, the author examined the multidimensional interactions of alternative levels of economic development and population growth projected to the end of this century. The analysis illustrated the difficulties of achieving rapid economic development and bringing about significant changes in population structure under conditions of rapid population growth. At the same time it also suggested the need for rapid economic growth in order to bring about population change.<sup>160</sup>

129. Work on total population projections by age and sex is much more advanced methodologically than the other types of demographic projections, although further progress is desirable, particularly in modifying and updating model life tables, developing the cohort approach in projecting fertility, and studying the factors influencing future trends of international migration. Improved projections of urban and rural population, based on the component technique, call for the development of better measures of rural-urban differentials in fertility and in mortality, better measures (both direct and indirect) of internal migration and of the short and long range effects of migration selectivity on patterns of fertility and mortality.

<sup>158</sup> For examples of such projections, see Brown, "Analysis of a hypothetical stationary population ..." (1957); Glass and Davidson, "Household structure and housing needs" (1951); Tamásy, "Projections of families in Hungary ..." (1967); Schubnell, "Statistical ascertainment of households and families in the census ..." (1969). The United States of America, Bureau of the Census has prepared projections of the number of households by various family types, such as husband-wife type households, single-member households and others. See United States of America, Bureau of the Census, *Projections of the Number of Households ...* (1968).

<sup>159</sup> As indicated in other chapters, the interrelationships on which a co-ordinated system of projections is based have not yet been sufficiently studied, so that the projections themselves cannot be expected to be completely satisfactory at the present stage.

<sup>160</sup> Macura, "Demographic prospects for the next thirty years" (1971).

130. In terms of model development, more research needs to be focused on the influence of various levels of educational attainment on fertility and mortality differentials within the urban and rural environments, respectively. The results of such research used in conjunction with projected levels of educational attainment would help improve the efficiency of the model used for population projections. The suggested research would also help to determine to what extent rural-urban differences in fertility and mortality are due primarily to educational differentials rather than to "urbanism" or "rurality" *per se*.

#### D. The use of demographic projections in planning

131. In the shaping of national development strategy—at the policy-making levels and in planning—it is increasingly recognized that many demographic variables have to be considered in conjunction with economic and social variables. While these demographic variables are influenced by prevailing economic and social conditions, the latter are in turn influenced by population growth and structure. Because of their complexity, these interrelationships between demographic, economic and social factors are not easy to study and are not yet well understood. For planning purposes, the need for studying the relation of population size, density, growth and structure to available resources, levels of development and economic growth have been particularly stressed. In addition, it is important to have information concerning the size and growth of population components such as the child population, the school-age population, the working-age and old-age population and other population segments which are directly related to the functioning of the national economy, or which require specific social services.<sup>161</sup>

132. Improved knowledge of the interrelationships of various demographic and other factors is essential in order to provide a firm basis for different types of demographic projections. These projections are needed at every step of national and regional planning, since the population of a country is both the producer and consumer of goods and services. Hence, population trends play a major role in determining the size and composition of the labour supply, as well as the volume and composition of consumption needs.<sup>162</sup>

133. Although the importance of demographic projections for development planning is widely recognized, current planning techniques do not adequately allow for demographic considerations as integral components of economic and social development. Macura has noted that the existing economic models usually comprise population and labour force variables, either explicitly or implicitly, but with a rather limited scope.<sup>163</sup> On the other hand, demographic models and projections are often limited to population variables in the narrow sense—generally

fertility, mortality, and the size and sex-age structure of the population.<sup>164</sup> These limitations can be expected to be gradually overcome with the improvement of data and basic knowledge needed for the development of comprehensive models.

134. In view of the interdependence between demographic variables and economic and social development, the results of population projections based on purely demographic analyses sometimes have to be modified to take account of the probable effects of the development plan.<sup>165</sup> The preparation of such modified projections requires close co-operation between demographers, planners and the varied institutions engaged in development planning.<sup>166</sup>

135. Demographic projections of various kinds have applications in planning both at the national and regional levels. Estimates of future total population are essential at the first step of planning when general targets of development are set out.<sup>167</sup> One of the principal targets of an economic development plan is an increase in income, which is not independent of the rate of population growth. If the plan assumes an increase in the aggregate income, the corresponding change in *per capita* income—and consequently of the level of living—will obviously depend on the growth of population. If the target is to increase *per capita* income, one needs to know the future size of the population in order to estimate the aggregate quantity of national income that has to be produced.<sup>168</sup>

136. The principal kinds of demographic projections which have been developed in recent years have been discussed in earlier sections of this chapter. They include projections of the population by sex and age, projections of labour force, urban and rural population, agricultural and non-agricultural population, school enrolment, and households and families. The roles and uses of different kinds of demographic projections in each of the principal sectors of planning are discussed below.

#### 1. INDUSTRIAL DEVELOPMENT

137. Manpower projections are of particular importance in the process of development planning, since they measure the future employment needs of the population, and full employment is often considered among the primary development targets.<sup>169</sup> Along with measures of

<sup>161</sup> United Nations, *Report of the Interregional Seminar ...* (1969), pp. 12-15.

<sup>162</sup> United Nations, *General Principles for National Programmes ...* (1965), pp. 2-3.

<sup>163</sup> Macura, "Relation between demographic projections ..." (1967), p. 12. On the neglect of demographic factors and effects, see also Meade *et al.*, "Demography and economics" (1970), p. 25.

<sup>164</sup> Macura, "Relation between demographic projections ..." (1967), p. 12. See also Brass, "Summary of discussion" (1963), p. 372.

<sup>165</sup> See, for example, Starovsky, "Metodika issledovaniia elementov ..." (1964), pp. 3-4.

<sup>166</sup> United Nations, Economic Commission for Asia and the Far East, *Projections of Population of Sub-National Areas* (1969), pp. 6, 46.

<sup>167</sup> See chapter XVI.

<sup>168</sup> On the role of the rate of population growth in target setting, see, for example, United Nations, Economic Commission for Asia and the Far East, *Programming Techniques ...* (1960), pp. 12-13.

<sup>169</sup> United Nations, Economic Commission for Asia and the Far East, "Economic development and planning in Asia and the Far East" (1955), p. 34. In the less developed countries, because of the large backlogs of unemployment and under-employment which frequently exist, planning goals often cannot aim at full employment, but may have more modest goals of providing employment  
(Continued on next page)

economic factors, labour force projections provide the basis for estimating future economic growth in general and in manufacturing and related industries in particular. Classified by such characteristics as sex, age, educational level, occupation and industrial sector, they may be matched against projections of labour demand in order to assess probable surpluses or shortages of different types of labour. Such analyses permit corrective measures to be taken, for example, through adjustments in employment plans, or in educational and training programmes.<sup>170</sup> Information on the availability of various kinds of skilled labour, which can be estimated from educational and training programmes, is usually of special importance for development planning.<sup>171</sup>

## 2. AGRICULTURAL DEVELOPMENT

138. Projections of the size and sex-age composition of the total population are used in calculating prospective food demands, based on the nutritional requirements of different population groups. Food production goals set on the basis of such projections have implications for various other aspects of planning, such as investment in agriculture and related sectors, the training of workers and the application of new techniques. Closely related are estimates and projections of the agricultural labour force and its demographic characteristics. These are needed for formulating measures to raise agricultural productivity and for shifting surplus workers to the non-agricultural sector. In addition, projections of total agricultural population, including both workers and dependants whose main sources of livelihood is in the agricultural sector, are needed for estimating the adequacy of income in this sector and assessing the extent of agricultural overpopulation. Projections of agricultural population also permit the calculation of the marketable surplus of agricultural production.<sup>172</sup>

## 3. EDUCATION

139. School enrolment projections for the different educational levels, derived by applying forecasts of enrolment ratios to the population projections of school-age population, provide the basis for developing adequate teacher training programmes, as well as plans for school

and college construction.<sup>173</sup> These projections are also indispensable for estimating the cost of the educational system; the higher the ratio of the projected school-age population to the total population, the greater the need—other things being equal—for teachers, classrooms, books etc.<sup>174</sup> Planning in the education sector involves not only providing basic facilities to meet the demands of the cohorts of school-age population, but also calls for improvements in quality and changes in types of education to equip the future labour force with the skills required by an industrializing economy.<sup>175</sup> Long-term projections of manpower requirements are thus desirable for educational planning, while shorter-term forecasts of manpower needs are basic to vocational training programmes.<sup>176</sup>

## 4. HEALTH

140. Population projections provide the means for more accurately anticipating demands for various types of medical facilities, such as hospital beds and health care units, and for specialized medical and health personnel.<sup>177</sup> As medical needs vary markedly with age, and to some extent with sex, the sex and age composition of the future population is particularly pertinent.<sup>178</sup> Different health programmes have to be developed for young children—the group hardest hit by disease—for workers in particular occupations and industries,<sup>179</sup> and for aged persons, who constitute an increasing proportion of the population in many countries.<sup>180</sup>

141. The planning of other programmes closely related to health conditions, such as sanitation services, including

(Footnote 169 continued)

for the annual additions to the labour force and gradually absorbing the unemployed over a longer time period. International Labour Office, *Employment and Economic Growth* (1964), pp. 130-131. See also the discussion of employment targets in development plans in chapter XVI, section B.

<sup>170</sup> United Nations, *General Principles for National Programmes* ... (1965), pp. 17-18.

<sup>171</sup> Bhalla, "Manpower planning in the context ..." (1967), p. 482. For an application of such analyses of future labour supply and demand, see Zschock, *Manpower Perspective of Colombia* (1967).

<sup>172</sup> For a discussion of the role played by demographic factors in planning for food and agricultural development, see United Nations, *Report of the Interregional Seminar* ... (1969), pp. 20-23; —, *Current Status and Development of Demographic Studies* ... (1969), pp. 19-24. See also Food and Agriculture Organization of the United Nations, "Methods and assumptions for projections of agricultural population" (1969).

<sup>173</sup> See, for example, United Nations, *General Principles for National Programmes* ... (1965), p. 22; United Nations/UNESCO, *Estimating Future School Enrolment* ... (1966), pp. 10-11; United Nations, *Science and Technology for Development* (1963), vol. 6, p. 41.

<sup>174</sup> Sauvy has noted that "Fortunately, the increasingly widespread practice of making population forecasts makes it possible to calculate several years ahead, on the national scale, the number of pupils covered by compulsory education and the number of teachers in certain hypothetical cases. Although local contingencies consequent on internal migration remain, school building plans can be drawn up with some assurance, and an unexpected increase in the number of pupils can no longer qualify as an excuse." Sauvy, "Social factors in education plans" (1964), p. 102.

<sup>175</sup> United Nations, *Report of the Interregional Seminar* ... (1969), pp. 27-28.

<sup>176</sup> United Nations, *Planning for Economic Development* (1963), p. 24; —, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* (1964), p. 8.

<sup>177</sup> Llewelyn-Davies and Macaulay, *Hospital Planning and Administration* (1966), pp. 64-65; World Health Organization, Pan American Sanitary Bureau, *Health Planning* ... (1965), p. 43. It has been estimated, for example, that 420,000 more hospital beds will be required in Latin America by 1980 (an increase of more than 50 per cent as compared to 1965) simply to maintain the low ratio of 3.2 beds per 1,000 population. —, *Administration of Medical Care Services* (1966), p. 116.

<sup>178</sup> World Health Organization, Pan American Sanitary Bureau, *Health Planning* ... (1965), p. 40; Bogatyrev, "Znachenie zabol'vaemosti ..." (1970), p. 9.

<sup>179</sup> Biraud, "Implications of population trends ..." (1964), p. 122.

<sup>180</sup> Bedny, *Prodolzhitel'nost' zhizni* ... (1967), pp. 184, 188.

water supply and sewerage, has to rely on data obtainable from population projections for small areas.<sup>181</sup>

## 5. HOUSING

142. The rate of population growth in urban and rural areas, and more particularly, changes in the number and size of households or families, are essential data for estimating future housing needs.<sup>182</sup> Household or family projections give an indication of the number of new dwelling units which must be provided during a given time to house the population according to any given standard of accommodation; additional units may be required to make up for existing shortages and to replace dilapidated dwellings.<sup>183</sup> Projections of changes in household or family composition by sex, age and marital status provide important information for calculating needs for housing units by type and size.<sup>184</sup> Besides estimates of

<sup>181</sup> Biraud, "Implications of population trends ..." (1964), pp. 121, 126-127. See also World Health Organization, Pan American Sanitary Bureau, *Health Planning ...* (1965), pp. 41-42. As an example of the use of population projections for various aspects of urban planning, including the provision of water supply and electric energy, see Pinheiro and Norton, "Evolução demográfica de Lourenço Marques ..." (1966).

<sup>182</sup> Sovani, "Statement by the moderator" (1966), pp. 172-173. For an example of the utilization of population projections in estimating housing needs in urban and rural areas, see Trevallion, *Metropolitan Kano ...* (1963), pp. 53, 61. Some of the implications of expected trends in urban population growth in Asia for housing needs are discussed in United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* (1964), pp. 34-35.

<sup>183</sup> United Nations, "Implications of population trends ..." (1964), p. 113; Cabello, "Estimation of housing needs in Latin America" (1969), pp. 442-444.

<sup>184</sup> See, for instance, Eversley and Jackson, "Problems encountered in forecasting ..." (1967), pp. 418-422; Platonov, "Demo-

graphic indicators helping to determine ..." (1967), pp. 431-437; Steigenga, "The contribution of demography ..." (1969), pp. 124-126.

## 6. REGIONAL AND URBAN DEVELOPMENT

143. Since rates of population growth and the composition of the population are not identical in different regions of a country, planning for the development of different areas requires separate demographic projections for subnational areas.<sup>185</sup> Projections for urban and rural areas, which take into account differences in natural increase and the rate of rural-to-urban migration, are particularly valuable owing to the substantial differences in economic and social conditions between such areas. Local projections for small areas may also be required for such purposes as the planning of housing projects, school construction, the location of industrial plants, provision of adequate hygienic and sanitary installations, transportation, and the like.<sup>187</sup>

<sup>185</sup> United Nations, Economic Commission for Latin America, *Social Change and Social Development Policy in Latin America* (1970), p. 217.

<sup>186</sup> See, for example, United Nations, *General Principles for National Programmes ...* (1965), pp. 5-6; ———, Economic Commission for Asia and the Far East, *Projections of Population of Sub-National Areas* (1969), p. 4; De Rita and Ruberto, "L'utilizzazione delle previsioni demografiche ..." (1968).

<sup>187</sup> United Nations, *General Principles for National Programmes ...* (1965), pp. 5-6; ———, *Report of the Interregional Seminar ...* (1969), pp. 36-37. See also Steigenga, "The contribution of demography ..." (1969), pp. 121 ff.

## Chapter XVI

### DEMOGRAPHIC CONSIDERATIONS IN PLANNING

1. In general terms, planning may be described as the rational process whereby the best manner for achieving certain goals with the available means is identified and defined. Economic and social planning may thus be said to involve the translation of the general objectives of economic and social policy into a set of consistent, quantified targets and the selection and determination of the measures and means necessary to achieve those goals. Planning, while not providing by itself a solution to problems, determines through a systematic analysis how the general policy objectives, adopted following an examination of alternative policies, can be fulfilled, taking into account the limited amount of resources and other constraints which the policy-makers have to face.

2. This chapter broadly examines the role of demographic factors in planning for economic and social development. The sections of the chapters are concerned with demographic considerations in economic planning, in planning for selected social sectors—education, health, housing—and in regional planning; and with family planning in so far as such policies are an integral part of planning and plans.<sup>1</sup> Although some general comments on planning are included, the chapter is not concerned with the methodology and organization of planning, the implementation and evaluation of plans or with the techniques for projecting demographic variables needed for planning.<sup>2</sup> It is only incidentally concerned with strictly economic considerations in planning and, therefore, does not discuss extensively those aspects which figure prominently in the economic literature on the subject. Finally, no systematic coverage of existing economic and social plans has been attempted; only selected and a limited number of plans have been discussed to illustrate the variety of approaches in dealing with demographic factors in economic and social planning. In discussing these aspects a distinction is made, as is customary in much of the literature, between the centrally planned economies, the developed market economies and the developing market economies, even though such a classification rests more on practical considerations than on appropriate scientific criteria.

3. A wide diversity exists with regard to the approaches, the scope and the importance assigned to planning. Planning on a systematic scale is a relatively recent phenomenon. It was initiated in the USSR shortly after the revolution of 1917 when the transition to and the

establishment of the socialist system, with its collective ownership of the predominant part of the productive capacity of the economy, made comprehensive planning imperative.<sup>3</sup> In the Eastern European countries, planning is more recent and has its beginnings in most cases with the establishment of the socialist system after the Second World War.<sup>4</sup> In this period, planning also became increasingly important in the developed private enterprise or market economies, especially those of western and northern Europe.<sup>5</sup> The rapidly growing importance of planning in recent times, however, has been mainly attributed to the need felt by the economically less developed countries, many of which gained independence in this period, to promote their economic growth and social advancement.<sup>6</sup> Planning has thus emerged as a tool of policy in countries differing widely not only in their economic and social systems, but also in their stages of development.

#### A. Approaches to planning and the role of population

4. The approaches to and methods of planning differ substantially, as Myrdal and others have noted, according to the prevailing level of development and the institutional framework.<sup>7</sup> A number of writers have discussed the specific differences in this respect. In the economically less advanced, as opposed to the more developed countries, the major issues in planning, it is asserted, revolve

<sup>3</sup> For the origins and development of planning in the USSR, see among others, Strumilin, *Ocherki sotsialisticheskoy ...* (1959) and his *Planning in the Soviet Union* (1957), pp. 14-25; Sorokin, *Planirovanie narodnogo khoziaistva SSSR ...* (1961); Cherkovets, *Planomernost sotsialisticheskogo proizvodstva* (1965); Bor, "The organization and practice ..." (1965); Kursky, "Development of forms ..." (1966); Dobb, *Soviet Economic Development ...* (1966), chaps. 4-13.

<sup>4</sup> For the development of planning in some Eastern European countries, see Rakowski, *Zagadnienia planowania ...* (1955); Marczewski, *Planification et croissance économique des démocraties populaires*, tome 1 ... (1956); Brus, *Ogólne problemy ...* (1961); Vergner, "Economic planning ..." (1965); Jelic and Orthaber, "Some characteristic features ..." (1965); Wellisz, *The Economies of the Soviet Bloc ...* (1966); Seth, *Theory and Practice ...* (1967), pp. 234-294.

<sup>5</sup> For a discussion of the background to planning in these countries, see Myrdal, *Beyond the Welfare State ...* (1960); Wellisz, "Economic planning ..." (1960); Shonfield, *Modern Capitalism* (1965); Bjerve, *Planning in Norway ...* (1959).

<sup>6</sup> United Nations, *Planning for Economic Development ...* (1963), p. 1; United Nations, Economic Commission for Asia and the Far East, "A decade of development planning ..." (1961).

<sup>7</sup> Myrdal, *Beyond the Welfare State ...* (1960), chap. 8; United Nations, *Planning for Economic Development ...* (1963), pp. 2-3; Jelic, "Some problems ..." (1965); Caire, *La planification ...* (1967), p. 33; Tinbergen, *Lessons from the Past* (1963).

<sup>1</sup> Policies and measures affecting fertility are discussed more generally in chapter XVII.

<sup>2</sup> The techniques of population projections and other aspects related to them are discussed in chapter XV.

around the acceleration of the rate of development, higher levels of income and productivity and the diversification of the economy. The most crucial factor in this connexion is often thought to be the scarcity of resources and in most, though not all, of these countries the stepping up of the rate of capital formation occupies a central place in planning. In the more developed countries, with a high productive capacity, the level of capital formation, according to these writers, does not constitute a special problem. A high rate of economic growth, while also a basic goal in planning, is often subject to the fulfilment of other conditions—such as full employment, a balance-of-payment equilibrium, a certain measure of price stability and, in some cases, the reduction of income inequalities among social groups or geographical areas.<sup>8</sup> Differences in the institutional framework, such as the different forms and extent of ownership and control over the means of production in the centrally planned economies as compared with the market economies, have also been stressed in explaining basic differences in planning. In the former, it has been noted, planning is comprehensive and centralized, with most targets being translated into guiding principles, which become binding for the different sectors, branches and industries. In the market economies, however, plans are mainly intended to provide coherent targets for production and investment, but, except for the public sectors, the decisions of the individual enterprises can only be indirectly influenced.<sup>9</sup>

5. Despite these differences in approaches and methods, the planning process as such has certain common traits. Actual planning techniques are based as a rule on models which contain the elements entering into planning.<sup>10</sup> Among the elements of planning, a basic distinction is that between the targets of the plan—that is, the objectives stated in quantitative terms—and the means or instruments, both quantitative and qualitative, needed and available for attaining the targets. Other elements that writers have distinguished, apart from targets and means, are the data, constraints or exogenous variables

<sup>8</sup> Mahalanobis, "Some observations ..." (1953); United Nations, *Planning for Economic Development* ... (1963), p. 3; United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 1; United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 1, p. 5.

<sup>9</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 1, p. 3; Sevaldson and Trzeciakowski, "Construction and application ..." (1967); Strumilin, *Planning in the Soviet Union* (1957), pp. 4, 12. Planning in the centrally planned economies is sometimes referred to as "direct" or "imperative" planning, whereas in market economies it is supposed to be "indirect" or "indicative". See United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 1, p. 3; Bénard, "Problèmes et instruments ..." (1958); Fourastié et Courthéoux, *La planification économique en France* (1968), pp. 112-116; Black, "The theory of indicative planning" (1968). Recent literature, however, suggests a trend towards a narrowing of these differences between planning in the socialist and the market economies. See, for instance, Sevaldson and Trzeciakowski, "Construction and application ..." (1967).

<sup>10</sup> United Nations, "Use of models ..." (1961), defines models as "an organized set of relationships that describes the functioning of an economic entity, whether it be a household, a single industry, or a national economy, under a set of simplifying assumptions". Many other definitions have, however, been suggested and used.

which must be considered as given by the planning authorities and which reflect certain technical, behavioural and institutional parameters. They may include natural resources and climate, technical processes, international factors and certain other characteristics. Finally, there are the structural relationships; these describe the behaviour and structure of society and specify the interdependence between the variables and factors involved in the planning process and the limitations and constraints which the policy-maker must take into account.<sup>11</sup> It has also been noted, however, that although conceptually the distinction between these different factors and elements of a plan is clear, the dividing line between them may shift with the premises and actual conditions of planning.<sup>12</sup>

6. Planning involves a wide range of issues and activities and, consequently, plans or programmes may exhibit large differences in scope and content. Although no simple classification of planning and plans exists, differences in types and forms of planning are generally acknowledged. In this manner a distinction is sometimes made between economic planning and planning for social development. In recent years, regional planning has emerged as an important category. However, a classification of plans along these lines is, according to many writers, only partially valid. Different types of plans can be considered independent of each other only to a limited extent. Thus, the interdependence of economic and social development and planning has been increasingly recognized and stressed.<sup>13</sup> Likewise, regional planning is no longer viewed as an isolated activity, but has come to be considered and dealt with as an integral part of planning at the national level.<sup>14</sup>

7. Another distinction often made is that between general plans or programmes, sectoral plans, and pro-

<sup>11</sup> Tinbergen, *On the Theory of Economic Policy* (1952), pp. 3-5; Chenery, "Development policies ..." (1958); Strumilin, *Planning in the Soviet Union* (1957), pp. 12-13; Bjerve, *Planning in Norway* ... (1959), chap. 2; United Nations, "Use of models ..." (1961); Horvat, "Methodological problems ..." (1962); Boudeville, *Les programmes économiques* (1965), pp. 20, 25-26; Tinbergen, *Economic Policy* ... (1967), pp. 4-5; Sevaldson and Trzeciakowski, "Construction and application ..." (1967).

<sup>12</sup> Weststrate, *Economic Policy* ... (1959), p. 7, noted, for instance, that in most plans it is possible to discern two orders of objectives: the ultimate aims and the subsidiary goals, which often have a certain instrumental value. On the different roles—as targets, instrument, and exogenous variables—of different factors, including institutional characteristics, under different conditions, see Chenery, "Development policies and programmes" (1958); United Nations, Economic Commission for Asia and the Far East, "A decade of development planning ..." (1961); United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 1, chap. 4, p. 1; United Nations, Economic Commission for Europe, *Macro-economic Models* ... (1967), pp. 13-14.

<sup>13</sup> United Nations, *Report on the World Social Situation* ... (1961), pp. 23, 38, 82; ———, *Planning for Economic Development* ... (1963), p. 17; ———, Economic Commission for Asia and the Far East, "Social development planning" (1963); ———, *Problems of Social Development Planning* ... (1964), pp. 63-64; International Conference of Social Work, "Report of the pre-conference ..." (1965); Tinbergen, "Social aspects ..." (1965); Kahn, *Theory and Practice* ... (1969), pp. 3-6.

<sup>14</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning ..." (1965).

jects. Usually, it is asserted, the first step in planning is the determination of the general rate of development which a country seeks to attain, and general programming provides a framework for the possible development of the economy in terms of the most important aggregate variables, such as national output or income; consumption, savings and investments; imports and exports.<sup>15</sup> The concept of sector used in planning varies widely and includes both planning for the economic and for the so-called social sectors. Planning for economic sectors has been said to involve the determination of the planned level and composition of output and the productive resources required to achieve these targets. In its simplest form, such sectoral planning is based on a differentiation among only a few strategic sectors, ignoring the interrelations between sectors. The more complex sectoral plans distinguish a large number of sectors and stress the interrelations and complementarities between industries, branches or sectors, frequently through the use of input-output analysis or inter-industry relations.<sup>16</sup> Projects, finally, refer to the smallest units considered in programming, such as the establishment of a single industry or factory, the construction of a road or bridge, or the production of determined goods and services.<sup>17</sup> Despite these differences in the various types of plans and programmes, many authors have stressed their interdependence. Different types of plans, it is asserted, are linked in a number of ways by virtue of the interrelations which exist between the over-all growth or development of the economy and that of its constituent parts. Comprehensive planning, which encompasses all the factors which play a role in economic growth and social advance and extends to all facets of these processes, including regional planning, will therefore be necessary, it is held, in order to ensure the consistency of the various plans with each other and with total resources.<sup>18</sup>

<sup>15</sup> Tinbergen, *The Design of Development* (1958), pp. 9-11; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 8; United Nations, *Planning for Economic Development* ... (1963), p. 10; Caire, *La planification* ... (1967), p. 299; Colm and Geiger, "Country programming ..." (1962).

<sup>16</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 19; United Nations, *Planning for Economic Development* ... (1963), p. 8. The United Nations study, "Use of models ..." (1961), noted that the subdivision of the economy into a large number of sectors is primarily of importance to countries which have already achieved a certain degree of development and hence have a substantial volume of inter-industry transactions.

<sup>17</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 33; United Nations, Economic Commission for Latin America, *Manual on Economic* ... (1958), pp. 4, 9-12.

<sup>18</sup> Tinbergen, *The Design of Development* (1958), pp. 20-21; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 19; Chenery, "Development policies ..." (1961); United Nations, *Planning for Economic Development* ... (1963), pp. 8-9, 27-29; Flecha, *Técnica de planificación económica* (1966), pp. 40-42. In connexion with the different types of plans, a distinction is sometimes made: "planning from below", where plans are made first for individual enterprises or goods and then aggregated, or "planning from above", where the formulation of a general programme constitutes the first step in planning. Tinbergen, *Central Planning* (1964), p. 16; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic*

8. Plans differ not only as regards their contents and scope, but also in the planning period, that is, the time over which the given objectives and targets are supposed to be reached. As far as the plan duration is concerned, a threefold classification has developed: long-term or perspective plans, medium-term plans, and short-term plans. Long-term plans may cover a period of from one to three decades; medium-term plans have a duration varying between three and seven years and short-term plans are mostly formulated for a period of from one to three years.<sup>19</sup> Ideally, it has been argued, planning must be conceived of as an integrated system of long-term, medium-term and short-term plans.<sup>20</sup>

9. The role of demographic factors in planning derives from their nature as both determinants and consequences of economic and social progress. The population and its functional subgroups as both consumers and producers play a basic role in determining economic and social development. The size, growth, composition and the distribution of the population are considered basic in determining consumption aims and, especially through the working-age contingent, production and employment goals. The same factors are also involved in all those sectoral plans which concern certain segments of the population, such as children, youth, working adults, the retired and the elderly, urban and rural population and so forth. The demographic variables relevant to planning thus include: population size and growth as well as its components; sex-age structure; spatial distribution of the population, internal migration and urbanization; and international migration. In addition, demographic factors may be considered as consequences of planning since they can be expected to undergo change as a result of the planned development process. Mortality, fertility, population growth, composition and distribution all may be affected by the planned development, either directly or indirectly. Specifically, if a population policy is part of development planning and implementation, a changed rate of population growth or a different regional distribution may be seen as one of the targets of the plan. Even in the absence of an explicit population policy, the economic and social changes resulting from planning are likely to have their effect on virtually all demographic factors mentioned.

10. The necessity to consider the nature of demographic variables in planning as both determinants and conse-

*Development* ... (1960), p. 87; United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 18.

<sup>19</sup> United Nations, *Planning for Economic Development* ... (1963), p. 7; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 5; Horvat, "Methodological problems ..." (1962); Flecha, *Técnica de planificación económica* (1966), p. 40; Caire, *La planification* ... (1967), pp. 61-63; Boudeville, *Les programmes économiques* (1965), pp. 21-22.

<sup>20</sup> United Nations, *Planning for Economic Development* ... (1963), p. 7; Seth, *Theory and Practice* ... (1967), pp. 98-99. A relatively recent practice which can ensure the continuity of plans of different duration is that of introducing "rolling plans", which are medium-term plans with another year being added as each year is completed.



quences has been widely recognized.<sup>21</sup> Nevertheless, in practice, the incorporation of demographic variables in the plans of most countries is less than complete, owing to a number of reasons. Planning, it has been noted, cannot take adequately into account demographic variables in the absence of reasonably accurate demographic data and the determination of their role in models for programming.<sup>22</sup> Another obstacle is the as yet limited understanding of the interrelationships between demographic, economic and social variables. While such knowledge has been improving, further advances would enable the planner to take into account both the implications of prospective population trends for economic and social conditions and the effects of the latter upon demographic variables.<sup>23</sup> As has also been noted before, the current planning techniques and demographic models do not permit the integral treatment of demographic variables in planning. On the one hand, the existing economic models and planning procedures do not make allowance for a more detailed consideration of demographic factors; on the other, the demographic models seem to be limited to population variables in a narrow sense.<sup>24</sup> In many countries, however, planning is only a recent phenomenon and the lack of integration of demographic variables in their plans is the result of the limited experience in planning rather than of the failure to recognize the importance of population factors for planning.

## B. Demographic considerations in economic planning

11. As noted, the first step in comprehensive economic planning is usually the formulation of the general programme, or plan. Based mainly on mathematical models of the economy formulated in terms of the main aggregate variables, the general programme is said to provide the framework for translating the major objectives of planning into basic targets and makes it possible to assess the feasibility of these goals in terms of the available resources and existing constraints.<sup>25</sup> The objectives of the general programmes are based primarily on political considera-

tions, value systems and so forth. Although it has been recognized that such objectives, therefore, may vary according to national circumstances, many writers have stressed common elements. Plans of this type, they assert, are generally concerned with determining the possible or desired rates of growth of income, product or consumption, the division of the national product among consumption, investment and exports, as well as the expected or required volume of domestic savings, imports and foreign financial assistance.<sup>26</sup> Basically, two approaches to formulating a general programme have been distinguished. The first, which has been referred to as "explanatory" by Perroux, is based on a study of past trends, including a diagnosis of the national economy, and an analysis of the feasible and probable future changes. An over-all survey of this nature provides the planning authorities with an assessment of the growth potentialities of the economy and the efforts required to attain given rates of development. In the second approach, described as "normative", first the targets of economic development in terms of national income, production, or other variables are set and subsequently the conditions for attaining such objectives are examined.<sup>27</sup>

12. It has also been recognized, however, that general programming in setting the over-all rate of development provides a less than complete picture of that process. Development implies, in addition, changes in the composition of the demand for goods and services, the supply of factors of production and their productivity, the structure and the degree of diversification of the economy, and so forth. It is for this reason that planning by sectors is considered a necessary complement of general programming.<sup>28</sup> It is argued that, whereas general programming—by determining the main economic variables—provides a test of consistency of sectoral and partial plans,<sup>29</sup> the latter in turn make it possible to detect obstacles to growth and to determine the conditions for a "balanced" or "proportionate" expansion of all sectors.<sup>30</sup>

<sup>21</sup> United Nations, *Asia and the Far East Seminar on Population* ... (1957), p. 2; —, *Latin American Seminar on Population* ... (1958), p. 52; United Nations, Economic Commission for Africa, *Report of the Seminar on Application of Demographic Data* ... (1969), p. 7.

<sup>22</sup> United Nations, *Seminar on Evaluation and Utilization of Population Census Data in Latin America* ... (1960), pp. 5-6.

<sup>23</sup> United Nations, *Seminar on Evaluation and Utilization of Population Census Data in Asia and the Far East* ... (1961), p. 5.

<sup>24</sup> See chapter XV, sections C and D.

<sup>25</sup> Tinbergen, *The Design of Development* (1958), pp. 9-10; Mahalanobis, "Some observations ..." (1953); United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 3; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 8; United Nations, "Use of models ..." (1961). Models involving the main macro-economic variables are usually referred to as aggregate models. A typical aggregate model might include (a) technical equations, principally the production function which determines output or product as a function of one or more inputs; (b) behaviour and institutional equations, such as consumption or saving functions, import and export functions etc.; and (c) balances, equations or "constraints" which specify the necessary relations between different variables, such as the equality of total resources and total expenditures.

<sup>26</sup> Tinbergen, *The Design of Development* (1958), p. 19; United Nations, "Use of models ..." (1961); United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 8.

<sup>27</sup> For a discussion of the first approach, see United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 3. For the second approach, see United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 81. See also United Nations, Economic Commission for Asia and the Far East, "A decade of development planning ..." (1961); Caire, *La planification* ... (1967), pp. 238-295. Perroux, *Les techniques quantitatives* ... (1965), pp. 33-34, commented that, theoretically, planning requires models of both the first (explanatory models) and second types (normative models).

<sup>28</sup> United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 26; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 19; Caire, *La planification* ... (1967), p. 299.

<sup>29</sup> Tinbergen, *The Design of Development* (1958), p. 10; United Nations, *Planning for Economic Development* ... (1963), pp. 8-10, 21-27, 32.

<sup>30</sup> United Nations, *World Economic Survey*, 1964, part I ... (1965), p. 32; Chenery, "Development policies ..." (1958); United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 19.

13. Demographic considerations are involved in the planning process in a number of ways. Most obvious is the effect population growth and size have in setting the general rate of development, but major implications derive also from the nature of population as both consumers and producers in planning decisions. With the recognition of the importance of demographic factors in this context and with the progress in the techniques of planning, recent literature has to an increasing extent emphasized the importance not only of the size and growth, but also of the structure and composition of population.<sup>31</sup> Therefore, plans of production, consumption, investment, distribution and so forth should, it has been asserted, be closely connected with population factors.<sup>32</sup>

14. Even though general programmes can have a number of objectives, the increasing of the levels of living of the population occupies a central place in most plans. Whether formulated in terms of income or other indicators of levels and conditions of living, such as consumption or employment, these objectives must take into account the size of the population as a basic factor. It has been noted that increases of income—the most common objective in planning—and population growth are linked as fundamental determinants of levels of living and that, mathematically speaking, trends in population can play as large a role in determining *per capita* income as trends in production.<sup>33</sup> Given the targets of economic growth in terms of *per capita* income, population growth will determine at what rate total income or product should increase to attain such targets.<sup>34</sup> Even where targets are set in terms of growth of total income, the population factor, it has been pointed out, determines whether such growth is sufficient to absorb the effects of an expanding population on levels of income.<sup>35</sup> It is because of this linkage between growth of income and growth of population that the regulation of population growth is considered an important means for raising income and levels of living in a number of countries where the growth of population is so high as to jeopardize the chances of attaining the desired levels of living within the foreseeable future.

15. Whereas population growth thus sets a lower limit to the general rates of development, the actual rate which can be planned is limited basically by the available productive resources. In many developing countries, it is frequently held, capital is the scarce factor and constitutes the main bottleneck to rapid economic growth.<sup>36</sup> Where

the major constraint to planning is the level of investment, planning will often proceed in function of a so-called "capital-centred" model of the Harrod-Domar type in which the growth of income is considered a function of the rate of net capital formation and the marginal capital-output ratio.<sup>37</sup>

16. Planning in terms of a capital-centred model does not take explicitly into account demographic factors and one of the criticisms against this approach is that such a model ignores the contribution to production of all factors except capital. Nevertheless, it has been shown that even in capital-centred planning, demographic factors cannot be ignored. In the first place, the growth of population determines the lower limit of investment needed to maintain the existing levels of income. The higher the rate of population growth, the larger these so-called demographic investments have to be. In order to assure an increase in income, productive investments must thus increase at a rate substantially in excess of the rate at which population grows. In the second place, the upper limit of investment is determined by the minimum acceptable share of consumption in national income, which will depend at least in part on demographic factors such as population growth and composition.<sup>38</sup> In the literature on planning, little attention has been given to an additional factor in this connexion, that is, the effects of demographic factors on the patterns and structure of investment. Since a growing population requires large outlays for investments which are not directly productive, such as those in housing, schools, transport and communications, urban facilities and so forth, it will tend to raise the capital-output ratio and thus the required rate of capital formation needed to attain the pre-determined goals.<sup>39</sup>

17. Demographic factors are explicitly incorporated into the planning process where employment is a basic goal of economic policy or where because of serious employment problems planning targets are set primarily in terms of employment creation.<sup>40</sup> Since they are the

<sup>31</sup> See, for example, Macura, "Problemi demografskih ..." (1962); United Nations, *Seminar on Population Studies in Southern European Countries* ... (1959), pp. 18-21.

<sup>32</sup> Uralnis, "Demographic factors ..." (1966).

<sup>33</sup> United Nations, *Report on the World Social Situation* ... (1961), p. 25.

<sup>34</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), pp. 9, 83; Seers, "Economic programming ..." (1962); Flecha, *Técnica de planificación económica* (1966), p. 134.

<sup>35</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), pp. 12-13.

<sup>36</sup> Higgins, *Economic Development* (1959), p. 4; United Nations, Economic Commission for Asia and the Far East, *Programming*

*Techniques for Economic Development* ... (1960), p. 8; ———, "A decade of development planning" (1961); United Nations, "Use of models ..." (1961); Bettelheim, *Studies in the Theory of Planning* (1965), pp. 295-300; Seth, *Theory and Practice* ... (1967), p. 12. See also the discussion later in this section.

<sup>37</sup> United Nations, *Analyses and Projections of Economic Development*, I ... (1955), pp. 20-23; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), pp. 13, 83-84; Mahalanobis, *Talks on Planning* (1961), pp. 9-12; United Nations, "Use of models ..." (1961); ———, "Methods of aggregative economic projections ..." (1964), pp. 50-53; Tinbergen, "Simple devices for development planning" (1965). For a discussion of Harrod-Domar models, see also chapter XIII, section B.

<sup>38</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), pp. 9-10; United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, p. 12. See also Kronrod, "O protivorechiakh v razvitií ..." (1959); Notkin, "Planning of rates ..." (1966); Das Gupta, *Planning and Economic Growth* (1965), pp. 50-52.

<sup>39</sup> For a discussion of these aspects, see chapter XIII, section D.

<sup>40</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 6; International Labour Office, *Employment and Economic Growth* (1964), pp. 125-126; United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 64.

main determinants of the number of potential producers, the size and sex-age composition of the population occupy an important place in "employment-centred" planning. In this type of planning the growth of total population and labour force are usually taken as a point of departure and the plans themselves are based on projections of these variables over the planning period. A simple model of this type would estimate total product as a function of the projected working population and assumptions regarding product per worker, where the latter may be based either on what economic growth is desired in terms of *per capita* income,<sup>41</sup> or on what the possible future trend of output per worker is.<sup>42</sup>

18. Despite the basic differences between capital-oriented and employment-oriented planning, in practice plans formulated on the basis of either of these approaches will often take into account the implications for the other factor. Thus "capital-centred" planning will usually involve some consideration of the consequences for employment of the planned development and, likewise, the assessment of the implications of employment targets for investment is as a rule undertaken in "employment-centred" planning. As a result of such analysis, plan objectives are often modified or adapted to make allowance for their effects on employment or capital formation in, respectively, capital-oriented and employment-oriented planning.<sup>43</sup> In view of the possible conflict between maximizing levels of income and levels of employment, the importance of an approach to planning integrating both aspects has been stressed in a number of writings.<sup>44</sup>

19. The role of demographic factors varies in the planning of different sectors. In the case of planning for consumer goods and investment goods sectors, population in its role as consumer is thought to affect both the distribution between the consumer goods sector and the investment goods sector as well as the composition of demand with respect to each of them. In more general terms, the view has been stressed that, apart from changes in tastes, the demand for consumer goods depends basically on population trends and the level and distri-

bution of income.<sup>45</sup> In literature on the subject, it has also been noted that given the growth of total income, the effect on total consumer demand and its composition may be quite different depending on whether the growth of total income takes the form of a higher *per capita* income or the same *per capita* income for an increasing population.<sup>46</sup>

20. Similar considerations hold for planning for the industrial sectors—agriculture, manufacturing, construction etc.—the purpose of which has been described as the determination of the type and rate of development of each sector in accordance with the targets for consumption, investment and external trade within the limits set by the available resources and the existing economic structure.<sup>47</sup> The needs of the population, as determined by its size and composition, are considered important in determining the demand for various goods and services and for setting targets for specific sectors. Nevertheless, in most cases where population is explicitly incorporated into sectoral planning models, total population only is taken into account.<sup>48</sup> The role of demographic factors has been stressed, especially in the case of agriculture and foodstuffs. Together with the level and distribution of income, population growth and composition—the latter to make allowance for different nutritional or different population groups—are important in determining the future needs and demand for food.<sup>49</sup>

21. Demographic factors are also important in plans for industrial sectors which are concerned with employment considerations. Since increases in over-all productivity can be attained either through productivity increases in individual sectors or through the transfer of labour from less to more productive sectors, changes in the structure of the labour force and its diversification become important.<sup>50</sup> The importance of structural changes in the economy, its implications for employment and the role of demographic factors in this process have been stressed particularly in the case of the developing countries, where this process of industrialization is a key to development.

<sup>41</sup> Since the relation between total and working population is known, the level of product per worker can be derived from the desired level of *per capita* income.

<sup>42</sup> Tinbergen, *The Design of Development* (1958), pp. 12-13; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 13; United Nations, "Use of models ..." (1961); Seers, "Economic programming ..." (1962); Bor, "The organization and practice ..." (1965); Bjerve, *Planning in Norway* ... (1959), pp. 95-102; Caire, *La planification* ... (1967), pp. 242-243.

<sup>43</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 84.

<sup>44</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 13; United Nations, Economic Commission for Asia and the Far East, "A decade of development planning ..." (1961); International Labour Office, *Employment and Economic Growth* ... (1964), p. 125. The so-called Cobb-Douglas production function has been used to illustrate the implications of different investment and employment policies, taking into account population growth and composition. See United Nations, Economic Commission for Asia and the Far East, "Growth models ..." (1958).

<sup>45</sup> United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), pp. 28-29; Sen, *The Strategy for Agricultural Development* ... (1962), pp. 175-176; Lewis, *Development Planning* ... (1966), pp. 179-180.

<sup>46</sup> It has been noted that elasticities of the demand for certain consumer goods may be quite different in urban and rural communities. United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 29. See also Bor, "The organization and practice ..." (1965).

<sup>47</sup> United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 28; United Nations, *World Economic Survey*, 1964, part I ... (1965), p. 32.

<sup>48</sup> See, for instance, Chenery, "Patterns of industrial growth" (1960); United Nations, *A Study of Industrial Growth* (1963); United Nations, Economic Commission for Asia and the Far East, *Sectoral Aspects of Long-Term Economic Projections* ... (1967), pp. 6-12, 141-163.

<sup>49</sup> United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 30; United Nations, *World Economic Survey*, 1964, part I ... (1965), p. 46.

<sup>50</sup> United Nations, *Processes and Problems of Industrialization* ... (1955), p. 2.

## 1. THE CENTRALLY PLANNED ECONOMIES

22. Planning in the modern sense which, as noted above, emerged with the establishment of the Soviet Union as the first Socialist State, occupies a central place in the development of the socialist countries. Given the ultimate goal of the creation of communism, planning under socialism, as the selection and execution of a strategy of development which will lay the material and technical bases for communism, has several distinctive features. Economic planning is thus considered one of the prime tasks of government and implies a centrally directed and comprehensive system of management of the economy and its active projection.<sup>51</sup> To that end the socialization of all sectors and the social ownership of all means of production is thought to be essential.<sup>52</sup> Planning under socialism, as opposed to conditions existing under capitalism, thus would, according to Lenin, replace the anarchy of production of the former by a planned organization of the social process of production in order to guarantee the welfare and full employment of all members of society.<sup>53</sup>

### (a) *Planning and the role of population*

23. Although the common goal of planning in socialist countries is the creation of communism, specific goals and objectives depend on the stage of development which the country has attained. This is in accordance with Marxian theory, which holds that the mode of economic organization, and hence economic policy, corresponds to the stage of development of the society's material powers of production. Despite this and other differences, planning in the centrally planned economies has certain basic premises in common, which also distinguish it from planning in the non-socialist countries. Since the means of production are predominantly publicly owned, planning in the socialist countries has been called "direct"—as opposed to that in the market economies where it is "indirect"—in the sense that the central authority has the disposition over the preponderant share of national resources and available to it the machinery for economic administration and control at all levels.<sup>54</sup> Moreover, in the centrally planned economies the attainment and maintenance of full employment is a basic principle and fundamental premise of planning. Finally, because the demand for and the supply of consumption and production goods are directly planned, production in these economies, unlike that in the private enterprise or mixed economies, cannot be limited by an insufficient effective aggregate demand.<sup>55</sup> Growth of production and develop-

ment, it has been noted, are thus determined by the supply of factors and the level of national income by the full employment of productive capacity.<sup>56</sup>

24. Among the premises of planning in the centrally planned economies an important place is occupied by the "objective economic law of planned proportionate development of the national economy". As one of the economic laws of socialism, it implies the need for proportionality and determinate priority relationships between different elements and aspects of planning such as between production and consumption goods, industrial and agricultural output etc.<sup>57</sup> In the actual planning process, the "balance" method is used to ensure the maintenance of the necessary proportions in the development of the economy and the consistency between plan requirements and resources. These balances, as devices used for the purpose of co-ordinating and reconciling interdependent indicators, play an important role in determining the links and obtaining the consistency between the basic economic factors, comprising aggregate plans as well as all sectors of the economy. The system includes balances of the material components of production, consumption and accumulation; balances of natural resources; fixed assets; productive capacity; balances of production, distribution and final utilization of national income, as well as manpower balances.<sup>58</sup>

25. Such balances are used in the formulation of the development plan which usually takes place in various stages. In view of the complexity of the planning process, which encompasses a large number of aspects, and the need for co-ordination of the whole plan, the central planning organ prepares, as a rule, first a general model or quantitative framework which contains certain over-all figures including tentative output targets; levels of consumption; availability of equipment and raw materials; labour force and employment and so forth. More detailed sectoral analyses are also prepared and, in a final stage, a consistent plan with respect to both aggregate and sectoral indicators is prepared through successive approximations.<sup>59</sup>

26. Demographic considerations play a role in formulating the strategy of development as well as in the preparation of plans in the centrally planned economies. As a general principle it is taken for granted that the rate of growth of national product will surpass sub-

<sup>51</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 12; Bor, "The organization and practice ..." (1965); Vergner, "Economic planning in Czechoslovakia" (1965); Hungary, "The main features of national economic planning ..." (1965).

<sup>52</sup> United Nations, *Planning for Economic Development* ... (1963), p. 29; Vergner, "Economic planning in Czechoslovakia" (1965); Pajestka, "Methods of long-term projections ..." (1964).

<sup>53</sup> Lenin, *Collected Works* (1926), vol. 6, p. 113.

<sup>54</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 1, p. 3.

<sup>55</sup> Pajestka, "Methods of long-term projections ..." (1964); United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, p. 10.

<sup>56</sup> Brus and Laski, "Growth with full employment ..." (1966); Pajestka, "Methods of long-term projections ..." (1964); United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, p. 10.

<sup>57</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 13; Kolodny and Stepanov, *Planirovanie narodnogo khoziaistva SSSR* (1963), p. 17; Vikent'ev, *Razvitie ekonomiki SSSR i problemy proporcionalnosti* (1963), pp. 81 ff.; Lange, *The Political Economy of Socialism* (1957); Bor, "The organization and practice ..." (1965).

<sup>58</sup> United Nations, *Planning for Economic Development* ... (1963), pp. 21-27, 35-40; Bor, "Draft relating to chapters 1, 2, 3 and 4. Annex II" (1963), pp. 117-119; United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, pp. 23-31.

<sup>59</sup> United Nations, *Planning for Economic Development* ... (1963), pp. 32-33.

stantially the rate of population growth.<sup>60</sup> More specifically, population enters into the planning process in its capacity as both consumer and producer. Demographic projections are used to assess the changes likely to occur in the total population and its segments. From these projections and the *per capita* indicators and standards of consumption for the main functional population groups, consumption requirements are derived, which in turn are confronted and reconciled with the capacity of the consumer goods industries.<sup>61</sup> It is in this context that demographic factors are also introduced in the more general problem of the determination of the proper ratio between investment and consumption and the production of producer and consumer goods.<sup>62</sup>

27. Labour resources and labour productivity are considered the main determinants of the rate of economic expansion, and demographic analyses provide the basis for deriving estimates of the population of working age and in the labour force. This is done by means of manpower balances. The system of manpower balances includes balances of labour reserves which show the state and changes of these reserves during the planning period and especially the manpower balances proper, which establish labour requirements, reconcile them with labour resources and determine the distribution of labour in accordance with the given objectives. The balance of labour resources is derived from demographic data and thus indicates the total population of working age, the active population, and the distribution of labour by sectors. From the number of workers in the productive sector and the estimated productivity of this labour the volume of the national product is derived.<sup>63</sup>

#### (b) *Demographic considerations in economic plans*

##### (i) *An over-all view*

28. Major economic and social changes have been condensed in the centrally planned economies within a relatively short period.<sup>64</sup> The strategy of development in the Soviet Union and the other Eastern European socialist countries<sup>65</sup> responded, especially in the early phases of their development, to the then existing conditions of low productivity, low levels of industrialization and high unemployment. Planning, therefore, emphasized

accelerated industrialization and rapid structural change and, since capital was the scarce factor, increases in the rate of investment figured prominently in the early plans of all these countries.<sup>66</sup> Nevertheless, even in the earlier plans and more so in the later ones, the plans contemplated substantial increases in the production of consumer goods<sup>67</sup> which outpaced population growth.

29. Capital accumulation also was essential and decisive in absorbing the available labour force and for ensuring the full employment of the working population. The transfer of the surplus agricultural population to more productive industrial activities, the absorption of the urban unemployed and underemployed and the increase of labour force participation rates, especially that of females, not only eliminated unemployment, but made possible the achievement of high rates of increase in national product, even with relatively small increases in capital per worker. This absorption of labour force reserves during the early long-term plans in the Soviet Union and those of the Eastern European countries was made possible, it is asserted, through the effective methods of economic control introduced as a result of nationalization and land reforms.<sup>68</sup>

30. As far as demographic considerations were concerned, planning during this period stressed the employment aspect. In the Soviet Union visible unemployment was ended in the course of the First Five-Year Plan (1928-1932) through the industrialization and collectivization of agriculture. Although some underemployment still persisted, the same result was achieved in most Eastern European countries in the early 1950s.<sup>69</sup> Thus, whereas during the early plans the rapidly growing demand for industrial labour could be satisfied relatively easily by incorporating the existing labour reserves into the production process, later, however, labour shortages appeared when large-scale collectivization barely added to the non-agricultural labour supply, the supply of new labour began to decline and urban bottle-necks in housing and services also developed while the demand for labour continued to be high.<sup>70</sup>

31. Once full employment had been attained, high rates of economic growth could no longer be sustained

<sup>60</sup> Braginsky, "Uchet demograficheskikh faktorov pri planirovani ekonomicheskogo razvitiia" (1966).

<sup>61</sup> Pajestka, "Methods of long-term projections ..." (1964); United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, pp. 10-11, 20; Bor, "The organization and practice ..." (1965); Wellisz, *The Economies of the Soviet Bloc* ... (1966), pp. 130-131.

<sup>62</sup> Strumilin, "K probleme optimalnykh proporsi" (1962), proposed as a criterion for determining these shares the maximization of the growth of consumption during the economically active life span of a generation.

<sup>63</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, pp. 10-11; Czechoslovakia, "Obyasnitelnaya zapiska k zakonu o pervom pyatiletnem plane ..." (1950); United Nations, *Planning for Economic Development* ... (1963), pp. 33-34. Bor, "The organization and practice ..." (1965).

<sup>64</sup> United Nations, *Planning for Economic Development* ... (1963), p. 32.

<sup>65</sup> Because of lack of information, this review excludes the non-European socialist countries.

<sup>66</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 4, pp. 1-9; United Nations, *Planning for Economic Development* ... (1963), p. 31; Pajestka, *Zatrudnienie i inwestycje a wzrost gospodarczy* ... (1961) and his "Methods of long-term projections ..." (1964).

<sup>67</sup> For the earlier plans of the Soviet Union see, in this respect, Dobb, *Soviet Economic Development* ... (1966), pp. 235-237, 286-288.

<sup>68</sup> Pohorille, "Development and rural overpopulation ..." (1964).

<sup>69</sup> Shortages of manpower in Eastern European countries existed or manifested themselves early in the German Democratic Republic and, especially, in Czechoslovakia, but in 1950 labour shortages also began to make themselves felt in the other countries. United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1957* (1958), chap. 7, pp. 48-50; ———, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 15.

<sup>70</sup> Marczewski, *Planification et croissance* ... (1956), vol. 1, pp. 202-204; United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1959* (1960), chap. 3, pp. 3, 6; ———, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 15; ———, *Economic Survey of Europe, 1968* (1969), chap. 3; Litvyakov, "Economic and social factors ..." (1967).

through the use of existing labour reserves. Economic growth came to depend to an increasing degree on increased efficiency and the rate of expansion of the supply of labour which, *inter alia*, led to an increased emphasis on such factors as the sex and age composition of the population, its educational levels and the skills and quality of the labour force.<sup>71</sup> The situation which planners in these countries had to face thus changed considerably: there were large gains in industrial strength and development and the manpower reserves had dwindled. In addition, the rate of population growth had decreased notably.<sup>72</sup> As a consequence of the smaller birth-rate during the war, the comparatively smaller population in the late 1950s and early 1960s became a limiting factor in the growth of employment and production. In most countries, annual increases in the size of the working-age population became smaller and remained below those of the total population, thus resulting in a higher dependency burden.<sup>73</sup>

32. With few exceptions—Albania, Bulgaria, Romania and Poland (the latter because of an expected high increase of young adults between 1960 and 1965)—the centrally planned economies, in formulating their plans for the first half of the decade, had to face the possibility of relative labour shortages. In the course of the Seven-Year Plan (1959-1965) of the German Democratic Republic, the working population was expected to decline by 4 per cent due to the effect of war losses, low post-war birth-rates and mass emigration. Increases in activity rates and further declines in agricultural employment became predominant factors in the expansion of the working force in Czechoslovakia and Hungary. In the former, about half of the expected increment in the labour force was to be recruited among women and the desired growth of the industrial labour force would depend on a decline of agricultural employment by 20 per cent. In the latter country, it was estimated that more than two thirds of the planned increase in the working population would come from the increased employment of marginal labour and an additional increase in the industrial working population would be obtained through a 15 per cent decrease in agricultural employment. In the Soviet Union, the already high share of women in the total working population, the relative decline in the number of students completing their education owing to the expansion of compulsory ten-year schooling, and the slow rate of increase of the working population were some of the factors responsible for an estimated decline of 6 to 7 per cent in the working force between 1958 and 1965.<sup>74</sup>

<sup>71</sup> Rajkiewicz, "Industrialisation and structural changes in employment..." (1966); Sonin and Zhiltsov, "Economic development and employment in the Soviet Union" (1967).

<sup>72</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1956* (1957), chap. 2, p. 2; ———, *Economic Survey of Europe, 1959* (1960), chap. 3, pp. 6-7; Pohorille, "Development and rural overpopulation..." (1964).

<sup>73</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1956* (1957), chap. 2, pp. 2, 14-15; ———, *Economic Survey of Europe, 1957* (1958), chap. 7, pp. 37, 44, 48-51; ———, *Economic Survey of Europe, 1968* (1969), chap. 3.

<sup>74</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1959* (1960), chap. 3, pp. 3, 7-11.

33. The plans for the period 1966 to 1970 also suggested in many cases smaller relative increases in the industrial labour force than in previous periods. Such was the case in Czechoslovakia, Hungary and Poland. Data on the rise of output and productivity in the Soviet Union indicate an increase of the order of 11 to 12 per cent in industrial employment or half of that for the years 1960 to 1965. In Romania, the estimated increase in industrial employment was 23 to 24 per cent as against 34 per cent in the preceding years. Only in Bulgaria did the plan foresee a somewhat faster expansion of industrial employment than in the period before. The transfer of manpower from agriculture to non-agricultural sectors was also expected to slow down everywhere. In Czechoslovakia, Poland and Hungary, the plans foresaw a virtually unchanged agricultural labour force, whereas the decline of 4 per cent in the Soviet Union and of 19 per cent in Bulgaria represented a decrease in the rate of transfer in comparison with earlier periods.<sup>75</sup>

34. The changing demographic trends had various implications for planning. Being among the factors which determine the supply of labour, population size growth and structure became a more prominent factor in planning. Their importance was further strengthened by virtue of the fact that, since with industrial development the relation between investment and consumption became increasingly stabilized and plans stressed a more rapid growth of consumer goods production, population in its role as consumer became more relevant for planning.<sup>76</sup> The downward trend in population growth and especially the working population, together with the other factors mentioned before, constituted in principle an obstacle to rapid economic growth, either limiting the rate of expansion or increasing excessively the capital-output ratio.<sup>77</sup> In addition, because of the emerging shortages of labour, the prevailing employment policy of attaining a global equilibrium between the supply of and the demand for labour had to be supplemented by a much more differential approach, with an increased emphasis on education and vocational training and the reconciliation of specific manpower resources with specific requirements.<sup>78</sup> In more general terms, due in part to the limited contribution of the size of the labour force to further expansion, recent plans in the countries laid an increased emphasis on higher productivity through higher investments, better equipment and organization, the development of skills and so forth.<sup>79</sup> Nevertheless, in most of

<sup>75</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1966*... (1967), chap. 2, pp. 42-44, 46, 50.

<sup>76</sup> United Nations, *Planning for Economic Development*... (1963), pp. 31-32; Notkin, "Planning of rates..." (1966).

<sup>77</sup> Kaigl, "International division of labour..." (1959); Kozłowski, *Programowanie eksportu na tle międzynarodowego podziału pracy w przemyśle chemicznym* (1965); Uralis, "The problem of demography and planning" (1968).

<sup>78</sup> Małysz, "Adam Józefowicz: Zagadnienie stagnacji w zatrudnieniu" (1968); Andorka, "A születésszám alakulásának gazdasági hatásai" (1964); Rajkiewicz, "Industrialisation and structural changes in employment..." (1966).

<sup>79</sup> See for instance Khrushchev, *O kontrolnykh tsifrakh razvitiia narodnogo khoziaistva SSSR na 1959-1965 gody*... (1959), p. 20; Communist Party of the Soviet Union, Twenty-third Congress, *Direktivy XXIII s'ezda Kommunisticheskoi partii Sovetskogo* (Continued on next page)



the countries, net domestic product was expected to grow more slowly than in the previous period.<sup>80</sup>

(ii) *Selected countries*

35. The basic considerations in the First Five-Year Plan (1928-1932) of the Soviet Union<sup>81</sup> were the industrialization of the country, the socialist reconstruction of the rural areas and the strengthening of the socialist sector in the country's economic system.<sup>82</sup> At the same time, the directives for preparing the plan found the disproportion between the size of the working population and the possibilities of its economic utilization one of the main difficulties to be solved.<sup>83</sup> As a result of the rapidly growing demand of industry for labour, unemployment, however, had virtually disappeared in the early 1930s and, in fact, during this period some shortages of skilled labour and of specialists developed.<sup>84</sup> The Second Five-Year Plan (1933-1937) continued to emphasize industrial development to make possible the transformation of the entire economy on the basis of modern technology and technical reconstruction, but foresaw a considerably slower growth in the industrial labour force than during the first plan period.<sup>85</sup> The Fifth Five-Year Plan (1951-1955)—after the Third Five-Year Plan (1938-1942), interrupted by the war, and the Fourth Five-Year Plan (1946-1950), which was mainly a reconstruction plan—contemplated a high rate of increase of industrial production, but foresaw only a relatively small increase in the industrial working force while stressing increased labour productivity. The plan also foresaw a narrowing between the rates of growth of production of capital and consumer goods.<sup>86</sup> The slowing down of the growth of the active population, combined with limited possibilities of further transfer of workers from agriculture, had several implications. The Sixth Five-Year Plan (1956-1960) stressed technical progress

and higher labour productivity as well as an increased emphasis on the rational distribution and most efficient utilization of the labour force.<sup>87</sup> The slow natural increase in the working population would apparently be a long-term phenomenon: the Twenty-Year Development Plan (1960-1980) assumed an increase in the working population of 40 per cent, but a considerable part of this increase would be caused by rises in the over-all activity rates through the reduction of household duties and the liquidation of individual farming plots.<sup>88</sup>

36. The relevance of demographic factors for planning broadened during the 1960s as the production of consumer goods was given an increasingly prominent place in the plans. The Seven-Year Plan (1959-1965) stated as one of its objectives the proposal to meet the requirements of the population in the most important foodstuffs and to provide the population with a wide assortment of high-grade foods.<sup>89</sup> Reporting on the directives for the Eighth Five-Year Plan (1966-1970), Kosygin noted that even though farm output had increased since the five-year plans had been initiated, this growth was inadequate to meet fully the increased demand due to population growth and higher purchasing power. More generally, a rapid expansion in the production of consumer goods and a doubling of the output of those producer goods on which the production of agriculture, light and food industries, housing and trade depended was planned for this period.<sup>90</sup>

37. The first plan (1946-1949) of Poland had as its main objectives the reconstruction of war damage, the nationalization of important industries and land reform, but the chief aim was raising the standard of living of the working masses above the pre-war level. Consequently, increases in levels of consumption and in the share of the latter in total income were planned and the output of production goods was to be determined by the requirements for the production of consumer goods.<sup>91</sup> The basic task of the Six-Year Plan (1950-1955) was the establishment of socialism in Poland and the development of the capital goods industries was seen as a basic condition for creating the technical basis for socialism. The increase in industrial output would depend to a large extent on the growth of the industrial labour force and the plan predicted an increase in employment outside agriculture of around 60 per cent, or over two million people.<sup>92</sup> The Five-Year Plan (1956-1960) concentrated chiefly on the improvement of levels of living; its purpose was to raise real wages in the cities, to increase substantially the *per capita* income of the agricultural population and to remove or, at least, mitigate economic disproportion

(Footnote 79 continued)

Soyuz ... (1966), p. 11; Ceaușescu, *The Five-Year Plan, a New Stage of Progress* ... (1966), p. 23; Poland, Główny Urząd Statystyczny, *Pięcioletni plan rozwoju gospodarki narodowej* ... (1961); Communist Party of Bulgaria, Ninth Congress, *Direktivi na Devetia Kongres na Blgarskata Komunisticheska Partia* ... (1966), p. 11.

<sup>80</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1966* ... (1967), chap. 2, pp. 42-44, 48, 50.

<sup>81</sup> Like the course subsequently followed in many other countries, planning in the Soviet Union was initially concerned mainly with certain sectors crucial for development, such as the Goelro plans for electrification. See Zaleski, *Planification de la croissance et fluctuations économiques en URSS*, tome 1 ... (1962), pp. 32-43; Bor, "The organization and practice ..." (1965).

<sup>82</sup> Union of Soviet Socialist Republics, State Planning Commission, *Piatiletni plan narodno-khoziaistvennogo stroitelstva SSSR*, tom 1 ... (1930), p. 9.

<sup>83</sup> Communist Party of the Soviet Union, *V rezolyutsiiakh i resheniiakh s'ezdov* ... (1953), vol. 2, p. 335.

<sup>84</sup> Baykov, *The Development of the Soviet Economic System* ... (1948), pp. 212-214; Zaleski, *Planification de la croissance et fluctuations économiques en URSS*, tome 1 ... (1962), p. 123; Dobb, *Soviet Economic Development* ... (1966), pp. 239 ff.; Litvyakov, "Economic and social factors ..." (1967).

<sup>85</sup> Union of Soviet Socialist Republics, *The Second Five-Year Plan* ... (1936), p. 93. On growth of industrial labour force, see Dobb, *Soviet Economic Development* ... (1966), p. 272.

<sup>86</sup> Communist Party of the Soviet Union, *Direktivy XIX s'ezda partii po piatomu piatiletnemu planu* ... (1952), pp. 27-29; Dobb, *Soviet Economic Development since 1917* (1966), pp. 316-317.

<sup>87</sup> Bulganin, *Report* ... (1956), pp. 9, 41-43; Communist Party of the Soviet Union, Twentieth Congress, "The Directives of the Sixth Five-Year Plan ..." (1956).

<sup>88</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1961*, part I ... (1962), chap. 2, p. 50.

<sup>89</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1959* (1960), chap. 3, p. 39.

<sup>90</sup> Kosygin, *Report* ... (1966), pp. 11, 19, 25-27; see also Communist Party of the Soviet Union, Twenty-third Congress, *Direktivy XXIII s'ezda Kommunisticheskoi partii Sovetskogo Soyuza* ... (1966).

<sup>91</sup> Poland, Central Board of Planning, *Polish National Economic Plan* ... (1946), pp. 7-10.

<sup>92</sup> Bierut et al., *Plan Sześcioletni* (1951).



tions. Nevertheless, for the later years of the planning period allowance was made for an increase in investments needed to ensure full employment of a rapidly growing population.<sup>93</sup> Thus, whereas, on the one hand, population growth and the rise in standards of living led to a strong emphasis on the production of consumer goods, especially in the first years of the plan, the growth of the population, on the other hand, and particularly the working force and the need to maintain full employment called for a higher level of investments towards the end of the planning period.<sup>94</sup> The Five-Year Plan (1961-1965), while stating the need for investment policy to be guided by the principle of technical progress, particularly in the heavy and the engineering industry, also stressed the necessity of making investments to increase employment even at the cost of technical progress. Population growth, especially in the working-age group, was one of the main reasons causing an increase in investment above the levels of previous periods.<sup>95</sup> The very high increase of young adults during the plan period was thought to have a number of repercussions for employment, the structure and mobility of the labour force, vocational training, and housing and educational needs.<sup>96</sup>

38. The First Plan (1947-1948) of Czechoslovakia noted the existence of labour shortages as a limit to the rate of development of the economy. It contemplated among the measures to alleviate such shortages the redistribution of workers from administration to industry, the incorporation of women, pensioners and young persons into the labour force and the use of labour reserves in the countryside.<sup>97</sup> The main consideration in the First Five-Year Plan (1949-1953) was the development and transformation of the economy, with emphasis on industrialization. The increase in the levels of living, as the chief aim of the plan, was based primarily on an increased productivity of labour. It was the latter which would make the main contribution to economic growth, since the labour force would increase only little—5.6 per cent—over the planned period. Population growth, which in general was considered the chief source of labour-force growth, would, it was estimated, make only a limited contribution to the latter's expansion during the planning period, in view of the fact that the new entrants would be drawn largely from the small generations born during the depression years. Apart from population growth, the plan relied on increased employment of women and of persons with reduced capacity, re-immigration, and the utilization of labour in backward regions through creation of employment opportunities there as additional sources of labour supply. Since the number of young persons was declining, the requirements of indus-

trial production for young skilled entrants could not be met and all production sectors had to make provision for the selection and training of workers already employed in those sectors.<sup>98</sup> For the period of the Second Five-Year Plan (1956-1960) only a relatively small increase in employment—some 7 per cent—was expected and increasing reliance had to be placed on raising the number of women and aged persons in the labour force.<sup>99</sup> The Third Five-Year Plan (1961-1965) included among its tasks the increase of productivity, which was the main factor and fundamental source of economic growth. Population growth was apparently inadequate to provide the needed new workers. Employment was to increase by 420,000 persons, approximately half of whom would be recruited from married women. In addition, agricultural employment was expected to decrease by 20 per cent, contributing to a larger shortage of agricultural labour and a deterioration in the age structure and qualifications of the rural labour force.<sup>100</sup>

## 2. THE DEVELOPED PRIVATE-ENTERPRISE AND MIXED ECONOMIES

39. Planning in the developed market economies is a relatively recent phenomenon. The first attempts at planning in these countries were the reconstruction plans in the early post-war years. One important factor in the subsequent spread of planning was the realization that the automatic market mechanism was incapable of ensuring stable economic growth and full employment, as was demonstrated in the severe depression of the 1930s. Because of the experience during these years and the development of new theoretical ideas concerning the manipulation of income, the maintenance of full employment and the welfare state, the maintenance of such conditions came to be increasingly considered as the responsibility of the central authorities, leading to an increased role of government in the economic sphere and, in turn, to the need for planning. The growing preoccupation, not only with short-term fluctuations, but with medium and long-term economic development, reinforced this trend and widened the horizons of planning in these countries. Even though a number of the developed market economies have no formal planning at all or engage in planning activities only on a very limited scale, plans as a guide for economic and social development are acquiring increasing importance in many of these countries, as well as in the developing countries.

### (a) Planning and the role of population

40. As noted before, the framework within which planning takes place and its goals differ considerably, depending on institutional and economic conditions. Planning in the developed private-enterprise and mixed

<sup>93</sup> Secomski, *Premises of the Five-Year Plan in Poland* . . . (1958), pp. 21 ff., 75 ff.

<sup>94</sup> Wellisz, *The Economics of the Soviet Bloc* (1966), pp. 105, 109.

<sup>95</sup> Gomułka, *Przemówienia 1960* (1961); Poland, Główny Urząd Statystyczny, *Pięcioletni plan rozwoju gospodarki narodowej* . . . (1961).

<sup>96</sup> Secomski, "Demografia a planowanie rozwoju społeczno-gospodarczego" (1967).

<sup>97</sup> Czechoslovakia, Ministry of Information and Public Culture, *The First Czechoslovak Economic Five-Year Plan* . . . (1949), pp. 48, 81-83.

<sup>98</sup> Czechoslovakia, Ministry of Information and Public Culture, *The First Czechoslovak Economic Five-Year Plan* . . . (1949), pp. 52, 172-174, 200, 240-241.

<sup>99</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1957* (1958), chap. 7, p. 50.

<sup>100</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1959* (1960), chap. 3, pp. 10-11; Solar and Strádal, *The Whys and Hows of Economic Planning* (1961).

economies, as compared with that in the centrally planned economies, reflects necessarily the fact that most economic decisions in the former are in private hands and that government, while exercising control over the public sector, can influence only indirectly the course of action in private sectors. Economic plans under these conditions are mainly directed towards guiding and co-ordinating public policies and towards supplying production and investment targets without supplanting the decisions of the private sector, although consultations between the government and the private sector in plan preparation are becoming the practice in an increasing number of countries.<sup>101</sup> Differences also exist between planning in the developed market economies and the developing countries, especially as far as the objectives of planning are concerned. Whereas in the developing countries the increase in levels of income is of necessity the predominant objective, the plans of the developed market economies place much more emphasis on a broad range of goals and the balance between them. This is reflected in the nature of planning in these countries. In the developing countries it is an important tool for the transformation of the economy and society, but in the more developed countries it is rather a means of maintaining and stimulating a balanced economic growth and social development.<sup>102</sup> To these differences should be added those emanating from demographic trends. Whereas the developing countries must contend in their planning with the problems created by a rapid population growth and the predominantly unfavourable characteristics associated with it, in the developed countries, on the contrary, when demographic trends impose constraints on economic growth, they do so mostly not because population increases too fast, but because it does not increase rapidly enough.

41. In general, the main purpose of planning in the developed market economies has been described as the maintenance of the full utilization of the expanding volume of economic resources that arises out of technological progress and population growth.<sup>103</sup> More specifically, with regard to the industrialized countries of Western Europe, it was observed that Governments appeared to have the same basic objectives of full employment and a high rate of growth of national income in the context of a balance-of-payment equilibrium and domestic price stability, with most plans mentioning in addition the desirability of reducing income differentials among social groups and geographical areas.<sup>104</sup>

42. Since in most of the developed market economies population growth is low or moderate, demographic factors are thought to constitute in principle much less of an obstacle to economic growth than in those developing countries where population is increasing rapidly and

exerts a growing pressure on already scarce resources. In the developed market economies, however, population plays a role in planning precisely because its increase is slow. Demographic considerations, under these circumstances, will be relevant mainly where planning personal and "social" consumption and, especially, output, in so far as it is determined by the increase of the working population, are concerned. Since the rate of savings and levels of capital formation are already relatively high in these countries, significant increases in the share of investment, which are crucial in planning in the developing countries, do not constitute a major issue in the industrialized countries. Capital formation can thus be viewed largely as a dependent variable related to final consumer demand, while the latter can be determined on the basis of population growth and structure and levels of income.<sup>105</sup> To the extent that capital formation as well as land, which plays a relatively minor role, is not acting as a constraint on growth, the latter becomes a function mainly of the expansion of the labour force and the increase in its productivity.

43. Demographic factors may thus enter into the planning models of the developed market economies in various ways. Where demand is considered the crucial factor, such a model might take as its starting point the prospective levels of private and public demand at the end of the plan period which provide a basis for setting production targets for final consumer goods and services. Balances of labour supply and demand, of saving-investment and of international trade are then the constraints on income maximization.<sup>106</sup> Alternatively, in a supply-oriented model, estimates of the future working population and assumptions about possible changes in activity rates can be used to forecast the labour force. The estimates of the labour force, combined with certain hypotheses concerning the growth of labour productivity, yield an estimate of future output from which the values of other variables can be derived.<sup>107</sup>

#### (b) *Demographic considerations in economic plans*

##### (i) *An over-all view*

44. Generally speaking, population has not been a major factor in setting planned levels of consumption. In most plans, consumption was considered mainly a function of disposable income or, in long-term models where investment is a function of economic growth, consumption was derived as a residual.<sup>108</sup> Nevertheless, in some plans, such as that of Norway for the period 1962-1965, private consumption was mainly derived from a relationship incorporating population and product or income as explanatory variables.<sup>109</sup> On the whole, how-

<sup>101</sup> United Nations, *Planning for Economic Development* ... (1963), p. 2; United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 1, p. 3, chap. 3, pp. 3-4.

<sup>102</sup> United Nations, *Planning for Economic Development* ... (1963), p. 3.

<sup>103</sup> *Ibid.*

<sup>104</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 1.

<sup>105</sup> United Nations, *Planning for Economic Development* ... (1963), p. 12; ———, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 1, p. 5.

<sup>106</sup> United Nations, *Planning for Economic Development* ... (1963), pp. 12-13.

<sup>107</sup> United Nations, Economic Commission for Europe, "Long-term plans in Western Europe" (1962).

<sup>108</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 3, p. 7.

<sup>109</sup> *Ibid.*, chap. 3, p. 26.

ever, much more important was the role of demographic factors in setting levels of output.

45. Although in the post-war period some countries were facing employment problems due to the destruction caused by the war, conditions of underemployment which had emerged during the past (such as in Italy), or a relatively high population growth (such as in the Netherlands) in general, a slow rate of growth of the labour force has been the dominating demographic factor in the plans of these countries. Projections of the labour supply occupied an important place in planning and estimates of the future supply of labour as a function of population growth and activity rates figured prominently in a number of plans, such as the different French four-year plans and the Netherlands' long-term perspectives.<sup>110</sup> The importance of preparing future estimates of labour supply was brought out by the forecasts for Sweden for the 1961-1965 period when it was found, from a confrontation of the estimated labour supply with the demand, based on entrepreneurial plans, that the latter over-estimated the growth of labour resources, which required a downward revision of the employment and an increase in the investment objectives.<sup>111</sup> In Ireland, emigration, not the slow growth of population, was considered responsible, at least in part, for a dampening effect on activity, and the First Programme of Economic Expansion for that country emphasized the urgency of developing an industrial base which, through a rapid expansion of employment in industry, would reduce emigration.<sup>112</sup> The plans of a number of countries, such as Belgium's 1962-1965 programme, Greece's Perspective Development Plan (1960-1969) and the French perspectives, elaborated for the period 1956-1965, among others, took the future growth of the total and working populations as their point of departure and derived from the estimates thus obtained and others for labour productivity the future planned levels of national product, investment, consumption and so forth.<sup>113</sup>

46. The slow natural increase of the population in working ages, apart from constituting one of the most important constraints on setting the rate of economic growth, had other indirect effects on planning in these countries. The scarcity of labour led to an increased emphasis on the quality of the labour force, and many plans discussed vocational training and education and the conciliation of the supply of and the demand for labour force in different occupations, especially those which required more skills and training. Since employment could expand only slowly, increases in productivity became a very important factor in determining the rate of economic growth. However, rapid increases of productivity such as occurred in the early 1960s in many of the developed market economies, it has been pointed out, are likely to create, under conditions of labour scarcity,

heavy strains on the labour market and productive capacity. In order not to intensify such pressures, more moderate increases in productivity must be planned for in subsequent periods, a fact reflected in most plans for the latter part of the 1960s.<sup>114</sup>

47. Another related aspect is the increasing emphasis on determinants of the labour supply other than the growth of the population in working ages. Some plans noted the limited possibilities, in view of the pressure on the labour market, of reducing the hours of work. Other plans incorporated estimates of the effects of changes in activity rates, considering the positive effects of higher levels of female participation and the negative effects of the increase in the number of years of schooling and the decrease in activity rates at the more advanced ages. Increasing attention was also given in the plans to the possibilities of alleviating the problem of the scarcity of domestic labour by means of the immigration of foreign workers and estimates of the volume of such immigrations and their effects on economic growth have become incorporated as basic factors in a number of plans.<sup>115</sup> Finally, since the labour force was growing at such a slow pace, variations in its increase exerted considerable influence on setting the targets in planning. In the beginning of the 1960s optimistic forecasts were based in part on the expected faster growth of the labour force, due to the larger generations born in the post-war years. In addition, since this increase would consist predominantly of young workers, account was taken of the fact that while this would facilitate mobility, it might at the same time aggravate the shortage of experienced and skilled manpower.<sup>116</sup>

#### (ii) *Selected countries*

48. Demographic considerations have occupied an important place in French planning since the First Plan (1947-1951), which was a reconstruction programme for those sectors on which the recovery of the economy after the war depended. The scarcity of manpower was acknowledged to be one of the crucial factors in the development of the economy and the existence of a disequilibrium in the labour market became evident in the course of the Second Plan period (1954-1957). While as a result of the rapid development the demand for labour expanded considerably, the level of natural growth of population implied a slight decrease in the supply of labour, reinforced by the increase in the years of schooling. Only in the last year of the planning period would counteracting forces such as the reduction of unemployment to a very low level, an increase in the age of retirement and in female participation, and higher immigration become effective. Similar conditions characterized the Third Plan period (1958-1961), in which it was foreseen that the working population would remain relatively stable, despite the increase in total population. The plan conse-

<sup>110</sup> United Nations, Economic Commission for Europe, "Long-term plans in Western Europe" (1962); ———, *Economic Survey of Europe, 1962*, part II . . . (1965), chap. 3, pp. 23 ff.

<sup>111</sup> United Nations, *Economic Survey of Europe, 1962*, part II . . . (1965), chap. 3, p. 29.

<sup>112</sup> *Ibid.*, chap. 2, p. 7.

<sup>113</sup> *Ibid.*, chap. 3, pp. 28-29; Wellisz, "Economic planning . . ." (1960).

<sup>114</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1967* (1968), chap. 1, p. 64.

<sup>115</sup> *Ibid.*, chap. 1, p. 64; United Nations, Economic Commission for Europe, "Long-term plans in Western Europe" (1962).

<sup>116</sup> United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1967* (1968), chap. 1, p. 64; ———, "Long-term plans in Western Europe" (1962).

quently stressed the importance of increasing productivity under the conditions of a relatively stagnant working population. At the same time, the plan noted, provisions had to be made for the education and occupational training of the large number of young people born after the war who were to enter the labour force in the course of the subsequent plan period.<sup>117</sup>

49. The Fourth Plan (1962-1965) stressed both full employment as a basic objective and the restrictions on growth imposed by the limited supply of labour and by the necessity to maintain the internal and external equilibrium of the economy. Nevertheless, the plan observed that one important change compared with previous years was the higher number of young workers who would be incorporated in the labour force. The relatively high natural increase of the labour force would have a considerable effect on labour force trends and the outlook for growth during the plan period. The tendency towards a decrease of the percentage of active population would be slowed down or halted and the labour force would expand in the plan period by some 3.4 per cent, compared with an increase of barely 1 per cent over the two previous plans. Nevertheless, the scarcity of labour in general and, especially, in certain types of occupations would continue to prevail and not allow, for instance, a decrease in working hours.<sup>118</sup> The Fifth Plan (1966-1970) noted the favourable conditions for growth created by further increases in the number of better-educated young workers. In the course of the plan period, the working population would increase at a relatively modest rate and the rejuvenation of the labour force, while implying the presence of more young workers who had not yet reached their maximum experience, would create also a dynamic climate and a change in mentality favourable to growth. Nevertheless, the scarcity of labour continued to be a restraining factor and special emphasis was placed on attempts to increase investment.<sup>119</sup>

50. Only in few of the developed countries was population growth thought to be an obstacle to economic growth; one such case was the Netherlands in the years following the Second World War. In the face of a rapid growth of the potential labour force, the problem of maintaining full employment, further complicated by the expected increase in the labour force which had lapsed as a result of the war, became an important issue in economic policy. The First Memorandum on Industrialization considered rapid industrialization and the improvement of its regional patterns in order to deal with employment problems in certain areas essential to provide work for the fast-growing population. Even such an industrialization policy was thought to be insufficient and an emigration policy was introduced as an additional measure for promoting full employment. The demographic trends had another indirect effect on planning:

<sup>117</sup> France, *Troisième plan de modernisation* ... (1959), pp. 18-23, 26-29, 79-81.

<sup>118</sup> France, *Quatrième plan de développement économique et social* ... (1962), pp. 1-2, 5-7, 108-114.

<sup>119</sup> France, Commissariat Général du Plan d'Équipement et de la Productivité, *Rapport sur les principales options du V<sup>e</sup> plan* (1964), pp. 21, 26-29, 70-72; ———, *Cinquième plan de développement économique et social* ... , vol. 1 (1965), pp. 5-6, 12; vol. 2 (1965), pp. 5-7.

wage control being the most important policy instrument, in the early post-war period at least, the success of the wage policy was attributed in part to the rapid growth of the labour force, which helped to maintain wage stability through the ample supply of labour.<sup>120</sup> The long-term perspectives for the period 1950-1970, taking as the maximum admissible level of unemployment a figure slightly over 3 per cent, estimated, on the basis of a comparison of the demand for and the supply of labour, the necessary emigration under different assumptions as to the expansion of the economy in general and exports in particular.<sup>121</sup>

51. The medium-term prognosis for the period 1965-1970, however, observed that, despite the high increase of the labour force in comparison with most other European countries, an increasing pressure on the labour market emerged in the period 1955-1965. This shortage of labour force became especially pronounced in the early 1960s even though the working population in that period, due to the post-war birth wave, increased at the high rate of 1.5 per cent annually compared with only 0.7 per cent in the years 1955-1960. As a result of the increasing scarcity of labour, the net balance of emigration changed after 1960 to an immigration balance. The projections of the working population for the 1965-1970 period, which took into account, apart from the natural increase of the population in working ages, the effects of the increased participation of females, the increased years of schooling, and immigration, showed that the share of the working population in the total, which was already very low in comparison with many other developed countries, would further decrease. The projections foresaw, nevertheless, that labour might become somewhat less scarce because of the combined influence of a somewhat possible lower economic growth and continued immigration.<sup>122</sup>

52. The solution of the unemployment problem occupied an important place in the Italian programme for the period 1955-1964, the so-called Vanoni plan. This plan is also noteworthy because it included as objectives not only the reduction of unemployment and underemployment, together with a rapid increase of income, at the rate of 5 per cent, and the elimination of the trade deficit, but also the narrowing of the gap in levels and conditions of living between northern and southern Italy. But the persistence of unemployment and underemployment was seen as the crucial problem which the economy and society had to face. Underemployment, it was asserted, was widespread and, in addition, unemployment, despite rapid economic growth, continued at high levels owing, among other factors, to the more intensive use of labour instead of the use of more labour associated with the productivity increase. The plan set out to attain a reasonable equilibrium between the demand for labour and the need for jobs as determined by the natural increase

<sup>120</sup> Weststrate, *Economic Policy* ... (1959), pp. 19-23; United Nations, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 3, p. 3; chap. 5, pp. 23, 25.

<sup>121</sup> Netherlands Centraal Planbureau, *Een verkenning der economische toekomstmogelijkheden van Nederland, 1950-1970* (1955).

<sup>122</sup> Netherlands Centraal Planbureau, *De Nederlandse economie in 1970* (1966), pp. 14-15, 30-33, 36-38, 49-52, 59.

of the labour force and the existing unemployment and underemployment. On this basis, and within the framework of the other objectives, the plan estimated that 4 million new jobs would have to be created in the course of the plan period. This figure was reached in the following manner: new workers entering into the labour force—2 million; unemployed at the beginning of the period—1.8 million; underemployed and workers displaced by technical progress—1.7 million. In addition, 800,000 workers were estimated to have emigrated and allowance was made for frictional unemployment of about 700,000 workers at the end of the plan period, representing somewhat over 3 per cent of the active population.<sup>123</sup>

53. The Italian plan for the period 1966-1970, noting the long-term planning aims of the elimination of the major regional and sectoral imbalances, envisaged for the plan period a somewhat lower rate of growth of output than that which actually took place in preceding years, but sufficient to maintain a high level of employment. Other objectives reflected the planning goals set for the long term. Apart from an increase of national income at an annual rate of 5 per cent, the targets of the plan included an increase of social outlays up to 26-27 per cent of resources; an increase of agricultural production of 2.8 to 2.9 per cent annually—releasing some 600,000 labourers from agriculture; and an increase in employment outside agriculture by 1.4 million, of which some 40-45 per cent would be created in the south. This projected increase in employment would absorb the labour force increase as well as those workers displaced by agriculture, leaving a normal level of frictional unemployment of 2.8 to 2.9 per cent of the labour force. The starting point of the labour force estimates used in these targets was the expected population growth. Taking into account the changes in the activity rates due to increased schooling, the changes in female participation rates and the assumption that 300,000 workers would emigrate, the labour force would increase by some 600,000 persons over the plan period. With unemployment at the level indicated before, 800,000 new jobs would have to be created.<sup>124</sup>

### 3. THE DEVELOPING COUNTRIES

54. Planning for economic and social development, although a relatively recent phenomenon in the economically less advanced countries, has undergone a rapid evolution in the course of the last decades or so. In many countries the gaining of independence and the establishment of national governments were a turning point, raising the hopes and expectations of their peoples and giving them the opportunity to set out their own destiny and to formulate their own national economic and social aims. The strongest motivation for planning in the developing world as a whole was the desire to overcome the conditions of poverty and backwardness. Fostering economic and social development and achieving advanced levels of technological progress so as to obtain for their

populations the conditions of living commensurate with human dignity and the individual's development became a primary goal. Through planning, these countries undertook the formidable task of transforming their societies into economically modern and socially forward-looking nations.

#### (a) *Planning and the role of population*

55. Economic policy and planning may encompass in general a wide range of objectives including, among others, a rapid increase in total or *per capita* income, a high level of employment, a relatively stable price level, an equilibrium in the balance of payments, the reduction of marked disparities in prosperity in different regions and a diversified economy.<sup>125</sup> Despite this variety of possible goals, in virtually all of the developing countries the acceleration of the rate of economic growth necessary to overcome the economic stagnation at low levels of income is at the core of economic policy. Based on either past trends or desired future growth, plans set targets primarily in terms of total or *per capita* income even though under certain conditions income targets, it has been argued, may have to take into account other objectives or even be modified because of them. Such may be the case where serious unemployment problems exist and plans must make provision for creating sufficient additional new jobs.<sup>126</sup>

56. In the task of development, Governments and policy-makers have to face formidable obstacles. In a general sense, the rigidity of institutions, political instability, the absence of an adequate administrative capacity and a deficient infrastructure considerably hamper their development efforts. More specifically, the possibilities of attaining given levels of income or employment are limited because of the scarcity of resources. Under certain conditions, scarce natural resources constitute a serious limitation on development and its planning.<sup>127</sup> In recent years the importance of an adequate supply of trained and skilled manpower and human resources for economic development has been widely recognized.<sup>128</sup> None the

<sup>125</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 6; ———, Economic Commission for Europe, *Economic Survey of Europe, 1962*, part II ... (1965), chap. 2, p. 1. See also Tinbergen, *Lessons from the Past* (1963), pp. 108-110 and his *Economic Policy* ... (1967), pp. 15-17; Bjerve, *Planning in Norway* ... (1959), p. 5; Das-Gupta, "Economic planning ..." (1962).

<sup>126</sup> International Labour Office, *The World Employment Programme* ... (1969), pp. 55 ff.; ———, *Employment and Economic Growth* (1964), pp. 129-130; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 13.

<sup>127</sup> United Nations, *Measures for the Economic Development of Under-developed Countries* ... (1951), pp. 46-47; Singer, *International Development* ... (1964), pp. 26-27; Sen, *The Strategy for Agricultural Development* ... (1962); United Nations, *Processes and Problems of Industrialization* ... (1955), pp. 3-5. In many cases, however, institutional factors, such as systems of land tenure etc., are the main obstacle. See, for instance, United Nations, Economic Commission for Latin America, *Economic Development Planning* ... (1961), pp. 24-29; International Labour Office, *Employment and Economic Growth* ... (1964), p. 127.

<sup>128</sup> See section C of this chapter. The importance of human capital for economic growth is also discussed in chapter XIII, section D.

<sup>123</sup> Italy, Comitato Interministeriale per la Ricostruzione, *Lineamenti del programma di sviluppo* ... (1956), pp. 1, 23 ff.

<sup>124</sup> Italy, Ministero del Bilancio, *Programma economico nazionale per il quinquennio, 1966-1970* (1967), pp. I-III.

less, most development plans stress the low levels and rates of capital formation as the major constraint on planning targets. Although it is generally recognized that it would be an over-simplification to regard economic development as a function of capital formation only and that investment is a necessary rather than a sufficient condition for it, it has also been pointed out that if any one scarce factor associated with under-development should be singled out it would be capital.<sup>129</sup>

57. Raising the levels of capital formation occupies, therefore, a prominent place in the plans of most developing countries. Even so, the lack of capital constitutes in many instances a limit on plan objectives. This is especially the case in employment planning. Employment targets, generally speaking, depend on the level of capital formation and the average investment per additional worker. Given the level of total investments, maximum employment is created when, by means of the use of labour-intensive methods of production, capital outlays per worker are kept at a minimum. For several reasons, however, it is held that the feasibility of such a labour-intensive approach to development is limited. In the first place, it has been argued that the choice of methods of production is limited and that most of them require considerable capital outlays.<sup>130</sup> More specifically, the arguments are that economic development requires many projects which are capital-intensive and have only limited employment effects<sup>131</sup> and that modern technology, developed in the more advanced country where labour is often the scarce factor, is labour-saving rather than capital-saving.<sup>132</sup> In the second place, it has been asserted that in the long run both income and employment would benefit most from the most efficient, that is the capital-intensive, use of a nation's capital resources.<sup>133</sup>

<sup>129</sup> United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), p. 20; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 8; United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 3; Basch, *Financing Economic Development* (1964), p. 1; Seth, *Theory and Practice* ... (1967), p. 12; Furtado, *Development and Underdevelopment* (1964), p. 61; Das-Gupta, *Planning and Economic Growth* (1965), pp. 45-46.

<sup>130</sup> On the general problem of a limited choice of techniques, see chapter XIII, section D.

<sup>131</sup> International Labour Office, *Employment and Economic Growth* (1964), pp. 130-131. Especially public overhead facilities, such as roads and transportation, which are basic for development, require large investments—see United Nations, *Measures for the Economic Development of Under-developed Countries* ... (1951), pp. 53-56; Singer, *International Development* ... (1964), pp. 93 ff.

<sup>132</sup> United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), pp. 7-8; —, *Economic Development Planning* ... (1961), pp. 30-32. See also Bhatt, "Employment and capital intensity" (1954); Buchanan and Ellis, *Approaches to Economic Development* (1955), pp. 64-65; Leibenstein, *Economic Backwardness and Economic Growth* ... (1957), p. 259; Bauer and Yamey, *The Economies of Under-developed Countries* (1957), pp. 123-125; Myint, *The Economies of the Developing Countries* (1965), pp. 137-138.

<sup>133</sup> United Nations, Economic Commission for Asia and the Far East, "Development planning in ECAFE countries in the recent past ..." (1964). For views favouring capital-intensive development see also Baran, *The Political Economy of Growth* (1957), p. 288; Bettelheim, *Studies in the Theory of Planning* (1959), pp. 44-57; Galenson and Leibenstein, "Investment criteria, productivity and economic development" (1955); Higgins, *Economic Develop-*

58. Low productivity and under-development are closely interrelated with a structure of the economy in which primary activities dominate as at low levels of income most of the population is engaged in agricultural production to satisfy its basic needs, especially for food. Economic development, with the increased productivity it implies, is caused by and consequent upon simultaneous and interdependent shifts in the structure of employment: from primary to secondary and tertiary activities and, especially within agriculture, from less efficient to more productive activities. As has been pointed out, these changes in the production relations make it possible, on the one hand, by increasing the non-agricultural labour force, to satisfy the increased demand for non-agricultural products associated with higher levels of living. On the other hand, they create the conditions for releasing the necessary labour from agriculture through increases in productivity, while maintaining at the same time production at levels high enough to satisfy the demand for agricultural products.<sup>134</sup>

59. Industrialization in the sense of the structural transformation of the economy thus constitutes a key factor in rapid economic growth and most plans have accepted rapid industrial growth as the central feature of long-term economic growth. The emphasis on industrial development planning responds to the nature of these sectors as the leading ones in economic development as well as to the argument that only industries and the other non-agricultural sectors are capable of absorbing the surplus rural population. In discussions on priorities of development, however, it has also been argued that agricultural development is primary since the rate of industrialization depends fundamentally on the rate of expansion of agricultural production. Not only, it is asserted, is the demand for food at low levels of development more urgent, but, in addition, industrialization requires increased agricultural productivity in order to release labour from the land and to feed the increasing

*ment* ... (1959), pp. 330-333; Mahalanobis, "Some observations ..." (1953) and his *Talks on Planning* (1961), pp. 9 ff., 13 ff., 95, stressed in this connexion, especially, the need for investments in capital goods production. See also Dhar, "Heavy industry ..." (1962) and Banerji, "Growth of investment ..." (1962). For views favouring capital-saving investments and labour-intensive techniques, see Buchanan, *International Investment and Domestic Welfare* (1946), p. 24; Kahn, "Investment criteria in development programs" (1951); Chenery, "The application of investment criteria" (1953); Nurkse, *Problems of Capital Formation* ... (1953), p. 35. Several studies have pleaded for an appropriate blending of capital-intensive and labour-intensive techniques; see, for instance, United Nations, Economic Commission for Latin America, *Economic Development Planning* ... (1961), p. 32; Seth, *Theory and Practice* ... (1967), pp. 104-109. For a general discussion of the issues involved, see also International Labour Office, *Employment and Economic Growth* (1964), pp. 130 ff.; Caire, *La planification* ... (1967), pp. 443 ff.; Singer, *International Development* ... (1964), pp. 75 ff.; Das-Gupta, *Planning and Economic Growth* (1965), pp. 53-54. See also chapter XIII, sections C and D.

<sup>134</sup> United Nations, *Processes and Problems of Industrialization* ... (1955), pp. 1-7; United Nations, Economic Commission for Latin America, *Analyses and Projections of Economic Development*, I ... (1955), pp. 6-7; United Nations, Economic Commission for Asia and the Far East, "Problems of industrialization ..." (1958); United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), pp. 19-29. Singer, *International Development* ... (1964), pp. 41 ff. See also chapter XIV, section A.



non-agricultural population and provide it with the necessary raw materials. Nevertheless, in general, it has been accepted that the planning of both agricultural and industrial development should complement each other in such a manner that the productive capacities of both sectors are utilized to the fullest possible extent.<sup>135</sup>

60. Any effective development plan, therefore, will have to consider the transfer of labour from agriculture into the industrial sectors and formulate employment targets accordingly. Whereas the long-term employment aspect of planning for industrial development is to provide productive work for an increasing labour force, the immediate employment considerations concern the mobility of labour and the efficient absorption of the existing industrial labour force and the additions to it through natural growth and migration. Although the view is found that as a general principle industrial planning should favour labour-intensive development so as to create the highest possible employment, the more general opinion is that industrial development does not require much labour and adds little to employment.<sup>136</sup> The limited employment objectives of most plans for industrial development and their failure in many cases to absorb the existing supply of labour has led a number of experts to stress the importance of providing additional jobs through special programmes, especially in rural areas, whose effect would also be to reduce the excessive inflow of rural labour into the urban labour market.<sup>137</sup>

61. Demographic considerations are involved in a number of ways in planning for economic development. For the past few decades the majority of the developing countries have experienced or are experiencing a significant acceleration in the rate at which their populations grow, as a result of declining levels of mortality accompanied by persistent high levels of fertility, the latter also being the main determinant of the "young" age distribution. Unprecedented high rates of population growth have become typical for the majority, though not all, of the developing countries. An inquiry on the implications of population growth for economic and social development

<sup>135</sup> For the different viewpoints and their discussion see United Nations, *Processes and Problems of Industrialization* ... (1955), pp. 2-3; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), pp. 19, 30; ———, "A decade of development planning ..." (1961); Nicholls, "The place of agriculture in economic development" (1964); Robinson, "The role of industry in development" (1965); United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 46, 54.

<sup>136</sup> United Nations, Economic Commission for Asia and the Far East, "Problems of industrialization ..." (1958); United Nations, *Report of the United Nations Seminar on Industrial Programming* ... (1964), pp. 7-9; United Nations, Economic Commission for Latin America, *The Process of Industrial Development* ... (1965), pp. 42 ff.; Rivkin, "The role and scope of industrialization ..." (1965). See also chapter XIII, sections C and D. It has, however, also been noted that in developing countries a bias towards a more than optimal use of capital-intensive methods of production may exist. International Labour Office, *Employment and Economic Growth* ... (1964), p. 136.

<sup>137</sup> Oshima, "A strategy for Asian development" (1962); International Labour Office, *Employment and Economic Growth* (1964), pp. 132, 156-172; United Nations, *World Economic Survey, 1959* (1960), pp. 124-125; ———, *World Economic Survey, 1964*, part I ... (1965), pp. 66-67; Mahalanobis, *Talks on Planning* (1961), p. 69; Singer, *International Development* ... (1964), pp. 99 ff.

found that "many of the responses from Governments of the developing countries manifest more or less serious concern with the high rates at which the population of their countries is increasing, considering this a serious handicap to economic and social development".<sup>138</sup>

62. High rates of population growth do not imply only the need for income to grow faster in order to gain a rise in levels of living; they also contribute to a deterioration in the relation between population and other resources. With respect to the main components of income, consumption and investment, it has been noted that the rapid growth of population in most of the developing countries makes the primary task of maintaining *per capita* consumption in itself considerable. It also requires large capital outlays, the so-called demographic investments, only to prevent the existing levels of living from declining.<sup>139</sup> In practice, economic growth cannot take place without any growth in *per capita* consumption while future development depends on raising the levels of capital formation. Therefore, the growth of income must surpass that of population by a substantial margin. To these effects of population growth must be added the adverse consequences of the "young" age distribution in the developing countries with its high dependency ratios, which affect savings and productive capacity as well as the composition of investment with a relatively large share of investments that are not directly productive, such as education, health, housing and so forth.<sup>140</sup>

63. Demographic factors are especially prominent in the case of employment planning. Fundamentally, the setting of employment targets must depart from the projected labour-force growth. In many of the countries under consideration where the labour force is expanding rapidly and unemployment and underemployment frequently are already high, planning for full employment meets many obstacles. Even where investments and other resources are allocated in such a manner that they would create the highest possible employment—implying low ratios of capital and land to labour and the use of labour-intensive methods of production—low levels of investment and scarcity of land in many cases preclude the possibility of attaining full or satisfactory levels of employment. Since, as noted, the opportunities for labour-intensive techniques are limited and development plans are generally productivity-oriented rather than employment-oriented, the employment objectives in development planning, it has been observed, are as a rule necessarily limited.<sup>141</sup> Attempts at increasing employment rapidly are further hampered by the fact that although an over-all

<sup>138</sup> United Nations, *Inquiry among Governments* ... (1960), p. 8.

<sup>139</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 3; United Nations, Economic Commission for Latin America, *Economic Development, Planning* ... (1961), pp. 2-3. For a discussion of a lower and upper level of investments, as determined in part by population growth, see also section A of this chapter. On "demographic investments", see chapter XIII, section B.

<sup>140</sup> On the effect of the age distribution on the structure of investment, see chapter XIII, sections B and D.

<sup>141</sup> International Labour Office, *Employment and Economic Growth* (1964), p. 130; ———, *The World Employment Programme* ... (1969), pp. 55 ff.; United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 64-65. Several writers have noted that even if capital was allocated so as to create maximum

(Continued on next page)



labour surplus exists, there is a shortage of qualified and skilled manpower; this acts as a constraint on the rate of development as well as on employment expansion.<sup>142</sup> Because the employment generated directly by the planned development remains far short of the increased supply of labour associated with a rapid population growth, a number of plans contemplate special programmes to expand productive employment which would require little additional investment. More jobs can be created, it is asserted, through fuller utilization of existing capacity or by promoting various types of labour-intensive projects.<sup>143</sup>

64. Planning the industrial and sectoral development of the economy is to a considerable extent conditioned by demographic factors. Rapid population growth in developing countries signifies, according to various authors, for various reasons an obstacle to rapid industrialization. To the extent that it depresses income, it will slow down capital accumulation and the expansion of markets for manufactured products. While holding back the development of the industrial sectors, rapid population growth, together with the high income elasticities of demand for food at low and stagnant levels of income, will require large increases in the supply of agricultural commodities.<sup>144</sup>

65. In planning the development of industry and, especially, agriculture, the relationship between population and agricultural land or resources, included in the general programmes, emerges as an important factor. Differences in agricultural density, as has been frequently noted, may affect the development of agriculture as well as the timing and sequence of the industrialization process. In countries where population density and the agricultural labour-land ratio are high, prospects of raising agricultural production through the extension of the area under cultivation or more intensive exploitation of the land already under cultivation are much more restricted than in low-density countries.<sup>145</sup> In countries with high rural density, it is argued, a prerequisite for agricultural development is the transfer of part of the agricultural labour force from the land before any attempts to increase productivity in this sector can be expected to bear fruit. In low-density countries, on the contrary, raising the levels of agricultural productivity is a necessary condition

for the release of labour from the land and for supplying the non-agricultural population with the necessary food and raw materials. Whereas thus in the latter case the increase of agricultural productivity would be a pre-condition for industrialization, in high-density areas planning for industrial development should concentrate primarily on creating additional employment opportunities in the non-agricultural sectors so as to absorb the surplus rural population.<sup>146</sup>

66. Among the demographic factors directly associated with the industrialization process and the planning of industrial development, the occupational and geographical mobility of the population is of crucial importance, the redistribution of the population from predominantly rural-agricultural to urban-industrial areas and occupations is both a condition and a consequence of the development process. Urbanization and industrialization are closely linked to each other. For technological and organizational reasons, the concentration of workers in urban areas is a virtually necessary concomitant of the process of industrial change and the changes in conditions and standards of living; the diversification of the demand and so forth are, in turn, directly related to the urban way of life.<sup>147</sup> However, the experience of the developing countries, in particular, has shown that the two processes are not necessarily balanced. The rapid growth of urban populations, frequently at a rate faster than that warranted by the pace of industrialization, it is held, are a basic factor in the urban employment problems in many developing countries.<sup>148</sup>

67. Within the context of industrial development planning, employment policies have to take into account not only the over-all growth of the labour force, but also its spatial and occupational change. With the large displacements of labour from agriculture to non-agricultural activities, typical of many developing countries, the primary task of employment planning, it has been argued, must be the creation of additional job opportunities in industry and related sectors. Even though in a number of these countries agriculture could conceivably absorb additional workers, any effective industrialization policy must provide, according to this view, for the increase of non-agricultural employment, which would absorb the rapidly growing labour force as well as the underemployed rural labour.<sup>149</sup> Employment objectives formulated on

(Footnote 141 continued)

employment, the available capital resources might still be insufficient to create full employment—see Higgins, *Economic Development* ... (1959), p. 259; Singh, "Employment aspect of our planning" (1962); Das-Gupta, *Planning and Economic Growth* (1965), pp. 35, 41; Kalecki, "Three ways to full employment" (1946), p. 43.

<sup>142</sup> See section C of this chapter.

<sup>143</sup> International Labour Office, *Employment and Economic Growth* (1964), especially chap. 6; ———, *The World Employment Programme* ... (1969), pp. 59 ff.; United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 67-68; ———, *World Economic Survey, 1959* (1960), pp. 124-125.

<sup>144</sup> Robinson, "The role of industry in development" (1965); Mellor, "Increasing agricultural production ..." (1962); United Nations, *Processes and Problems of Industrialization* ... (1955), p. 18.

<sup>145</sup> United Nations, *Measures for the Economic Development of Under-developed Countries* ... (1951), p. 9; ———, *Processes and Problems of Industrialization* ... (1955), pp. 3-4; Nurkse, *Problems of Capital Formation* ... (1953), pp. 52-53; Hoselitz, "Agriculture in industrial development" (1956).

<sup>146</sup> United Nations, *Processes and Problems of Industrialization* ... (1955), pp. 3-4; Singer, *International Development* ... (1964), pp. 26-27; Hoselitz, "Agriculture in industrial development" (1956); Sen, *The Strategy for Agricultural Development* ... (1962), p. 20; International Labour Office, *Employment and Economic Growth* (1964), p. 126.

<sup>147</sup> See chapter XIV, section A.

<sup>148</sup> United Nations, *Report on the World Social Situation* ... (1957), p. 124; United Nations, Economic Commission for Latin America, *The Process of Industrial Development* ... (1965), p. 11; United Nations, *Towards a Dynamic Development Policy for Latin America* (1963), pp. 24-25; International Labour Office, *Employment and Economic Growth* (1964), p. 132.

<sup>149</sup> United Nations, *Processes and Problems of Industrialization* ... (1955), p. 3; United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 28; International Labour Office, *Employment and Economic Growth* (1964), pp. 154-155; Robinson, "The role of industry in development" (1965).

this basis, however, would, in the view of others, often clash with the promotion of higher productivity as an essential ingredient of industrialization. In general, it has been asserted that industry can play only a relatively minor part in the direct absorption of the redundant labour force. Modern industrial processes, as noted in the preceding pages, are for the most part highly capital intensive, requiring comparatively little labour and thus have only a limited impact on creating new jobs.<sup>150</sup> The employment problems arising in the course of an industrialization programme, due to high population growth and an excessive inflow of workers in the non-agricultural labour market, have focused attention on the possibilities of creating additional employment through special programmes designed to the expansion of rural jobs, which would also constitute a check on unduly large migrations to the cities. Among the areas considered for action in this respect are: cottage and small-scale industries, rural works programmes, including such works as digging wells, building rural roads, terracing land and so forth.<sup>151</sup>

(b) *Demographic considerations in economic plans*

(i) *An over-all view*

68. The rapid growth of population in the developing countries has been a significant factor in the setting and implications of targets for economic growth both at the international and national level. The proposal for the First United Nations Development Decade suggested a minimum rate of growth of aggregate income of 5 per cent as a goal to be reached at the end of the Decade. Such a growth rate would permit, assuming a continuation of the then prevailing rate of population increase in the developing world, a doubling of the levels of living within a period of 25 to 30 years. The growth rate of 5 per cent annually, however, would not permit a very rapid rate of increase in *per capita* income in those countries where population was growing most rapidly.<sup>152</sup> The action programme for the Second United Nations Development Decade set as objectives for the developing countries a rate of expansion of at least 6 per cent in total and 3.5 per cent in gross product per head. This objective was based on the assumption of a 2.5 per cent average annual increase of population. This rate, being below that actually forecast for the 1970s, suggests the measures each developing country should formulate for its own demographic objectives within the framework of its development plan.<sup>153</sup> In a study discussing the plans of thirty-eight developing countries, it was noted that the high rates of population growth were an important factor in setting high planned rates of growth of domestic pro-

duct, which in no case was below 4 per cent and for the majority was 5 per cent or more.<sup>154</sup>

69. Rates of population growth of the order of 2 to 3 per cent were also at the basis of the high planned increases in total consumption of 4 to 5 per cent. Since at the same time most plans projected high marginal saving ratios, which might prove to be difficult to attain if population growth were to be more rapid than foreseen, the necessary rate of growth of income would be very high.<sup>155</sup> Population growth, together with the high income elasticity of the demand for food—estimated at about 0.8—and the aim to reduce the dependence on imports, accounted for the rapid acceleration in the growth of agricultural production envisaged in most plans. Since in a number of countries agricultural production had failed to keep pace with the growth of population according to the study cited, agricultural plans made to an increasing extent allowance for the influence of demographic factors. Because of the high rates of growth, for instance, an increasing emphasis was placed on agricultural and food production for the domestic market instead of that on export crops.

70. Many of the plans for the agricultural sector also reflected the implications of population density on the planning outlook, particularly for the possibilities of increasing or not the area under cultivation and for capital requirements.<sup>156</sup> While almost all plans reviewed in the study contained targets for the output of industry, the details with which these plans were elaborated varied greatly. Estimates for final and intermediate goods by the main branches of manufacturing industries were normally based on targets for consumer expenditures, as well as on information about the income elasticity for various products and on knowledge of input requirements of other industries.<sup>157</sup>

71. The role of employment planning in development programmes varies widely. In many countries employment has tended to be given a more or less residual role in the actual process of development planning. Where employment targets are formulated, they are frequently relatively modest and plans have considered full employment mostly a long-term objective.<sup>158</sup> The deterioration over the past few years of employment conditions, when in many developing countries the increase in income has far outpaced the rise in productive employment, has suggested the necessity for assigning a higher priority to employment creation than in the past. It is on this basis that proposals have been made for a world employment programme at the centre of which is the principle of development through fuller employment.<sup>159</sup>

<sup>150</sup> United Nations, *Report of the United Nations Seminar on Industrial Programming* ... (1964), pp. 6-9; International Labour Office, *Employment and Economic Growth* (1964), pp. 131 ff.

<sup>151</sup> International Labour Office, *Employment and Economic Growth* (1964), p. 132, 156 ff.; United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 66-67; Oshima, "A strategy for Asian development" (1962).

<sup>152</sup> United Nations, *The United Nations Development Decade* ... (1962), p. 8.

<sup>153</sup> United Nations, *International Development Strategy* ... (1970), pp. 3-4.

<sup>154</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 4, 23.

<sup>155</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 4, 23.

<sup>156</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 39.

<sup>157</sup> *Ibid.*, p. 56.

<sup>158</sup> International Labour Office, *Employment and Economic Growth* (1964), p. 130; ———, *The World Employment Programme* ... (1969), p. 55.

<sup>159</sup> International Labour Office, *The World Employment Programme* ... (1969), especially chap. 2.

72. The extent to which employment is an often neglected aspect of planning was indicated in an earlier cited study. Of the thirty-eight countries considered, about two thirds estimated the likely increase in the labour force, but only twelve formulated specific targets for increases in non-agricultural employment and only a few agricultural targets in a systematic manner.<sup>160</sup> According to this study, in those cases where industrial employment estimates were prepared, they were mainly derived from the planned increase in output or investment in the industrial sectors. Most developing countries in their plans have assumed that the rate of increase in non-agricultural employment would substantially exceed the rate of increase of their labour force. In spite of this, the expected increase in the total labour force in almost all countries has been greater than the additional employment opportunities foreseen in the non-agricultural sector so that in the absence of a significant expansion of agricultural employment, the absolute number of unemployed or underemployed would increase over the plan period. The recognition of this limited effect of industrialization programmes has led to an intensified search for employment creation in other fields, including rural areas, through small-scale industries and cottage industries, additional construction activities and so forth.<sup>161</sup>

73. As far as plans were concerned where employment was considered as a distinct target, even though limited by the total resources available, it was found that, generally, the setting of the employment target was guided by the projected increase in the labour force. Of the twenty-six plans for fifteen countries, some of which had reached a fairly high level of development, only two set targets lower than the expected increase in the labour force. But altogether in sixteen plans the projected increase in employment was equal or only slightly above that in the labour force. Even so, in many of these cases plans had to be adjusted or revised or special programmes had to be introduced in order to meet the employment targets. In many instances, it was found, the employment targets would thus not decrease significantly the serious employment gap typical of many developing countries.<sup>162</sup>

#### (ii) Selected countries

74. The role of population in planning the general rate of development was recognized in the early plans of those Asian countries, particularly India, which were among the first of the developing countries to initiate economic planning. In India's pioneering First Five-Year Plan the rate of population growth was included, next to the rate of capital formation and the marginal capital-output ratio, as one of the main factors in estimating possible rates of development. The plan stressed the strategic role of capital formation, but also noted that population growing at a certain rate would require an increase of income at the same rate merely to maintain

existing levels of living, which meant that not only would so much less of the additions to national income be available for ploughing back into investment, but a part of what was ploughed back would be taken up by capital equipment required for maintaining *per capita* income in the subsequent period.<sup>163</sup> The Second Five-Year Plan, noting that although the rate of population growth in India was estimated to be not higher than in some of the advanced countries, stated that the estimated annual growth—of some 4.5 to 5 million persons—represented a large increase in terms of the resources required to maintain even existing levels of living.<sup>164</sup> The acceleration of the rate of growth of population, characteristic of many of the developing countries, according to the Third Five-Year Plan, had substantially affected the performance of the 1950s—despite a large increase in total income, income per head experienced in this period only a moderate increase of 16 per cent—as well as the long-term perspectives.<sup>165</sup>

75. The problem of employment planning received special attention in the plans of India. The First Five-Year Plan, while pointing out the possible advantages of large resources of unutilized or underutilized labour force and the increase of manpower accompanying a growing population, also stressed that in the initial stages of development the scope for directly utilizing such manpower was limited and, whereas the plan contemplated various measures for alleviating the problems of unemployment and underemployment, their elimination in an under-developed country such as India was by its nature regarded as a long-range problem.<sup>166</sup> The Second Five-Year Plan concluded that in the first plan period employment opportunities had not been increasing *pari passu* with the labour force and that, in addition to the 10 million jobs to be created for the expected increase in the labour force in the course of the second plan, a backlog of unemployment estimated at 5.3 million existed. While acknowledging the desirability of introducing employment-creating, labour-intensive techniques, the second plan also argued that the limited choice of techniques and the probable negative effects of the use of labour-intensive

<sup>163</sup> India, Planning Commission, *The First Five-Year Plan* (1952), pp. 12-19.

<sup>164</sup> India, Planning Commission, *Second Five-Year Plan* (1956), pp. 5-7.

<sup>165</sup> India, Planning Commission, *Third Five-Year Plan* (1961), pp. 20-21, p. 750. Provisional results of the 1961 population census showed a population considerably higher—by 7 per cent—than the projections used in the Second Five-Year Plan. In the First Five-Year Plan it was estimated, assuming a continued population growth of 1.25 per cent annually, that *per capita* income could be doubled by 1977. In the long-term perspective prepared at the time of the Second Five-Year Plan, a slightly higher population growth was assumed, but in view of a better than expected performance of the economy in the preceding five years, the doubling of *per capita* income was expected to occur by 1973-1974. However, in the Third Five-Year Plan, earlier population projections had to be substantially revised and a rate of growth of population of 2 per cent was foreseen. Although the original estimates of growth of income were increased from about 5 to nearly 6 per cent annually, the plan stressed that it would be very difficult to fulfil the aim of doubling *per capita* income by 1973-1974, as proposed at the time of the Second Five-Year Plan.

<sup>166</sup> India, Planning Commission, *The First Five-Year Plan* (1952), pp. 15-18, 24, 85.

<sup>160</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 64.

<sup>161</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 64 ff.

<sup>162</sup> Hsieh, "Planned rates of employment increase in development plans" (1968).

techniques on savings and investments reduced the possibilities for actually using such measures extensively, the more so in view of the high priority given to capital-intensive heavy industry. The employment targets set out in the Second Five-Year Plan were, therefore, relatively modest: the plan contemplated the absorption of the new entrants into the labour force, as well as relief of some of the existing underemployment, without solving the employment problem.<sup>167</sup> In the course of the second plan period, however, the employment situation suffered a further deterioration, according to the Third Five-Year Plan, and the high rate of population growth, as revealed by the data of the 1961 population census, implied that the employment situation had become increasingly complex. Despite the significant additional employment created in the course of the earlier plans, by the end of the second plan the unemployment backlog had increased to 9 million persons, while a further 15 to 18 million were estimated to be underemployed. In order to prevent a further deterioration, the minimum goal of planning should be to absorb at least the equivalent of new entrants into the labour force. Nevertheless, as a result of the sharp increase of population, the expected number of new entrants—17 million—in the third-plan period was higher than the projected increase in employment—14 million—and a special need existed, therefore, to create additional employment by various other means, such as rural industrialization and rural-work programmes.<sup>168</sup>

76. The role of population in planning development was also emphasized in the national plans of Pakistan. The First Five-Year Plan noted the existence of a serious population problem facing the country and both the pressure of population on other productive resources as well as the impact of the rapid growth of population on development were stressed in the Second and Third Five-Year Plans.<sup>169</sup> However, the lack of population and labour force data at the time the earlier plans were formulated did prevent the incorporation of demographic variables into the plans. One of the main problems created by the rapid growth of population was that of employment. According to the estimates of the Third Five-Year Plan in the 1950s, less than 70 per cent of the labour force increase was absorbed, but a relative improvement took place in the course of the second plan period when employment expanded fast enough to absorb nearly the whole labour force increase of that period.<sup>170</sup> Population growth was an important consideration in the perspective plan for Pakistan (1965-1985), formulated at the time when the Third Five-Year Plan was prepared. While over the twenty years considered, a rate of growth of total

income of 7 per cent annually was considered feasible, the attainment of the proposed increase of *per capita* income of 4 per cent annually was considered very much contingent on the future growth of population. Although population at the time the perspective plan was formulated was assumed to increase by 2.6 per cent annually, planned improvements in health facilities and nutrition were thought to lead to a continued rapid decline of mortality and, unless population growth was checked by a fall in fertility, it was likely to increase to over 3 per cent, thus jeopardizing the increase of 4 per cent annually in *per capita* income.

77. Demographic considerations occupied an important place also in Ceylon's Ten-Year Plan. According to the plan, the continuation of the relative advantage which Ceylon enjoyed in comparison with most of the other countries of the region as a result of a relatively advanced plantation economy would depend to a great extent on the future growth of population.<sup>171</sup> While discussing various implications of rapid population growth for development, the plan emphasized especially the unfavourable effects on investment, since high population growth tends not only to increase consumption needs faster and so reduce the rate of investment, but also requires a high proportion of the available investment resources to be diverted to the social needs arising from population growth, thus limiting the directly productive investments. Unlike the experience of the Western countries, according to the plan, there is no certainty that the decrease in mortality will be followed by a lowering of fertility, as the rapidly growing population may offset the effects of economic growth so that the socio-economic changes, which are a prerequisite for a decline in fertility, will not take place. In Ceylon, the plan states, low levels of development exist alongside chronic unemployment and an excessive pressure of population on land and other resources.<sup>172</sup> Even if the birth rate declined, this would not significantly affect the labour force during the first decade and a half after its onset and rates of economic growth which would be sufficient to raise levels of living substantially then might not necessarily ensure full employment.<sup>173</sup>

78. The implications of population growth and characteristics have also been discussed in the plans of various other Asian countries, although the importance attributed to demographic factors varies greatly. The Second Five-Year Plan of the Federation of Malaya drew attention not only to the consequences of the high rate of population growth—over 3 per cent annually—for the forced pace of economic growth required to keep up only with the increasing needs for goods and services, as well as employment, but also to the high pressure of population on the land and the rural overcrowding.<sup>174</sup> The Third Four-Year Plan (1961-1964) of China (Taiwan) also noted that the high rates of population growth posed a

<sup>167</sup> India, Planning Commission, *Second Five-Year Plan* (1956), pp. 5-6, 26-27, 110-114, 124. For a discussion of employment considerations in India's Second Five-Year Plan and their background, see also Robinson, "India 1955: unemployment and planning" (1965).

<sup>168</sup> India, Planning Commission, *Third Five-Year Plan* (1961), pp. 74, 154-156, 160-161.

<sup>169</sup> Pakistan, National Planning Board, *The First Five-Year Plan, 1955-1960* (1957), p. 191; Pakistan, Planning Commission, *The Second Five-Year Plan, 1960-1965* (1960), p. 331; ———, *The Third Five-Year Plan, 1965-1970* (1965), p. 36.

<sup>170</sup> Pakistan, Planning Commission, *The Third Five-Year Plan, 1965-1970* (1965), p. 36.

<sup>171</sup> Ceylon, National Planning Council, *The Ten-Year Plan* (1959), p. 7.

<sup>172</sup> *Ibid.*, pp. 9-15.

<sup>173</sup> Ceylon, National Planning Council, *The Ten-Year Plan* (1959), pp. 19-21.

<sup>174</sup> Malaya, *Second Five-Year Plan, 1961-1965* (1961), pp. 14-15.

serious threat to economic development, but added that an increasing awareness by the general public of the population problem had led to a growing self-restraint, lowering fertility; the high increase of population was therefore expected to slow down in subsequent years.<sup>175</sup> The plans of some other countries of the region, however, took the demographic factors for granted and apparently considered them less serious as obstacles to their development. The Second Four-Year Plan of Burma stated that unemployment had not been as serious a problem in Burma as in such countries as India or Pakistan. However, it recognized the fact that, with the increase in labour force over a longer period, unemployment might become serious and more labour-intensive production methods should be preferred. Nevertheless, even though the rate of growth of population was expected to accelerate, the additional employment to be created according to the long-term objectives would be considerably higher than the requirements resulting from labour force growth.<sup>176</sup> The three-year and five-year plans of the Philippines stressed the employment problems the country faced, but took the high population growth for granted and devoted little attention to demographic aspects.<sup>177</sup> But the implications of population growth for employment and economic development in general, as well as specific aspects, were the subject of a joint study of the United Nations and the Government of the Philippines.<sup>178</sup> The acceleration of the rate of population growth in some of the countries of the region affected the performance of the plan. In the case of Thailand, for instance, the rate of growth of income for the years 1961-1963 was higher than the planned target, but owing to a higher increase of population than expected, the *per capita* growth of income remained below the planned rate.<sup>179</sup>

79. Whereas in Africa some planning activities, especially as regards the funds reserved by the metropolitan areas for the dependent territories, go back to the colonial period, planning underwent a rapid development only during the later stages of this period and particularly after independence was attained. Although the idea of planning has been firmly established in the region, lack of information and data, especially on population, continues to hamper development planning seriously in these countries and many of the plans formulated are only partial.<sup>180</sup> In the First Five-Year Plan (1963-1967) of Somalia it was noted, for instance, that apart from data on product, other statistics—including those on population, birth and death rates, age distribution, immigration and emigration, labour force, employment and unem-

ployment—were either not available or not reliable.<sup>181</sup> In Ethiopia, in the absence of a population census, population estimates for the Second Five-Year Development Plan (1963-1967) had to be based on an old population count and two sample surveys.<sup>182</sup> Population figures, where available, often become very crucial for other estimates even though other data are lacking. In the First National Development Plan (1966-1970) of Zambia, agricultural production targets were derived, for instance, from estimates of the active rural population and levels of consumption.<sup>183</sup> In the case of Ghana, the projected demand for food was based on nutritional standards and population.<sup>184</sup>

80. The Ten-Year Plan of the United Arab Republic, which aimed at doubling real income between 1960 and 1970, noted the problem of unemployment and underemployment and the existence of a labour surplus. In view of the continued rapid growth of population, such underemployment as existed was thought likely to increase, especially in agriculture, which would need to absorb a number of workers much in excess of the estimated requirements. Therefore, the plan provided for additional investments in small enterprises in the non-organized business sectors, and especially for the development of rural areas.<sup>185</sup> The problems posed by the fast acceleration of population growth for economic development and employment were considered in detail in Morocco's Five-Year Plan for 1960-1964. In view of the rapid population growth and the existing backlog of unemployment and underemployment, the problem of the absorption of the labour force was one of the central issues of the plan. The estimated total future employment—based on estimates of net investment and unchanged production techniques distinguishing between the traditional-subsistence sector and the modern-market sector—fell appreciably short of the expected increase in the labour force—the latter was estimated to increase by 90,000 persons annually in comparison with 80,000 new jobs to be created under the programmes envisaged in the plan—and the plan also foresaw the need to take additional measures aimed at increasing employment.<sup>186</sup>

81. Population pressure and growth also had an overbearing influence on the development programmes of Mauritius. The so-called "Meade report" asserted that the future of Mauritius, in view of the limited extension of the island and the predominantly agricultural character of its economy, was dominated by its population. The

<sup>175</sup> China (Taiwan), Ministry of Economic Affairs, *Taiwan's Third Four-Year Economic Development Plan* ... (1962), pp. 12, 26.

<sup>176</sup> Burma, Ministry of National Planning, *Second Four-Year Plan* ... (1961), pp. 21-22, 25-29.

<sup>177</sup> Philippines, National Economic Council, *The Five-Year Economic and Social Development Program* ... (1957); —, *Three-Year Program of Economic and Social Development* ... (1959).

<sup>178</sup> United Nations, *Population Growth and Manpower in the Philippines* (1960), especially chap. 7.

<sup>179</sup> United Nations, Economic Commission for Asia and the Far East, "Development planning in ECAFE countries in the recent past ..." (1964).

<sup>180</sup> United Nations, Economic Commission for Africa, "Economic planning in Africa" (1962).

<sup>181</sup> Somalia, Planning and Co-ordinating Committee for Economic and Social Development, *First Five-Year Plan, 1963-1967* (1963), pp. 25-26.

<sup>182</sup> Ethiopia, Planning Board Office, *Second Five-Year Development Plan, 1963-1967* (1962), p. 58.

<sup>183</sup> Zambia, Office of National Development and Planning, *First National Development Plan, 1966-1970* (1966), p. 9.

<sup>184</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), pp. 46-47.

<sup>185</sup> United Arab Republic, Ministry of Planning, *Planning of Economic Development in the United Arab Republic* (1963), pp. 32-34; —, National Planning Committee, *Cadre du plan quinquennal général* ... (1960), p. 21.

<sup>186</sup> Morocco, Ministère des Affaires Economiques du Plan et de la Formation des Cadres, *Plan quinquennal, 1960-1964* (1960), pp. 7-10, 21, 56-57.

increase in the rate of growth of population since the pre-war period and the existing pressure of the population on the land were thought to have been contributing factors in the decline of levels of living observed at the time.<sup>187</sup> Both the Five-Year Capital Expenditure Plan (1957-1962) and the Five-Year Plan (1960-1965) considered the demographic aspect fundamental for future development. The earlier plan noted that the growth of population was the main problem facing Mauritius in the struggle for development and that, since the decision to solve the problem of overpopulation must be found in the social conscience of the people themselves, in the absence of a response to the existing social conditions, the aim of planning in Mauritius should be, as prospects for large-scale emigration were also considered limited, to delay the effects of high population growth on levels of living.<sup>188</sup> The Five-Year Plan for 1960-1965 proposed, in order to cope with the population problem, to encourage, apart from a diversification of the economy, the growth of new secondary and labour-intensive industries.<sup>189</sup>

82. Ghana's Seven-Year Plan (1963/64-1969/70) affirmed that a growing population presented an opportunity as much as a problem for economic development. Population growth not only implies more needs, but also a higher productive potential through the increase in the working force. However, according to the plan, a sustained stream of productive investments is required to turn this opportunity into reality, while, on the other hand, a young and rapidly growing population implies a high dependency and a heavier burden of savings on the working population. The long-range perspective plan placed special emphasis on the rapid growth of the labour force of the country and the problem of employment. Each year, over 70,000 additional workers would have to be employed, but in the six years between 1955 and 1961 the leading sectors provided work only for some 100,000 additional workers. Although the Seven-Year Plan aimed at substantial improvements in the employment situation, it was also recognized that full employment would only be reached after many years of sustained economic growth.<sup>190</sup>

83. In other African countries, either because population settlement is relatively scarce and no pressure of population on natural resources exists or because population increases at moderate rates, demographic factors are not considered a serious obstacle to economic development. Nigeria's Development Plan for 1962-1968 stated that, although population was growing rapidly, there were still large areas of the country which remained to be opened up and developed. Nevertheless, demographic considerations were not absent from the plan. In setting a lower limit of growth of income of 4 per cent and in determining the investments required to attain this level,

account was taken of the fact that at this rate of economic growth consumption would increase at 2.8 per cent annually, a rate which would hardly exceed that at which population was increasing.<sup>191</sup> In Ethiopia's Second Five-Year Plan (1963-1967), the rate at which population was estimated to grow—2 per cent annually—was viewed as encouraging both from the point of view of the availability of labour force and the extension of the domestic market, the more so since Ethiopia was a sparsely settled country. On the other hand, the plan recognized that under the prevailing levels of income and lack of trained personnel, it would be impossible to provide the population, as one of the most important factors in development, with the desired education, health protection and essential facilities at an early date.<sup>192</sup>

84. The need for a development planning policy in Latin America has been recognized for some time, but most of the earlier plans date back only to the late 1950s or the beginning of the 1960s. The adoption of the "Carta de Punta del Este" signified an important step towards the progress of planning in this region. According to Urquidí, it was generally held that development planning in Latin America should be based on the need to make more efficient use of resources, to stimulate import-substitution activities and to meet basic social needs. The population expansion—the scope of which has only recently been realized—has not so far been a determining factor in such changes, but unless population trends can be significantly altered, they will assume first-rank importance in the future.<sup>193</sup> Much of the discussion on demographic factors in plans for the countries of this region have focused on employment aspects. In the case of Ecuador, a study setting out the bases and guidelines for development planning stressed the implications of population growth for employment and considered the creation of job opportunities as one of the main problems facing the country. Specifically, it proposed that in order to promote fuller employment, public investments should be oriented towards labour-intensive projects. As in many other countries of the region, the problem of insufficient employment and the need to create additional jobs in the non-agricultural sectors were stressed.<sup>194</sup>

85. The development plan for 1963-1966 of Venezuela, while noting the high rate at which population was increasing, took a positive view, in general, of the effects of population growth. While asserting that human resources are the most valuable asset of a nation, the plan also recognized that the creation of sufficient employment opportunities was also among the main tasks of planning. However, the estimates of future growth of the economy, based on historical trends, revealed that despite a high rate of growth of income, employment would expand at a rate only slightly higher than the expected labour force

<sup>187</sup> Meade et al., *The Economic and Social Structure of Mauritius* (1961), pp. 3-4.

<sup>188</sup> Mauritius, Legislation Council, *A Plan for Mauritius ...* (1958), p. 35.

<sup>189</sup> Mauritius, Legislation Council, *Reconstruction and Development Programme, 1960-1965 ...* (1961), p. 3.

<sup>190</sup> Ghana, Planning Commission, *Seven-Year Plan for National Reconstruction and Development ...* (1964), pp. 5-8.

<sup>191</sup> Nigeria, Federal Ministry of Economic Development, *National Development Plan, 1962-1968* (1962), pp. 19, 23-24, 29.

<sup>192</sup> Ethiopia, Planning Board Office, *Second Five-Year Development Plan, 1963-1967* (1962), pp. 58-60.

<sup>193</sup> Urquidí, "Population growth ..." (1967).

<sup>194</sup> Ecuador, Junta Nacional de Planificación y Coordinación Económica, *Bases y directivas para programar el desarrollo económico ...* (1958), vol. 1, pp. 17-18, 56-57, 130.



growth during the plan period. Consequently, the high level of initial unemployment—14.2 per cent in 1962—would decrease only slightly—to 13.7 per cent in 1966—showing that the continuation of past trends would not significantly contribute to the solution of the employment problem. Additional programmes, such as substantial increases in projects for the construction of low-cost housing, training of workers, formation of technical personnel, as well as a higher increase of employment in the service sectors, were expected to reduce unemployment to a more acceptable level of 6.9 per cent by 1969.<sup>195</sup>

86. Colombia's general plan for economic and social development identifies three main demographic problems: the high growth rate of the population; the even more rapid increase of the urban population, especially of the large cities; and the problem of the absorption of the labour force at satisfactory levels of productivity. The rate of economic growth proposed in the plan would not solve the employment problem which, as the result of rapid urbanization, would become especially pressing in the non-agricultural sectors. As areas of public policy contributing to the solution of the problem, the plan suggests the possibility of increasing the economic capacity of the smaller and intermediate cities, thus diverting migration from the large cities, and that of a special effort in the field of education and orientation of the persons about to enter the labour force.<sup>196</sup>

### C. Planning for education, health and housing

87. Planning for education, health and housing forms part of what is often referred to as planning for the social sectors as distinguished from economic planning.<sup>197</sup> However, as has been noted before, the validity of such a distinction and separation between social and economic planning has been questioned and the necessity of integrated planning encompassing both economic and social sectors is being increasingly accepted. It is generally recognized that for balanced social and economic development, the expansion of social services should proceed in some reasonable relationship to economic growth and that, in the allocation of resources, sufficient consideration should be given to the basic relationships between economic and social development.<sup>198</sup>

88. In a general sense, "social planning" may be said to convey two aspects both closely related to economic planning. In the first place, it encompasses social policy

<sup>195</sup> Venezuela, Oficina Central de Coordinación y Planificación, *Plan de la nación, 1963-1966* (1963), pp. 8, 11-12, 55.

<sup>196</sup> Colombia, Consejo Nacional de Política Económica y Planeación, *Plan general de desarrollo económico y social, primera parte* ... (1962), pp. 290-292.

<sup>197</sup> Planning for these sectors, although they are among the most important and most directly affected by demographic factors, does not exhaust the field of social planning. Other "social" sectors include, among others, social welfare and social security, levels of living and income distribution, labour policies and programmes etc.

<sup>198</sup> See the introductory part of this chapter, also United Nations, *International Survey of Programmes* ... (1955), p. 7; ———, *Report on a Co-ordinated Policy Regarding Family Levels of Living* (1957), p. 18; ———, *The United Nations Development Decade* ... (1962), pp. 2-3.

as part of development planning as a whole, which establishes social norms with respect to the allocation and utilization of resources and the distribution and use of the society's output and wealth. In the second place, it involves sectoral planning of what are usually referred to as social services such as education, health, housing and so forth.<sup>199</sup> In practice, planning covers both economic and social aspects and most plans include goals and objectives which are at the same time both economic and social: higher levels of living; high or full employment; the distribution of income and so forth.<sup>200</sup> Economic and social aspects are also closely related where the planning of social sectors is concerned. Not only does planning for these sectors contribute directly to improvement in the quality of life, which is the ultimate goal of development, but many of the social objectives are also important factors in promoting economic development.<sup>201</sup> It is for these reasons that social change and economic strategy have become recognized as both forming part of a single strategy of development.<sup>202</sup>

89. Even though in practice planning is concerned with both economic and social aspects, no over-all conception and theory of balanced social and economic growth and development exists and the integration and co-ordination of the economic and social fields in plans is in many instances still far from complete and the same holds for the social sectors considered by themselves.<sup>203</sup> Where a conflict between more strictly economic objectives and social objectives exists, priority has often been given to the former, partly, it is argued, because of the necessity to attain certain economic goals before social objectives can be reached.<sup>204</sup> The view is sometimes also found that in social planning priority should be given to those programmes that have the most direct effect on productivity.<sup>205</sup> As a result, allocations for development in the social sectors may tend to take the form of

<sup>199</sup> Twelfth International Conference of Social Work, "Report of the pre-conference working party to the Twelfth International Conference of Social Work" (1965).

<sup>200</sup> United Nations, *Report on the World Social Situation* ... (1961), pp. 82-86; United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962); United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963); Tinbergen, "Social aspects ..." (1965). The interrelation between social and economic aspects is especially close in community development planning, which combines social projects, such as education and health, with economic ones, such as agricultural development.

<sup>201</sup> United Nations, *Report on the World Social Situation* ... (1961), pp. 33-34, 85; ———, *Planning for Economic Development* ... (1963), p. 17; United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962).

<sup>202</sup> United Nations, *The United Nations Development Decade* ... (1962), pp. 2-3.

<sup>203</sup> United Nations, *Report on the World Social Situation* ... (1961), pp. 23, 35; United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962); United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963); United Nations, Economic Commission for Latin America "Social development and 'social planning' ..." (1966); United Nations, *International Survey of Programmes* ... (1955), p. 7.

<sup>204</sup> Twelfth International Conference of Social Work, "Report of the pre-conference ..." (1965).

<sup>205</sup> United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).



residual financing where these sectors are considered only after the claims of economic sectors have been established.<sup>206</sup> The lack of a theory of balanced economic and social development is in part responsible for such conditions, but the formulation of such a theory encounters various obstacles. In the first place, the influences of different economic and social factors upon each other are only incompletely or poorly understood and, secondly, no objective or rational common bases exist for measuring and comparing economic and social development in general or social planning in its different aspects.<sup>207</sup> The absence of well-defined methodologies and criteria is reflected in the techniques employed in social planning.

90. Most methods and techniques of social planning depend on an analysis or establishment of requirements. An exception to this, however, is the cost-benefit analysis, the purpose of which is the measurement of the economic benefits of social planning. As the name indicates, cost-benefit analysis attempts to determine what the benefits and costs of a certain project are and to compare these with those of other projects. Although in the case of social sectors one of the most difficult problems is that of measuring the benefits, in a number of cases this has not proved to be impossible and cost-benefit analysis has received increasing attention in the context of social planning.<sup>208</sup> Among the planning techniques relying on requirements is that based on the principle of complementarity. This method is based on the complementarity which exists between many factors in the economic and social fields and focuses on what implications the primary objectives of planning have for other variables which are considered instrumental for the former. It thus determines the targets in one sphere required to meet certain objectives in another sphere of planning. The best-known example of this technique is found in manpower planning, where the labour force according to qualifications and skills required to attain certain levels of output is determined.<sup>209</sup> Both these methods do not, however, establish in a specific manner what should, in general, be the planned levels of the various social variables and sectors. To determine the latter, requirements in development

planning can be approached from the social perspective: instead of establishing targets derived from economic requirements, it is possible to set social targets and to determine what economic resources are required. This method is extensively used in sectoral planning in the social fields.<sup>210</sup>

91. In so far as plans for the social sectors imply the assessment of social needs, a first step is the setting of standards for the individual or group. The fixation of standards involves a number of problems. Among these are the questions of what standards should be selected—in the case of education, for instance, literacy, compulsory primary school attendance etc.—what levels should be set, and over what period they should be reached. Various criteria can be used as far as the last problem is concerned. Some minimum level of social advance is necessary as a prerequisite to economic growth, but there is no absolute criterion what this level should be. Apart from setting standards in a relatively arbitrary manner, one method is to derive standards from a comparative analysis of development patterns within the total context of economic and social development. An alternative method is to derive standards from the practices of other countries presently at the same or a similar level of development or from the past experience of presently more developed countries.<sup>211</sup>

92. Demographic considerations are relevant in planning for the social sectors in so far as plans for these sectors aim directly at fulfilling specific needs of the population and much of the demand for these services is intimately related to population and demographic considerations. As far as the sectors here considered are concerned, educational needs vary with age and are concentrated, except for adult education or literacy campaigns, mostly in what are referred to as the school-going ages. Future educational needs will depend a great deal on the absolute increase and relative importance of the population in these ages, taking into account also the needs for education of different types and levels within this group. In health planning, mortality is itself one of the main components and, in addition, health provisions must reckon with such factors as sex, age, fertility and area of residence as well as over-all population trends. Likewise, housing needs must be formulated mainly on the basis of the family unit, the size, composition and growth of which is, in turn, to a great extent determined by such demographic factors as fertility and mortality, sex-age composition, and population growth. Together with the standards adopted, these demographic factors will determine the planning targets. Once standards in terms of the population or its functional age-groups have been set, the needs of the whole society can be derived

<sup>206</sup> However, it has also been pointed out that the possible conflicts between social and economic considerations in development programmes exist only in the short run and that in the long run the objectives of both economic and social programmes are identical. United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963) and ———, *Problems of Social Development Planning* ... (1964), p. 67.

<sup>207</sup> United Nations, *Report on the World Social Situation* ... (1961), p. 38; United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

<sup>208</sup> United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962); United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), p. 65; Tinbergen, "Social aspects ..." (1965). See also especially United Nations Research Institute for Social Development, *Cost-Benefit Analysis of Social Projects* ... (1966). Closely related to cost-benefit analysis is the comparative cost analysis which, estimating the cost involved in a given project, compares it with the present or future cost of not dealing with the problem under consideration.

<sup>209</sup> United Nations, *Report on the World Social Situation* ... (1961), pp. 35, 87, 90; United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962); Tinbergen, "Social aspects ..." (1965).

<sup>210</sup> United Nations, *Report on the World Social Situation* ... (1961), p. 36; United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962); United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

<sup>211</sup> United Nations, *Report on the World Social Situation* ... (1961); United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962); United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

from the expected future population growth and trends in its composition. Having calculated the global amount of services needed, the requirements in terms of resources needed can be compared with the available resources.

93. Population projections as an element in determining the future needs play an important role in the planning of these sectors. Estimates of future total population and its different contingents are fundamental requirements as a basis for planning in these sectors. In addition, even outside the specific context of target-setting, demographic projections deserve special attention in setting and determining the goals of development. In this connexion, projections may be used to determine what, given different goals, the over-all implications for planning are and the result, especially if implying an undesirable state of affairs in the future, can become in itself a major factor influencing policy decisions. Likewise, alternative projections can serve the same purpose as guides for determining objectives and targets.<sup>212</sup>

#### 1. EDUCATIONAL PLANNING AND DEMOGRAPHIC CONSIDERATIONS

94. Educational planning has come to be increasingly recognized as of fundamental importance in planning for development and growth. In this connexion two major aspects of an approach to educational planning are usually distinguished. The first is based on the premise that a certain level and content of education provide the individual the opportunity to develop his potentialities to the highest possible degree, by itself one of the main objectives of development and social well-being. Education, however, also constitutes an essential pre-condition for economic growth as far as the latter is a function of not only material but also of human resources. Through the improvements in skills, knowledge and training as well as by developing attitudes conducive to economic change and progress, education plays an important and, according to many, even a crucial role in economic development.<sup>213</sup> Traditionally, education has been considered mainly as a form of social consumption and it is

only in recent decades that the approach to education as investment in human resources has emerged and become widely accepted. The recognition that economic progress depends to a large extent on the development of human skills and training has not only had a profound effect on educational planning, but has also brought about large changes in planning for social and economic development in general. One of these changes has been the progressive integration of educational programmes into the whole planning process.<sup>214</sup>

95. Among the basic issues concerning educational programmes in integrated planning is the problem of the priority of educational as compared with other economic and social planning objectives and that of priorities within the educational plans themselves. With the increased emphasis on education as a factor in economic and social development in general, the traditional view that expenditures on economic development should take precedence over those in social services, including education, has weakened. However, there are a large number of competing needs which lay a claim upon limited resources besides education and since education absorbs an important part of public and private resources, the problem of allocation of resources between education and these other development needs has become prominent.<sup>215</sup> No clear criteria exist, either, for determining priorities within educational plans themselves. Among the issues involved in this decision-making process is the choice between more or less emphasis on different types and levels of education, between a larger quantity or higher quality of education, between satisfying the needs for education of one group or segment of the population or another, and so forth. Whereas decisions on such questions vary from country to country, the predominant view is that in the allocation of the resources for education, high priority should be given to the education and formation of trained and skilled personnel.<sup>216</sup>

96. As far as educational planning itself is concerned, a number of different approaches exist. With certain variations the following categories are often distinguished. The "social method" of educational planning is based on educational needs in terms of the current demand for education at different levels and involves the projection

<sup>212</sup> United Nations, Economic Commission for Africa, "Some problems of social development planning ..." (1962). The population projections needed for planning the different sectors have been discussed in detail in chapter XV, section D.

<sup>213</sup> United Nations, *The United Nations Development Decade* ... (1962), p. 7; United Nations Educational, Scientific and Cultural Organization, *Conference of African States* ... (undated), p. 9; ———, *Meeting of Ministers of Education* ... (1962), pp. 15, 22; ———, "La conferencia sobre educación y desarrollo económico ..." (1962); Parnes, *Forecasting Educational Needs* ... (1962), p. 8; Organisation for Economic Co-operation and Development, *Policy Conference on Economic Growth and Investment in Education* ... (1962), pp. 19 ff.; Phillips, "Economic and social aspects of the planning of education" (1962) and his "Education and development" (1964); Anderson and Bowman, "Theoretical considerations ..." (1967); Parnes, "Manpower analysis in educational planning" (1964); Vaizey, *The Economics of Education* (1962); Harbison and Myers, *Education, Manpower and Economic Growth* ... (1964). In addition to these and other factors, the role of education in reducing levels of fertility and population growth in developing countries and the consequent improved outlook for economic and social development under these conditions have been stressed by several authors. See, for instance, United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963); Vaizey, "Demographic considerations ..." (1967).

<sup>214</sup> United Nations Educational, Scientific and Cultural Organization, *Conference of African States* ... (undated), pp. 9 ff.; ———, *Meeting of Ministers of Education* ... (undated), pp. 22 ff.; ———, "La conferencia sobre educación y desarrollo económico ..." (1962); Parnes, *Forecasting Educational Needs* ... (1962), pp. 8-9. See also Poignant, *The Relation of Educational Plans* ... (1967), pp. 31 ff.; Phillips, "Education and development" (1964); Coombs, "Some reflections on educational planning ..." (1965).

<sup>215</sup> United Nations Educational, Scientific and Cultural Organization, "La conferencia sobre educación y desarrollo económico ..." (1962); United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963); Parnes, *Forecasting Educational Needs* ... (1962), p. 8; Phillips, "Economic and social aspects ..." (1962); Schultz, "Investment in man ..." (1959); Sauvy, *La montée des jeunes* (1959), pp. 104-105.

<sup>216</sup> Phillips, "Education and development" (1964); Lewis, "Education and economic development" (undated); Harbison, "The process of educational planning" (undated) and his "Human resources and development" (1964); Anderson and Bowman, "Theoretical considerations ..." (1967).

of these needs in function of the population increase, its age-distribution, long-term national goals and so forth. The "aggregate method" attempts to relate educational needs to some criterion of the society's demand for education based on norms or patterns found in other countries. The "education-output ratio" method, comparable to the capital-output ratio approach in economic planning, relates the stock of educated people and the changes in education at different levels directly to national output and its increase. The "manpower approach" is founded on the links between education and economic growth which exist through the knowledge and skills of the labour force. Finally, the "human resources approach" attempts to integrate education with other factors in human resources formation—such as measures in the field of manpower, employment, training and health—into development planning.<sup>217</sup>

97. These different approaches to educational planning have in practice led to a great variety of educational programmes depending on which factor was considered to be of most importance. Despite this lack of uniformity, attempts have been made to determine the aspects to be covered in comprehensive national planning. Phillips lists the following steps: projection of the future size and demographic composition of the population by single years up to 24 years and for a period of 15 to 20 years; the setting of a social standard or social minimum of education and a target date for attaining it; the study of long-term plans or projections of the economy by sectors and subsectors; the determination on the basis of these projections of the requirements for manpower and its desired occupational structure; the translation of occupational requirements into educational components; the review of targets based on social standards or occupational demand in order to take into account such factors as switches and turnover during schooling; geographical adjustment; effects of the increased supply of education on the demand for it; the need for formal education not considered in the preceding steps; requirements of adult education; and literacy campaigns. Subsequently the quantitative and qualitative changes required in the educational system and process and its implications for teacher training, school construction and so forth have to be determined. Once the total cost of these and other provisions has been established, planners have to be confronted with the available resources and the educational requirements arrived at have to be adjusted to fit into the over-all plan. Finally, according to Phillips, studies of incentives required for guiding

students into particular studies and school-leavers into occupations as required by the demand for labour should form part of the planning process.<sup>218</sup>

98. While practices may differ, educational planning, it is held, should for several reasons be preferably medium or long-term planning. First, the educational process itself extends over a long period and for its planning to be co-ordinated at the different levels, a long-term time perspective is necessary. Secondly, changes in the educational system may in many instances take a considerable period; in particular, the training of teachers may often take a number of years and, therefore, should be planned well ahead. Finally, it has been argued that investments in education are often "lumpy" and for that reason do not lend themselves easily to short-term planning.<sup>219</sup>

99. Population composition affects educational needs and capacity and, therefore, planning for education in a number of ways. The higher the fertility, at given levels of mortality, the larger is the population of school age relative to the total population and that of working age. Thus for stated standards of schooling, educational systems are proportionately more expensive in countries with high fertility than in those with low fertility, not only because the proportion of those in need of education is higher, but also since the working population, which has to support the former, will tend to be relatively smaller.<sup>220</sup> Raising the levels of education may have the additional effect of reducing or eliminating the participation of the school-age population in economic life, thus increasing the cost of education while limiting the capacity to pay for it.<sup>221</sup> Finally, a young age structure implies with equal pupil-teacher ratios and equal educational attainment the need for a larger number of teachers per thousand population than in the case of an old-age composition.<sup>222</sup> Apart from the age structure, the population's sex distribution occupies an important role in educational planning because of the often large differentials in school attendance and levels of education of each of the sexes. In many developing countries the proportions of boys and girls attending all levels of schooling differ substantially and even in many developed countries female enrolment, especially at higher levels of education, remains considerably below that for males.<sup>223</sup> The need for eliminating such inequities, where they exist, requires the considera-

<sup>218</sup> Phillips, "Education and development" (1964) and his "Economic and social aspects ..." (1962).

<sup>219</sup> Phillips, "Economic and social aspects ..." (1962); Coombs, *What is Educational Planning?* (1970), p. 33; United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963). On the need for long-term manpower planning, see Parnes, *Forecasting Educational Needs ...* (1962), p. 9; Anderson and Bowman, "Theoretical considerations ..." (1967); Parnes, "Manpower analysis in educational planning" (1964).

<sup>220</sup> Phillips, "Demographic considerations ..." (1967); United Nations Educational, Scientific and Cultural Organization, *An Asian Model ...* (1966), p. 12; United Nations, *Latin American Seminar on Population ...* (1958), pp. 56-57.

<sup>221</sup> Vaizey, "Demographic considerations ..." (1967).

<sup>222</sup> Sauvy, "Social factors in education plans" (1964), who also noted that teachers are an earlier generation than students.

<sup>223</sup> United Nations Educational, Scientific and Cultural Organization, *World Survey of Education, III ...* (1961), pp. 21, 107-108; —, *Comparative Study on Access of Girls ...* (1962).

<sup>217</sup> For a general description of these different methods see Phillips, "Education and development" (1964); Bruton, *Principles of Development Economics* (1965), pp. 220 ff.; Anderson and Bowman, "Theoretical considerations ..." (1967); Coombs, *What is Educational Planning?* (1970), pp. 37-46. On the "education-output ratio" method, see Tinbergen and Correa, "Quantitative adaptation of education to accelerated growth" (1962); Tinbergen and Bos, "A planning model ..." (1965); Tinbergen, "Educational assessments" (1964); Correa, *The Economics of Human Resources* (1963). On manpower and human resource planning, see Parnes, "Manpower analysis in educational planning" (1964) and his "Relation of occupation to educational qualification" (1964). Harbison, "Human resources and development" (1964), his "Human resource assessments" (1964), and his, "The process of educational planning" (undated); Harbison and Myers, *Education, Manpower and Economic Growth ...* (1964).

tion of the sex distribution in formulating educational plans.<sup>224</sup>

100. The rate of population growth may have both direct and indirect implications for educational planning. High growth of population, and of the school-age population in particular, causes a rapid expansion of educational requirements. To the extent that high rates of population increase are associated with a young age distribution providing for education of the school-age population places a heavy burden on resources. The combination of high fertility, low or declining mortality and rapid population growth in many developing countries, it has been noted, constitutes, both through the age distribution effect and the rate of growth of the school-age population, a limiting factor in setting educational targets.<sup>225</sup> Variations in the rate of population growth, especially those which result in "bulges" in the age distribution, may also present considerable problems where educational planning is concerned. Especially in the case of compulsory primary education, such effect may be important, it is asserted, because teachers' training frequently starts even before the birth of the children they have to teach. Post-primary education would be less affected since a longer period would be available for it to adapt itself to such population surges and at these levels enrolment rates and not the number of potential students are the main determinants of needs. The latter argument would also hold where primary education is not compulsory or is less than complete.<sup>226</sup>

101. The geographical distribution and settlement of population have an important bearing. Differences in density, the degree of concentration and patterns of settlement of the population have considerable effects on educational attainment.<sup>227</sup> These differences may be partly due to the impact of the economic, social and cultural environment on schooling, as exemplified in the case of urban and rural areas. Rural schools are often handicapped because of inadequate facilities, poor staffing and insufficient equipment and materials as well as by the lack of incentives for education on the part of the population. On the other hand, density and settlement by themselves may be a direct factor in formulating objectives for education. A low density of population and its spread over large areas may, because of the costs involved, often seriously restrict the planned expansion of education in such areas.<sup>228</sup>

102. Demographic factors play a major part in the process of educational planning itself. Especially for

<sup>224</sup> United Nations, *Asia and the Far East Seminar on Population* ... (1957), pp. 27-28; United Nations Educational, Scientific and Cultural Organization, *An Asian Model* ... (1966), pp. 100 ff.; *Conference of African States* ... (undated), p. 6.

<sup>225</sup> United Nations, *Latin America Seminar on Population* ... (1958), p. 57; United Nations, *Asia and the Far East Seminar on Population* ... (1957), p. 27.

<sup>226</sup> Sauvy, "Social factors in education plans" (1964); Phillips, "Demographic considerations ..." (1967).

<sup>227</sup> United Nations, *National Programmes of Analysis* ... (1964), p. 25.

<sup>228</sup> United Nations, *Latin American Seminar on Population* ... (1958), p. 57; Leduc, "Education as a basic factor ..." (undated); Brand, "The financing of education" (undated); Dietz-Hochleitner, "Educational planning" (1964).

planning, education in general population growth and structure are fundamental. The starting point is as a rule the preparation of projections of the future size and demographic composition of the population and of the population in school-going ages, up to 24 years, by single years for a period of 15 to 20 years. On the basis of these latter projections and targets, determined by a social standard or minimum, to be reached at a certain date, future educational requirements are established. Since targets are as a rule set for the different levels of education, these projections, taking into account expected wastage and drop-outs, provide pyramids of educational expansion at different times during the planning period. The educational pyramids are in turn the point of departure for formulating specific programmes within the educational plans such as those for the training of teachers for different educational levels, for the construction of school buildings during the different phases of the plan and so forth. The general picture of educational development thus obtained can then be evaluated in terms of cost and capacities and, where necessary, modified to allow for insufficient resources, bottle-necks in certain programmes etc.<sup>229</sup>

103. Whereas demographic projections thus are an integral part of educational planning, their direct influence on the scope of educational plans depends on the nature of the plans. Where programmes of compulsory education exist and are actually implemented, the problem of estimating needs and setting targets is uniquely demographic and determined by the number and distribution of the population of school-going age. If the entire school-age population does not receive education, as is usually the case for all levels of education in the developing countries and for secondary and higher education in the more developed countries, both demographic factors and social and economic criteria on which standards for education are based will determine the expansion of education.<sup>230</sup>

104. The relevance of demographic factors for manpower planning is more indirect since, involving the formulation of future manpower requirements for economic development, economic considerations play an important role. No generally accepted methodology for the planning of manpower exists, but one approach frequently found consists of the determination of the manpower requirements in terms of different occupations in accordance with the long-term economic projections. These requirements, established on the basis of surveys, past trends or changes in productivity, are then translated into their educational components. The resulting projections of the educational demand have to be compared with the projected supply as based on the projections of the size and growth of population and existing or desired trends in rates of school enrolment and attendance. After the necessary adjustments, the quantitative changes required to meet the estimated demand at the different educational levels can then be assessed.<sup>231</sup>

<sup>229</sup> Phillips, "Demographic considerations ..." (1967).

<sup>230</sup> Tinbergen, "Educational assessments" (1964); Sauvy, "Social factors in education plans" (1964).

<sup>231</sup> For general descriptions of methods of manpower planning see Harbison, "Human resource assessments" (1964); Harbison and

(Continued on next page)

105. Unlike in most other spheres of planning an international, regional approach to educational policies and development has emerged and regional policy statements and goals for educational development have been formulated for the world's major regions. Regional targets calling for universal primary education and sharp increases in secondary and higher education by the target dates were set by the ministers of education of Asia, Africa and Latin America, and these targets were widely accepted by individual nations. The "Karachi plan" for Asian countries called for free and compulsory education of at least seven years' duration for all children by 1980<sup>232</sup> and was subsequently extended to include, even though no specific targets were set, the expansion of secondary and higher, as well as adult education.<sup>233</sup> For this purpose of long-term educational planning in the region, a model for educational development was formulated which attempted to establish in quantitative terms the prospects of educational development and at the same time illustrated the interrelationships between the main factors involved in educational planning and between educational and other variables.<sup>234</sup> The plan for African educational development also set universal, compulsory and free primary education as a target for 1980, but stressed that secondary and higher education would be expanded to include, respectively, 23 and 2 per cent of the population in the appropriate age groups.<sup>235</sup> The Conference on Education and Economic and Social Development in Latin America recommended that efforts be made to attain universal, six-year primary education by 1970 and to expand secondary and develop higher education.<sup>236</sup> Targets for education in 1970 were also prepared for eighteen countries in the Organisation for Economic Co-operation and Development (OECD) region<sup>237</sup> and for six countries in a Mediterranean regional project.<sup>238</sup>

106. Demographic considerations have appeared in both the regional and the national plans for education. The recommendations for action at the national level by member States participating in the "Karachi plan" stressed the need for demographic statistics, studies and projections.<sup>239</sup> The need for an adequate demographic

base for planning was also stressed at the meeting of the ministers of education of the countries participating in the "Karachi plan". In Burma, the lack of reliable population data by age was seen as an obstacle to planning and in the case of Afghanistan it was noted that the target data had to be advanced to 1990 because of the fact that the original population estimate for the country was one fifth below the actual population.<sup>240</sup> The working plan of the "Karachi plan" emphasized the rapid increase of the population in the region, noted the importance of the high rate of growth of the school-age population as one of the main factors in the very large increase in primary school enrolment—171 millions or 258 per cent—needed to attain the target for 1980 and also pointed in this connexion to the rapid increase of enrolment in successive quinquennia of the plan period.<sup>241</sup> The demographic conditions and trends—especially the high levels of fertility, the rapid growth of population, the high dependency rate, and the rapid process of urbanization—were considered as having serious implications for educational planning in the region,<sup>242</sup> a viewpoint which was also reflected in the national plans of various countries.<sup>243</sup> A study aimed at determining the importance of population growth for the target of universal primary education in India, Indonesia, Pakistan and the Philippines, revealed that the rate of increase in population was an important factor in all cases, and accounted for the largest share of needed future enrolment in Indonesia and the Philippines, where current levels were already high.<sup>244</sup>

107. In African countries the lack of demographic data in sufficient quantity and of satisfactory quality constitutes a serious obstacle to planning in general and to educational planning in particular.<sup>245</sup> Even so, a number of African countries have made efforts to utilize the limited available demographic information in their educational plans; projections of school-age population were included in the plans of Madagascar,<sup>246</sup> Gabon<sup>247</sup> and Zambia<sup>248</sup> and estimates of enrolment rates were prepared for the Ten-Year Plan of the Sudan.<sup>249</sup> Rapid population growth and the high proportion of population

(Footnote 231 continued)

Myers, *Education, Manpower and Economic Growth* ... (1963), chap. 9; Skorov, "Manpower approach to educational planning ..." (1964); Parnes, "Manpower analysis in educational planning" (1962); Debeauvais, "La traduction des objectifs d'emploi en objectifs d'éducation" (1964).

<sup>232</sup> United Nations Educational, Scientific and Cultural Organization, *The Needs of Asia in Primary Education* ... (1961), pp. 5 ff.

<sup>233</sup> United Nations Educational, Scientific and Cultural Organization, *Meeting of Ministers of Education* ... (1962), chap. 5.

<sup>234</sup> United Nations Educational, Scientific and Cultural Organization, *An Asian Model* ... (1966), especially chap. 2.

<sup>235</sup> United Nations Educational, Scientific and Cultural Organization, *Conference of African States* ... (undated).

<sup>236</sup> United Nations Educational, Scientific and Cultural Organization, "La conferencia sobre educación y desarrollo económico ..." (1962).

<sup>237</sup> Organisation for Economic Co-operation and Development, *Policy Conference on Economic Growth and Investment in Education*, part 2 ... (1962).

<sup>238</sup> Parnes, *Forecasting Educational Needs* ... (1962).

<sup>239</sup> United Nations Educational, Scientific and Cultural Organization, *The Needs of Asia in Primary Education* ... (1961), p. 37.

<sup>240</sup> United Nations Educational, Scientific and Cultural Organization, *Meeting of Ministers of Education* ... (1962), pp. 12, 24, 34.

<sup>241</sup> United Nations Educational, Scientific and Cultural Organization, *The Needs of Asia in Primary Education* ... (1961), pp. 9, 12.

<sup>242</sup> United Nations Educational, Scientific and Cultural Organization, *An Asian Model* ... (1966), pp. 11-13; United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), pp. 3-4.

<sup>243</sup> See, for instance, United Nations Educational, Scientific and Cultural Organization, *Meeting of Ministers of Education* ... (1962), pp. 4 ff.

<sup>244</sup> United Nations, Economic Commission for Asia and the Far East, "Implications of population trends ..." (1964).

<sup>245</sup> United Nations Educational, Scientific and Cultural Organization, *Conference of African States* ... (undated).

<sup>246</sup> Madagascar, Commissariat Général au Plan, *Plan quinquennal, 1964-1968* (1964), p. 21.

<sup>247</sup> Gabon, *Plan de développement économique et social, 1966-1970* (1966), pp. 1-2.

<sup>248</sup> Zambia, Office of National Development and Planning, *First National Development Plan, 1966-1970* (1966), p. 5.

<sup>249</sup> Sudan, Economic Planning Secretariat, *The Ten-Year Plan of Economic and Social Development* ... (1962), p. 146.

in younger ages, both associated with high fertility, are, together with economic constraints, among the factors which affected educational planning unfavourably in various countries. In Ghana's Seven-Year Development Plan, where the development of education was linked to employment, it was found that even though employment in the modern sector in the past had increased considerably, the expansion had fallen far short of even absorbing the total output of elementary schools in the same period.<sup>250</sup> Rapid population growth was also seen as a serious obstacle to educational targets. Estimating the cost of providing educational facilities on the basis of alternative population projections, the plan stated that if the objective of universal primary education were to be attained in a reasonable period without seriously jeopardizing economic growth, the rapid increase of population would have to be checked.<sup>251</sup>

108. The Conference on Education and Economic and Social Development in Latin America noted also the need for more adequate educational and demographic data for planning education. It also observed that rapid population growth intensified the problems of educational progress found in the region.<sup>252</sup> In the Conference of Ministers of Education and Ministers responsible for Economic Planning in the Countries of Latin America and the Caribbean, it was reported that even though the rate of expansion at all levels of the educational pyramid had been more rapid than the growth of population in the corresponding age groups, serious problems persisted at the primary level and the secondary and higher levels were still unable to absorb sufficient numbers to satisfy the demands of society. Various countries noted the problems created by high population growth in extending education, the unlikelihood of attaining the goals set for 1970 because of the pressure on available resources, the need to adapt teacher-training programmes so as to be able to satisfy the basic demand for education, and so forth.<sup>253</sup> In more general terms, it has been stated that the rapid growth of population and of the number of children of ages 5 to 14 years as well as the accelerating rate of urbanization are among the factors which complicate educational planning in the region.<sup>254</sup> The implications of demographic factors for planning education were discussed in a number of development plans of Latin American countries. In the general development plan of Colombia, population growth trends were analysed in detail and their consequences for the expansion of basic education were examined. The plan noted the rapid growth of the population in school-going ages as well as the increase of the proportion of the population under 15 years in urban areas owing to heavy internal

migration.<sup>255</sup> The demographic pressure caused by the rapid growth of population was analysed in the development plan of El Salvador, which gave special attention to the planning of education in relation to the development of manpower resources. Demographic projections were used as a basis for estimating school enrolment in general and for analysing employment goals and manpower needs.<sup>256</sup> Other plans also took into account demographic factors in planning for education. In the case of Bolivia, where the problem of illiteracy was thought to merit special attention, especially as far as rural areas were concerned, projections of urban and rural school-age population were used to show the magnitude of the problem of spreading basic education and eliminating illiteracy.<sup>257</sup> In countries such as Venezuela<sup>258</sup> and Uruguay,<sup>259</sup> demographic considerations in educational planning dealt mainly with problems of creating employment opportunities for an expanding labour force.

109. Educational planning in the more developed countries presents different problems than in the developing, also in so far as demographic factors are concerned. In a report on the nature and magnitude of the task of education in the countries forming part of the Organisation for Economic Co-operation and Development, it was noted that, together with economic and social needs, demographic factors would be an important factor in the future expansion of education. The growth of population as it affects the corresponding school-age population would be the major factor in the increase of primary education, but would also be reflected in the growth of secondary and higher education where the expansion of the educational system would be concentrated.<sup>260</sup> Large changes in the school-age population have had special relevance in the planning of education in France, where yearly age groups of less than 600,000 children in 1946 have progressively increased to 800,000 or more. This "demographic wave", caused by the post-war increase in births, reached primary schools in 1952, secondary schools in 1957 and started to intensify the demand for higher education in the early 1960s. Combined with increasing enrolment ratios at the secondary and higher levels, it led to the need for an exceptionally rapid expansion of education in those years.<sup>261</sup> The extent to which demo-

<sup>250</sup> Ghana, Planning Commission, *Seven-Year Development Plan for National Reconstruction and Development* ... (1964), pp. 5-6.

<sup>251</sup> *Ibid.*, pp. 152-153.

<sup>252</sup> United Nations Educational, Scientific and Cultural Organization, "La conferencia sobre educación y desarrollo económico ..." (1962).

<sup>253</sup> United Nations Educational, Scientific and Cultural Organization, *Conference of Ministers of Education* ... (1962), p. 42.

<sup>254</sup> *Ibid.*, pp. 60-61.

<sup>255</sup> Colombia, Consejo Nacional de Política Económica y Planeación, *Plan general de desarrollo económico y social*, primera parte ... (1962), pp. 48-52, 229, 233.

<sup>256</sup> El Salvador, Consejo Nacional de Planificación y Coordinación Económica, *Plan de la nación para el desarrollo económico y social, 1965-1969*, primera parte (1964), pp. 32-45, 485-520.

<sup>257</sup> Bolivia, Junta Nacional de Planeamiento, *Plan nacional de desarrollo económico y social, 1962-1971* ... (1961), pp. 276-280.

<sup>258</sup> Venezuela, Oficina Central de Coordinación y Planificación, *Plan de la nación, 1965-1968* (1965), pp. 49, 78-84, 335.

<sup>259</sup> Inter-American Committee of the Alliance for Progress, Committee of Experts, *Evaluación del plan nacional de desarrollo económico y social de la República Oriental del Uruguay* ... (1967), vol. 2, pp. 6-15, 40, 425-427.

<sup>260</sup> Organisation for Economic Co-operation and Development, *Policy Conference on Economic Growth and Investment in Education*, part 1 ... (1962).

<sup>261</sup> Organisation for Economic Co-operation and Development, *Policy Conference on Economic Growth and Investment in Education*, part 4 ... (1962).



graphic factors enter into planning for higher education can be illustrated by the case of the United Kingdom of Great Britain and Northern Ireland. Taking as a point of departure the demand for higher education from qualified applicants, rather than future manpower requirements, the need for places in higher education is determined by the size of the age group relevant to higher education, the proportion of the age group obtaining the necessary qualifications and the proportion of those qualified who apply.<sup>262</sup>

110. In the centrally planned economies of Eastern Europe, educational planning is considered a basic aspect of economic progress and cultural development and an integral part of over-all planning. In the Soviet Union, where eight-year schooling is compulsory, plans for expanding the educational system up to that level were based first and foremost on population growth. On the basis of analysis of demographic trends, estimates of the corresponding population by age groups were made, thus establishing the number of pre-school and school-age children as a basic requirement for planning universal compulsory primary education. With the efforts to complete the transition to universal compulsory secondary education and the continued rapid increase of higher education, determined by the needs for highly qualified manpower, plans foresee large increases in the educational system at these levels.<sup>263</sup> The effect of the increased number of children born in the post-war period also affected educational planning in several of the socialist countries. The Five-Year Plan (1956-1960) of Poland foresaw a large increase in the construction of primary schools in order to absorb the very large number of children reaching school-age during the period.<sup>264</sup>

## 2. HEALTH PLANNING AND DEMOGRAPHIC CONSIDERATIONS

111. In general terms, health planning may be said to be concerned with and include all the services, including environmental ones, for promoting and maintaining communal and individual health.<sup>265</sup> As in others of the so-called social sectors, the health planning has two aspects: good health is by itself an objective of development, but, in addition, disease, inadequate health and insufficient sanitation are obstacles to attaining rapid development. Health planning, it is argued, must thus be an integral aspect of economic and social planning.<sup>266</sup>

<sup>262</sup> United Kingdom of Great Britain and Northern Ireland, *Higher Education* (1963); ———, *The National Plan* (1965), pp. 198-199.

<sup>263</sup> United Nations Educational, Scientific and Cultural Organization, *Educational Planning in the USSR* (1968), pp. 35-36, 86-87.

<sup>264</sup> Secomski, *Premises of the Five-Year Plan in Poland* . . . (1958), pp. 56-57.

<sup>265</sup> World Health Organization, *Basic Documents* . . . (1969), p. 1, defines health as "... a state of complete physical, mental and social well-being". See also Winslow, *The Evolution and Significance of the Modern Public Health Campaign* (1923), p. 1; World Health Organization, *Planning of Public Health Services* (1961), pp. 4-5.

<sup>266</sup> United Nations, *The United Nations Development Decade* . . . (1962), pp. 64-65; World Health Organization, *National Health Planning in Developing Countries* (1967), pp. 12, 21-22; United Nations, *1967 Report on the World Social Situation* (1969), p. 31; United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

112. The relations between health planning and planning in general are, in turn, mutual. Increases in income and levels of living of the population are bound to affect the demand for health services and the resources which would become available for health provision. At the same time, apart from its general impact on individual and social well-being, the importance of good health and planning for economic development has been emphasized. Health programmes, it is argued, will contribute substantially to raising the quality and productive capacity of the labour force—through better health of the workers in general, a higher degree of fitness, less absenteeism due to sickness as well as through improved environmental sanitation—thereby helping to raise national income and well-being more rapidly.<sup>267</sup>

113. Although it has been asserted that because of its effects on economic growth, outlays on health services should be regarded by the planning authorities as on a par with investment in capital,<sup>268</sup> it has also been pointed out that health plans make large demands upon a country's investment funds, especially where hospitals, medical and other training schools and environmental sanitation are concerned. Especially in the developing countries where resources are small and needs great, health plans will have to compete with the country's requirements in other fields.<sup>269</sup> Since health provisions cover a wide range of services and activities and resources are limited, the establishment of priorities and the setting of targets become difficult tasks. In general, health planning, involving the selection and determination of those forms of health activities best suited to the health needs of the community, has as its usual starting point the assessment of the existing health status of the population and its needs for all types of health services.<sup>270</sup> On this basis the priorities, given the available resources, are formulated. According to a report prepared for the World Health Organization, the priorities or criteria in the field of health planning might include: emphasis on prevention; services to people engaged in productive work;

<sup>267</sup> World Health Organization, *Planning of Public Health Services* (1961), p. 8; United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963); Taylor, "Health and Population" (1967); Taylor and Hall, "Health, population and economic development" (1969); United Nations, *Report on the World Social Situation* (1961), p. 33 which also noted however, that the effect of health programmes on labour productivity might be insignificant if there exists already a pressure of population on resources and a labour surplus. In more general terms, it has also been recognized that not all health services contribute to economic growth and that the assessment of health planning in this respect is difficult. World Health Organization, *National Health Planning in Developing Countries* (1967), p. 22; United Nations, *Report on the World Social Situation* (1961), p. 33.

<sup>268</sup> World Health Organization, *Planning of Public Health Services* (1961), p. 8, however, also notes that the contribution of health plans may be less direct than that of productive capital. See on this latter point also United Nations, *Report on the World Social Situation* (1961), p. 33.

<sup>269</sup> World Health Organization, *National Health Planning in Developing Countries* (1967), pp. 22 ff.; United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963); Rivkin, *The African Presence in World Affairs* . . . (1963), p. 118.

<sup>270</sup> World Health Organization, *Planning of Public Health Services* (1961), pp. 11-12; Biraud, "Implications of population trends . . ." (1964).



services to vulnerable groups (such as mothers and children); services which would affect the health of the largest number of persons and improvements of the nutritional standards of the population.<sup>271</sup>

114. Once these priorities have been determined as objectives and targets, specific health provisions can be formulated. These cover a wide range and include in general the following categories: services for environmental improvements; personal and social health services for the healthy, the handicapped and the sick; the control of communicable diseases and general services; education of personnel and research and other services which contribute to health, such as good nutrition, labour standards and so forth.<sup>272</sup> From these targets the implications for different categories of health services and the allocation of the available resources are derived, including such aspects as the number of hospital beds, doctors, health workers; the construction of new hospitals and other capital investments; the cost of maintaining the services etc.<sup>273</sup>

115. The time period over which health plans are drawn up varies considerably. To the extent that many elements of health plans, such as the training of medical personnel, the construction of hospitals and health centres require a long time, the plans may extend over as much as ten or twenty years.<sup>274</sup> However, such perspective plans often provide no more than a general picture of possible development. The possibility of unpredictable discoveries in medical knowledge, the uncertainty as to how far existing knowledge will be used and will contribute to health progress, the impossibility of foreseeing changes in economic and social conditions which affect health, all suggest the limitations inherent in such perspective plans and the desirability of preparing, in addition, plans over shorter periods from one to five years.<sup>275</sup>

116. Demographic considerations are of particular relevance in health planning in so far as data on mortality, morbidity, fertility and so forth provide the basic information on health conditions, requirements and priorities. As indicators of health conditions, demographic data are indispensable in assessing the health situation at the time of plan formulation and for the evaluation of progress

in the implementation of plans.<sup>276</sup> The demographic data which, together with other information, is required for health planning include particularly different measures of mortality—such as crude death rates, sex-age specific mortality rates, infant mortality and related measures, expectation of life, causes of death—as among the major indicators of health conditions. This information, in conjunction with other demographic data on fertility, the sex-age composition and the geographic distribution of the population, fundamental for health planning, is especially in developing countries often lacking or incomplete. For health planning the need to develop the statistical organizations which collect this information and to ensure adequate vital and health statistics which would provide a continuing and reliable basis for planning is, as has been frequently noted, essential.<sup>277</sup>

117. The levels of mortality and the age-specific death rates associated with them are not only indicators of the existing health conditions, but may also be important as factors determining the priorities within health programmes. A close relation exists between health needs and age, due to different general health conditions of the individual and the changing incidence of certain diseases at different ages. Priorities and targets in health planning are consequently often formulated with respect to population segments whose characteristics are closely associated with age, such as infants and children, pregnant women and mothers with young children, workers, aged persons and so forth. The age distribution thus becomes an important consideration in formulating priorities and, once the latter and the specific objectives have been established, in determining the total needs and the scope of programmes.<sup>278</sup> Differences in health planning and priorities between developed and developing countries, while responding primarily to the differences in mortality and morbidity characteristics of these countries, may be further increased by the implications of the different age composition for total health needs.<sup>279</sup>

118. Future health needs are a function of the different requirements resulting from the changing importance of

<sup>271</sup> World Health Organization, *Planning of Public Health Services* (1961), p. 12; see also United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

<sup>272</sup> For an exhaustive listing see World Health Organization, *Expert Committee on Public-Health Administration* (1952), pp. 6-8, and ———, *Planning of Public Health Services* (1961), pp. 27-30. For more general classifications, see also United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), pp. 25-26.

<sup>273</sup> World Health Organization, *Planning of Public Health Services* (1961), p. 13; United Nations, *1967 Report on the World Social Situation* (1969), p. 31. One of the main bottle-necks in health planning is the lack of trained personnel for most categories of health work; see United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), pp. 24, 26; World Health Organization, *Expert Committee on Public-Health Administration* (1952), pp. 15 ff.

<sup>274</sup> United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

<sup>275</sup> World Health Organization, *Planning of Public Health Services* (1961), p. 20-21.

<sup>276</sup> World Health Organization, *National Health Planning in Developing Countries* (1967), pp. 15-16, 27-28. See also ———, *Expert Committee on Health Statistics, Third Report* (1952) and ———, *Expert Committee on Health Statistics, Seventh Report* (1961).

<sup>277</sup> United Nations, *Asia and the Far East Seminar on Population* ... (1957), pp. 25-27; ———, *Seminar on Population Studies in Southern European Countries* ... (1959), pp. 6-10, 25; ———, *National Programmes of Analysis of Population Census Data* ... (1964), pp. 30-34.

<sup>278</sup> Biraud, "Implications of population trends ..." (1964); World Health Organization, *National Health Planning in Developing Countries* (1967), p. 29. On the different economic impacts of health provisions for persons in different ages, such as, for instance, a young person about to enter into the labour force and a retired worker, see Singer, *International Development* ... (1964), pp. 73 ff.; United Nations, Economic Commission for Latin America, "Social development" and "social planning" ... (1966); United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

<sup>279</sup> On the need for emphasis on health problems of infancy, childhood and early adult life in the young populations in developing countries see, for instance, Puffer, "Growth of population and public health programmes ..." (1958); United Nations, *Asia and the Far East Seminar on Population* (1957), p. 26.

different diseases and other health problems and of the changes in population.<sup>280</sup> Future population growth and sex and age composition and the expected future trends of fertility and mortality together with the changing health needs themselves are at the basis of future requirements in the field of health. Population projections and its changing composition are thus important factors in determining the scope of future health programmes.<sup>281</sup>

119. The geographical distribution of the population and its patterns of settlement are thought to have various implications for planning in the field of population. The degree of concentration or dispersion of population will not only be associated with different problems in health planning, but will also have repercussions for the programming of services.<sup>282</sup> The high density and concentration of population in urban areas requires, for instance, a much higher priority on environmental health than in rural areas, but provides more opportunities for specialization of health services than in the latter. Rapid urbanization in many developing countries, however, often poses, a considerable strain on health conditions and planning. Rural areas, in turn, are faced with other problems. Where density is low, the population scattered and communications inadequate, the health needs can only be satisfied at a substantial cost. Density and settlement patterns will also influence the distribution of health units and services, in particular the choice between smaller health units and more limited services—such as dispensaries—in more localities or larger units providing a wider range of health care—such as hospitals—concentrated in a few larger places.<sup>283</sup>

### 3. PLANNING FOR HOUSING AND DEMOGRAPHIC CONSIDERATIONS

120. Housing and food are among the primary needs of man and securing adequate and sufficient housing is one of the most deeply felt social needs. However, the viewpoint that the provision of housing is not only an objective by itself, but that it may have direct relevance to development has gained wide acceptance. Housing construction, it is argued, creates substantial employment, raises the efficiency of other investment, and increases

the productivity of labour through the effects improved housing conditions have on morbidity and health, labour stability and so forth.<sup>284</sup> Housing policies and objectives, it is concluded, should therefore be placed in the broader context of over-all planning and planning for housing should be co-ordinated with general economic and social planning and be given a suitable priority.<sup>285</sup>

121. As in the case of other sectors, and particularly the so-called social sectors, no completely satisfactory criteria for the allocation of resources to housing exist. In practice, housing has frequently been assigned a relatively low priority in planning social and economic development, the reasoning behind this being that residential construction involves heavy investment outlays but tends to have a low return, that is, a high capital-output ratio. This factor weighs heavily in developing countries where capital resources are already limited.<sup>286</sup>

122. In general, the long-term objective of housing is to ensure decent housing complying with certain minimum standards for the mass of the population.<sup>287</sup> Whereas one of the main tasks in planning for housing needs is the determination of total requirements, a comprehensive housing programme will also have to take into account the prospective future changes in the distribution of housing needs by size, number of rooms and so forth.<sup>288</sup> Housing programmes will also have to estimate or determine the existing shortages in housing, both in quantitative and qualitative terms, as indicated by such factors as over-crowding, doubling-up of households, the use of inadequate or substandard housing units, waiting lists of applicants for housing and so forth. Finally, in determining housing needs, allowance must be made for the deterioration of the existing stock of housing and the

<sup>280</sup> Biraud, "Implications of population trends ..." (1964).

<sup>281</sup> World Health Organization, *National Health Planning in Developing Countries* (1967), p. 29; Puffer, "Growth of population and public health programmes ..." (1958); World Health Organization, *National Health Planning in Developing Countries* (1967), p. 25, notes the need to take into account the effects of health programmes on demographic trends. See also United Nations, *Asia and the Far East Seminar on Population* (1957), p. 26.

<sup>282</sup> World Health Organization, *Planning of Public Health Services* (1961), p. 11.

<sup>283</sup> World Health Organization, *National Health Planning in Developing Countries* (1967), p. 29; Biraud, "Implications of population trends ..." (1964); United Nations, Economic Commission for Asia and the Far East, *Report of the Asian Population Conference* ... (1964), pp. 8, 9-10. On the emphasis on health planning for rural areas in the developing countries, see United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), p. 23. The implications of urbanization for health planning have been discussed in United Nations, Economic Commission for Asia and the Far East, *Report of the Asian Population Conference* ... (1964), pp. 10-11; —, "Social development planning" (1963).

<sup>284</sup> United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1962), pp. 3, 11, 13-14; —, *Report of the Interregional Seminar on Rural Housing* ... (1968), pp. 67, 80-81; —, *Methods for Establishing Targets* ... (1968), p. 1; United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), p. 42.

<sup>285</sup> United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1963), pp. 1, 5, 11-12; —, *Methods for Establishing Targets* ... (1968), p. 5; —, *Report of the Interregional Seminar on Rural Housing* ... (1960), p. 73; United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), pp. 35-36; United Nations, Economic Commission for Latin America, *Social Change and Social Development Policy in Latin America* (1970), p. 227. In addition, it has been pointed out that one of the goals of economic development policy itself should be the improvement of efficiency in the building industry. United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1963), pp. 5-6, 26 ff.

<sup>286</sup> United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1962), pp. 12, 18; —, *Report of the Interregional Seminar on Rural Housing* ... (1968), pp. 67, 76-78.

<sup>287</sup> United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), p. 35. More specifically it has been argued, however, that the objectives of housing programmes should be realistic. See United Nations, *Methods for Establishing Targets* ... (1968), pp. 12 ff.; United Nations, Economic Commission for Asia and the Far East, "Social development planning" (1963).

<sup>288</sup> United Nations, "Implications of population trends ..." (1964).

replacement demand, including the upgrading of existing levels of accommodation.<sup>289</sup>

123. As distinguished from housing needs, the potential supply of housing is determined by the available resources and the effective demand by the levels and distribution of income and the cost of housing. After evaluating the needs, resources, demand factors and other constraints, the housing programmes, it is asserted, should be so framed as to utilize the available resources most effectively and in such a manner that the more urgent and vital needs are satisfied.<sup>290</sup> Although plans so formulated can be reviewed and may need alterations because of unforeseen developments, medium- and long-term programmes are most usual in the case of housing.

124. Demographic aspects are acknowledged as a major determinant of housing policies and programmes. The demographic composition of the population is the basis for assessing housing needs in so far as the size and composition of the household, as the basic unit in housing programmes depends to a large extent on the sex, age and marital status composition of the population. Apart from those of unmarried persons living by themselves, new housing needs normally arise at the time of marriage. The required size of the dwelling increases with the birth and growth of the children and later decreases when the children leave home and the marriage is dissolved through the death of one of the spouses. Nuptiality, age at marriage and the levels of fertility and mortality are thus bound to have an important effect on housing needs.<sup>291</sup>

125. Besides the replacement of deteriorated dwellings and the reduction or elimination of existing housing shortages and deficits, population growth is the third and often the most important element in determining over-all housing needs. Population changes affect housing needs primarily through changes in the number of families which normally share one dwelling and the higher the rate of population growth the faster will be the rate at which housing needs increase. In general, housing needs may increase proportionately with the growth of population if the size and composition of the family or basic household unit remain unchanged. Changes in population and housing needs may no longer be proportionate where population growth slows down or accelerates since such a process is frequently associated with changes in the population composition and structure which involve corresponding modifications in the size and structure of households. It is thus not only the level of population growth, but its components and their behaviour which

determine the demographic implications for housing needs.<sup>292</sup>

126. The geographical distribution of the population and especially its urban-rural composition and changes in it have a considerable impact on planning for the housing sector. In view of the different standards and requirements for housing in urban and rural areas, the volume and types of housing needs may vary considerably with the relative levels of urbanization, the more so because of differences in the demographic composition of the urban and rural population. Moreover, the housing sector in urban areas is so closely related to other aspects of urban environment—such as transportation from home to work, sanitary services and other public utilities—that co-ordination between housing programmes and planning for other urban facilities is imperative.<sup>293</sup> The inflow of population into the cities in many developing countries in particular signifies a rapidly increasing need for housing and related utilities which in many cases, because of the scarcity of available resources, poses serious problems for urban housing programmes. Migration and especially rural-to-urban migration has thus come to be considered as a fundamental factor in planning for housing.<sup>294</sup>

#### D. Demographic considerations in regional planning

127. The term regional planning has been interpreted in a number of different ways and, in so far as it relates to regions within a country,<sup>295</sup> can be defined only in very general terms as dealing with policies for a region or regions, either independently or as part of a comprehensive national plan.<sup>296</sup> Because of the diversity of forms which have in common only their concern with certain spatial aspects of the community or society, it is impracticable to describe in a succinct manner the scope and content of regional planning.

128. Regional planning, it has been said, has evolved basically out of two approaches to spatial problems. The first, according to this interpretation, emerged as part of

<sup>289</sup> United Nations, *Methods for Establishing Targets* ... (1968), pp. 26-27; ———, "Implications of population trends ..." (1964); ———, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1962), p. 9.

<sup>290</sup> United Nations, *Methods for Establishing Targets* ... (1968), pp. 28-30; ———, "Implications of population trends ..." (1964); United Nations, Economic Commission for Asia and the Far East, *Problems of Social Development Planning* ... (1964), p. 39.

<sup>291</sup> United Nations, *Seminar on Evaluation and Utilization of Population Census Data in Latin America* ... (1960), p. 22; ———, *Seminar on Evaluation and Utilization of Population Census Data in Asia and the Far East* ... (1961), pp. 15-17.

<sup>292</sup> United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1962), p. 39; ———, *Methods for Establishing Targets* ... (1968), pp. 27-28; ———, "Implications of population trends ..." (1964).

<sup>293</sup> United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1962), pp. 1, 9, 17-18. On the question of priority of urban as compared with rural housing, see United Nations, *Report of the Interregional Seminar on Rural Housing* ... (1968), pp. 72-74.

<sup>294</sup> United Nations, *Report of the Ad Hoc Group of Experts on Housing and Urban Development* (1962), pp. 2-3; ———, *Methods for Establishing Targets* ... (1968), p. 27.

<sup>295</sup> The expression regional planning is sometimes also used to refer to the harmonization and co-ordination of national plans, often mainly with respect to the external sector of the economy, of countries in a certain region.

<sup>296</sup> Friedman, "Regional planning ..." (1964) and his *Regional Development Policy* ... (1966), p. 5; United Nations, *Selected Experiences in Regional Development* (1970), p. 7, describes regional development as activities which aim at arranging population and human activities in space and which: (a) have as their main aim the improvement of living conditions among the population at large; (b) reflect a multidimensional approach towards development; and (c) take a region as the essential unit of measure in organizing these activities.

economic policy when, in response to the economic backwardness of a certain region or regions or to excessive regional disparities in levels of living, measures were taken to speed up economic growth in these less advanced areas. The second approach, which became identified with physical planning, was mainly concerned with the organization and development of the physical environment and the rational utilization of space in order to accommodate economic and social activities often within the local community or area.<sup>297</sup> Both of these approaches, however, underwent a gradual transformation. Physical planning advanced, from being confined to planning in determined areas, to encompass various regions or even the whole country.<sup>298</sup> At the same time national economic policies and planning placed increasing emphasis on regional aspects of development and many plans included, besides over-all targets, certain objectives for regional development.<sup>299</sup> With the development of regional aspects in national planning and the evolution of physical planning, differences between the two approaches have narrowed, even though they have not disappeared completely. At present, however, the need for a co-ordinated and integrated approach to regional planning has become widely accepted.<sup>300</sup>

<sup>297</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning ..." (1966); Rodwin, "Current development in regional planning" (1959); Friedman, "Regional planning ..." (1964).

<sup>298</sup> United Nations, *Regional Planning ...* (1959), p. 2; ———, *International Survey of Programmes ...* (1959), p. 49; United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966). Traditionally, it has been noted, physical planning was often limited to the internal arrangements of cities and towns. United Nations, *Regional Planning ...* (1959), p. 2. See also, Glikson, *Regional Planning and Development* (1955), pp. 21-23; Gottmann, "En étudiant la planification régionale" (1952). A recent physical planning oriented classification of planning regions distinguishes: regions of resource development; rural regions in which village improvement projects are carried out; and metropolitan areas. United Nations, *Regional Planning ...* (1959), p. 4; Rodwin, "Current developments in regional planning" (1959). Physical planning at the national level may include country-wide programmes for roads, railways, rivers and electric power networks. Glikson, *Regional Planning and Development* (1955), p. 11; United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966).

<sup>299</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development ...* (1960), p. 57; United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); Isard and Reiner, "Regional and national economic planning ..." (1961).

<sup>300</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); United Nations, *Regional Planning* (1959), p. 5; ———, *International Survey of Programmes ...* (1959), p. 49; ———, *Selected Experiences in Regional Development* (1970), pp. 8-9; Ylvisaker, "Administrative considerations in regional planning" (1959); Brown *et al.*, *An Introduction to Town and Country Planning* (1969), p. 317; Isard and Reiner, "Regional and national economic planning ..." (1961); Gottmann, "En étudiant la planification régionale" (1952); Davin, *Economie régionale et croissance* (1964), pp. 90-91, 256-258. On the less than complete integration of these aspects of regional planning in practice see Ginsburg, "The regional concept and planning regions" (1959). On the need to integrate urban and metropolitan planning and national planning see Isard and Reiner, "Regional and national economic planning ..." (1961); Rodwin, "Metropolitan policy for developing areas" (1961). See also Friedman, "Regional planning ..." (1964) who distinguished

129. As the link between the national and local community, the region constitutes a suitable frame for a balanced integration of development projects of national significance and those based on local considerations.<sup>301</sup> In the most general terms, it has been noted, regional planning thus aims at the harmonization of national and local development or, alternatively stated, at comprehensive national development through the progress of different parts of the country. In this sense, regional planning has the dual objective of promoting not only economic growth and social progress in the regions concerned, but also in the country as a whole.<sup>302</sup>

130. Since regional planning in the broad sense used here is linked to national programmes, regional policies and physical and environmental planning, its specific objectives may reflect differences of emphasis on one or the other of these aspects. Regional policies may thus pursue a large number of different objectives which, from the point of view of the individual region, may include: economic and social progress through the development and utilization of the material and human resources of the region; improvement in levels and patterns of location of productive activities and infrastructure investments with a view to environmental factors; the balancing of population with employment opportunities and improved patterns of human settlement; the integration of the region into the natural culture and the creation of better organizational and administrative conditions.<sup>303</sup> From the point of view of national planning for regional development and of interregional considerations, objectives may involve a choice between the development of regions in order to maximize national income and levels of living; the accelerated development of backward regions and depressed areas with a view to equalization; the diversification of regional economies; "balanced" economic growth of regions and so forth.<sup>304</sup> Although in general it is accepted that most objectives of regional planning contribute, directly or indirectly, to attaining higher levels of development and that in many cases they may be identified with the goals of national plans, the different goals are not necessarily consistent. In particular, it has been observed that the maximization of regional develop-

between regional planning and city planning, but stressed the need for integration of the two. See also his "The concept of a planning region ..." (1964).

<sup>301</sup> United Nations, *Regional Planning ...* (1959), p. 7; ———, *International Survey of Programmes ...* (1959), p. 50; ———, "United Nations seminar on housing and community improvement ..." (1955).

<sup>302</sup> Friedman, "Regional planning ..." (1964); Richardson, *Regional Economics ...* (1969), p. 365.

<sup>303</sup> Resources for the Future, *Design for a Worldwide Study of Regional Development ...* (1966), pp. 2-3, 11-12; Bourcier de Carbon, "Quelques conditions d'efficacité ..." (1961); Davis, *Economie régionale et croissance* (1964), p. 15. For a more detailed classification see, for instance, United Nations, *Selected Experiences in Regional Development* (1970), pp. 9-10.

<sup>304</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development ...* (1960), p. 57; Bourcier de Carbon, "Quelques conditions d'efficacité ..." (1961); Davin, *Economie régionale et croissance* (1964), p. 15; Boudeville, *Problems of Regional Economic Planning* (1966), p. 18.

ment may be inconsistent with optimum national development.<sup>305</sup>

131. Covering all aspects which affect economic and social development in different areas and localities, the range of measures of regional policy is very broad. In the centrally planned economies, it has been noted, national plans provide for all the main categories of instruments for regional policies. Population and labour force movements are accounted for in the manpower balances; the building-up of the social and economic regional infrastructure is part of the investment plans and so is the location of economic activities in different regions.<sup>306</sup> In market economies, measures for regional development include such diverse aspects as the levels of public expenditures and investment; taxation and subsidies; influencing transportation and transfer cost through direct or indirect control; wage policies and other measures designed to influence the cost of capital; policies designed to affect the mobility of labour and capital and so forth.<sup>307</sup> However, in most of these countries, it has been noted, the effective means for regional development at the disposal of planners are, as a rule, restricted and mainly negative ones.<sup>308</sup>

132. Although the role of demographic factors in regional planning has not been clearly defined, there is a general recognition that the spatial distribution and mobility of the population occupy a central place in the strategy of regional development. The links between these demographic variables and regional development and its planning are close. The level of and outlook for development of a given region is by itself partly a function of the relation between population and material resources and physical environment. In addition, the process of development, whether planned at the national or regional level, will inevitably have implications for the spatial distribution of population, as well as economic activities—the most evident example being that of the urban concentration associated with the industrialization process—which depends to a considerable extent on the mobility of population and resources.<sup>309</sup> Through influencing levels and patterns of migration, regional development policy may bring about a distribution of population and

labour force better adapted to the potential development both of individual regions and the country as a whole. Migrations from backward areas where unemployment and underemployment are widespread to parts of the country where employment is expanding rapidly is an important tool of regional policy in adjusting the supply of labour to the existing or changing regional trends in employment. Even though, as has been observed, employment itself is not necessarily the main objective in regional planning,<sup>310</sup> the improved regional balance of labour supply and demand, through increased over-all employment, will also accelerate economic growth in general and decrease regional differentials.<sup>311</sup> Through measures affecting levels and, especially, patterns of migration, regional policy, by creating alternative employment opportunities and sources of income, may limit the drift of population towards over-developed or congested areas, particularly the large cities, where a greater concentration of population may for a number of economic, social and environmental reasons be undesirable.<sup>312</sup>

133. Nevertheless, the role of migration and changing patterns of population settlement in the strategy of regional development is not without its limitations. As far as policies with regard to backward regions are concerned, one basic question is the choice between migration and other policy alternatives of regional development. Such a choice is influenced by a great number of factors. In general terms, it may be said that where solving the unemployment problems is the primary goal migration policies may be most appropriate. However, if the purpose is to speed up the development of such regions in order to reduce regional income differentials, capital imports may be called for.<sup>313</sup> The choice of strategy also depends to a large extent on the causes of backwardness of the region. It has been argued that where a region remained behind because it failed to adapt its economic structure to change, moving capital to labour will be a more viable solution than in the case of regions handicapped by less favourable resources endowments.<sup>314</sup> The latter is especially true of the over-populated regions where the out-migration of labour may be a major means of adjustment to population pressures and may cause a more rapid economic growth. In the absence of such migration, development might not be feasible or be possible only at the cost of a massive inflow of capital in combination with a large industrialization programme and a radical

<sup>305</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 57; United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); United Nations, *Selected Experiences in Regional Development* (1970), p. 8; Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), pp. 12-13; Leven, "Establishing goals for regional economic development" (1964); Richardson, *Regional economics* ... (1969), pp. 365-372.

<sup>306</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966).

<sup>307</sup> Hoover, *The Location of Economic Activity* (1948, 1963 ed.), chap. 14; Davin, "Les conditions de croissance des économies régionales ..." (1961); United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966).

<sup>308</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966).

<sup>309</sup> Friedman, "Regional planning ..." (1964); Leven, "Establishing goals for regional economic development" (1964); Boudeville, *Problems of Regional Economic Planning* (1966), p. 48; Lewis, *Development Planning* ... (1966), pp. 68-69.

<sup>310</sup> Leven, "Establishing goals for regional economic development" (1964). See also Richardson, *Regional Economics* ... (1969), pp. 387-388. Boudeville, *Problems of Regional Economic Planning* (1966), p. 77 argued, however, that employment appears to be the basic tool with which to identify desirable objectives of regional development and the means for attaining them.

<sup>311</sup> Richardson, *Regional Economics* ... (1959), p. 394; Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), p. 52.

<sup>312</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 66; Resources for the Future, *Design for a Worldwide Study for Regional Development* ... (1966), p. 11.

<sup>313</sup> Richardson, *Regional Economics* ... (1969), pp. 392-393.

<sup>314</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966).

transformation of agriculture.<sup>315</sup> In contrast, migration from regions which are under-populated in terms of resources may prejudice their subsequent development. Capital inflows into these regions would have the double effect of fostering their development and slowing down their rate of out-migration.<sup>316</sup> The volume and characteristics of in-migration become crucial in the case of so-called "new regions" and occupy a central place in their development.<sup>317</sup>

134. In formulating regional development policies, allowance should not only be made for the effects migration has on population size, but also its implications for the age distribution. Because of the age-selectivity of migration, the largest number being concentrated in the ages roughly between 20 to 40 years, these movements tend to decrease the proportion in the labour force in regions of origin and to increase it in the areas of destination. By reducing the relative importance of the most dynamic segment of the labour force, and often the most enterprising and better qualified elements, and by raising the average or median age of the working population, migratory movements might have unfavourable repercussions on economic progress and employment in areas of out-migration.<sup>318</sup>

135. Although levels of living and employment are the most common motivations for labour movements, population, on the whole, will not be completely mobile, nor, for that matter, immobile.<sup>319</sup> Although migration can be induced through such measures as subsidies for education and training, direct financial assistance in moving, provisions for housing and other social services and infrastructure,<sup>320</sup> even strong inducements of this kind, barring direct compulsion, may be insufficient for many unemployed in backward areas to migrate.<sup>321</sup> It has been argued, therefore, that because of these locational preferences, part of the population must be con-

sidered as immobile from the economic point of view. Consequently, it is held, capital development in these regions is primary since, from the economic point of view, it uses labour which must be considered as immobile while, from the social point of view, it satisfies the locational preferences of the inhabitants.<sup>322</sup>

136. As far as the effects of internal migration on the more developed regions and comparative levels of development are concerned, it has been noted that, in general, the mobility of the population increases the income inequality between more and less developed regions. Since migration is selective, both with respect to age and characteristics of the migrants, the more developed regions will attract the most dynamic individuals from the other regions, stimulating the further development of the already more privileged areas.<sup>323</sup> The concentration of population in the large cities especially contributes to such development. Not only does it draw the most qualified labour from rural areas and small towns and cities, but it also absorbs a disproportionate share of the national total and public investment.<sup>324</sup> Urban concentration, it is argued, causes a dualistic structure in the space economy, characterized by a centre of rapid intensive development, equivalent to the modern sector, and a stagnant or only slowly progressing periphery dominated to a large extent by traditional activities.<sup>325</sup>

137. Rapid urban growth creates its own problems and the unprecedented growth of cities in the twentieth century has been said to be one of the most important factors in the development of regional planning.<sup>326</sup> In the great cities where a large population is concentrated, among the main problems are congestion and insufficient transport facilities, lack of public services and social infrastructure, and scarcity of land for housing.<sup>327</sup> Despite the advantages which in principle are derived from geographic concentration, external economies, it has been asserted, increase only slowly, once cities have passed a certain size, while the economic and social disadvantages increase at a very rapid rate, especially where public expenditures and investments are concerned.<sup>328</sup> Particularly in the developing countries, high rates of urbanization, in part the result of high population growth

<sup>315</sup> Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), p. 46; United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), p. 45.

<sup>316</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), pp. 48-49; Richardson, *Regional Economics* ... (1969), pp. 399, 401.

<sup>317</sup> Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), p. 46.

<sup>318</sup> Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), p. 49; Resources for the Future, *Design for a Worldwide Study of Regional Development* (1966), p. 48; Okun and Richardson, "Regional income inequality ..." (1964).

<sup>319</sup> United Nations, Economic Commission for Asia and the Far East, *Programming Techniques for Economic Development* ... (1960), p. 60; Leven, "Establishing goals for regional economic development" (1964), argued that population movements could be regarded as a totally independent or dependent variable, but that the actual situation is somewhere in between.

<sup>320</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); Richardson, *Regional Economics* ... (1969), pp. 393-394.

<sup>321</sup> Bauchet, "La programmation régionale" (1961); Richardson, *Regional Economics* ... (1969), pp. 398-399, 409.

<sup>322</sup> Richardson, *Regional Economics* ... (1969), p. 399, who also noted that at present policies designed to influence the location of new capital have gained a wider measure of acceptance than those aimed at inducing migration. *Ibid.*, p. 397.

<sup>323</sup> Myrdal, *Economic Theory and Under-Developed Regions* (1957), p. 27; Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), p. 29.

<sup>324</sup> Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), p. 31; Friedman, *Regional Development Policy* ... (1966), p. 9.

<sup>325</sup> *Ibid.*

<sup>326</sup> United Nations, *Regional Planning* ... (1959), p. 3; Resources for the Future, *Design for a Worldwide Study of Regional Development* (1966), pp. 11, 29.

<sup>327</sup> Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), p. 30; United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); Resources for the Future, *Design for a Worldwide Study of Regional Development* (1966), p. 29.

<sup>328</sup> Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), pp. 44-45.



which contributed pressure to this process directly as well as indirectly through the rural population, have exceeded in many instances by far the capacity of absorption of the cities both in terms of housing and other facilities and employment.<sup>329</sup>

138. Whereas the achievement of improved patterns of urbanization and urban decentralization have been regarded as among the objectives of regional development,<sup>330</sup> urbanization theory, it is held, has not provided the set of principles for such purposes and the assimilation of urbanization policies in the framework of regional or national planning is far from complete.<sup>331</sup> Experience, it has been observed, suggests that the location of new economic activities in such areas and the migration toward these centres cannot be easily controlled. Measures which conceivably might contribute to a greater dispersal of over-developed areas and a reduction of the migratory movements towards them are: the acceleration of economic growth of under-developed areas; the development of satellite and new towns; and the transfer of some of the economic or social activities away from congested areas.<sup>332</sup> Urban and city planning, it is asserted, thus needs to be integrated with planning for the countryside and rural areas.<sup>333</sup> It has been observed, however, that there may exist in this respect a contradiction in rural programmes in so far as they are aimed at holding back out-migration from rural areas, whereas in fact rural development in many instances is conditioned by or may cause rural out-migration.<sup>334</sup> Any policy of regional decentralization, it has been said, to be generally accepted has to consider the concentration of most economic activities in existing or new towns in industrial zones in order to have the benefit of the advantages of location.<sup>335</sup>

139. In general, it is held that a first step in regional planning prior to formulating a programme is the preparation of a comprehensive survey of the region or regions and its problems. Such a study, or "balance sheet", should include: population trends and characteristics; labour force growth, structure and skills; employment and unemployment; the growth of rural and urban population; and actual and potential migration.<sup>336</sup>

<sup>329</sup> United Nations, *World Economic Survey, 1964*, part I ... (1965), p. 66; Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), pp. 29, 31.

<sup>330</sup> Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), p. 11.

<sup>331</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966).

<sup>332</sup> *Ibid.*

<sup>333</sup> Ginsburg, "Current trends influencing regional planning" (1959); Isard and Reiner, "Regional and national economic planning ..." (1961).

<sup>334</sup> Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), p. 34; Ginsburg, "Current trends influencing regional planning" (1959).

<sup>335</sup> United Nations, Economic Commission for Europe, "Problems of regional economic planning and development ..." (1966); Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), p. 46.

<sup>336</sup> Glikson, *Regional Planning and Development* ... (1955), p. 10; Bauchet, "La programmation régionale" (1961); Davin, *Economie régionale et croissance* (1964), p. 40; Resources for the Future, *Design for a Worldwide Study of Regional Development* ... (1966), pp. 8-9, 47.

It has also been argued that, before defining a regional development policy, demographic and related economic projections should be prepared in order to indicate the possible evolution and to establish the choices of policy objectives and goals to be determined by the decision-makers.<sup>337</sup>

140. Regional planning and policies differ greatly and so does the extent to which demographic factors are taken into account. In the centrally planned economies, regional development is an integral part of planning and the State determining the development goals for each region also sets the economically desirable volume of migration between regions.<sup>338</sup> Active policies for decentralization and dispersal are applied in the Soviet Union and most of the other centrally planned economies, including Czechoslovakia,<sup>339</sup> Hungary,<sup>340</sup> and Poland.<sup>341</sup> Special attention is also given to rural development programmes designed to alter the rural settlement patterns with a view towards increasing agricultural production, such as in the case of Poland.<sup>342</sup> China's first and second plans gave regional development priority through rational geographical location of industries and programmes to build new industrial bases. A balanced regional development was seen as necessary to strengthen national defence and develop backward areas.<sup>343</sup> In this context, it pursued an active policy for controlling the rural-urban migration, including measures for the return of rural migrants.<sup>344</sup>

141. In the developed market economies, regional planning has taken a number of different forms. The best-known example of planning for the development of resources is probably the Tennessee Valley Authority (TVA) which, although primarily responsible for the development of water resources, became a multipurpose project. At least in part as a result of the programme, the region experienced spectacular changes in its economic structure—especially as far as the decrease in agricultural and the increase in manufacturing employment are con-

<sup>337</sup> Communauté Economique Européenne, *La politique régionale dans la Communauté Economique Européenne* (1964), pp. 52-54; Bauchet, "La programmation régionale" (1961); Rodwin, "Metropolitan policy for developing areas" (1961).

<sup>338</sup> Daragan, "Economic development and internal migration" (1967); Konstantinov, "Rural-urban migration as a factor of economic development ..." (1967).

<sup>339</sup> See, for instance, Czechoslovakia, Ministry of Information and Public Culture, *The First Czechoslovak Economic Five-Year Plan; Act* ... (1949), pp. 200, 240-241, 273.

<sup>340</sup> Kőrödi, "The system and principal tasks of regional economic planning in Hungary" (1965).

<sup>341</sup> Fisher, *City and Regional Planning in Poland* (1966), chaps. 11-13; Goryinski, "Metropolitan planning in Poland" (1967). See also Kruczała, "Regional planning in the Kraków Voivodship" (1966); Welpa, "Regional planning in the Byałyostok Voivodship" (1966).

<sup>342</sup> Benko, "Rural planning in Poland" (1966).

<sup>343</sup> China, *First Five-Year Plan for Development of the National Economy* ... (1956), pp. 18, 40-42. See also Communist Party of China, *Proposals of the Eighth National Congress* ... (1956), pp. 16-17; Chou En-Lai, *Report on the Proposals for the Second Five-Year Plan* ... (1956), pp. 67-69.

<sup>344</sup> China, Communist Party, "Joint Directive of Chinese Communist Party, Central Committee and State Council on Prevention of Blind Exodus of Rural Population" (1957); China, "Directive banning the influx of peasants into the cities" (1957).



cerned—a rapid increase in levels of income and a steady growth of population.<sup>345</sup> Regional planning has also received much attention in Italy in connexion with the development of southern Italy. As part of the ten-year plan for 1955-1964, which had among its targets fuller employment and a better balanced and harmonious development of the different regions, investment programmes which would provide productive employment for the unemployed and underemployed and the increase in the labour force in the southern regions were stressed.<sup>346</sup> Regional planning received special emphasis in the Fourth Plan (1962-1965) and Fifth Plan (1966-1970) of France. The Fourth Plan gave high priority to the industrialization of the western and southern parts of the country and the conversion of industries in other regions. The Fifth Plan had similar objectives, but added to these the development of metropolitan regions and an equilibrium in the development in each of them in order to provide a balance to the influence of the Paris region.<sup>347</sup> Regional planning has also become widely accepted in other developed market economies. Measures with respect to industrial location and the establishment and development of new towns have a long history in England.<sup>348</sup> Planning for urban conglomeration, development of the less industrialized regions, and the balanced distribution of population are elements of regional planning in the Netherlands.<sup>349</sup> Other countries such as Sweden, the Federal Republic of Germany and Japan provide incentives to workers who move to other less congested parts of the country.<sup>350</sup>

142. Regional planning has been increasingly accepted in recent years in many of the developing countries. Large projects for resource development have been or are being developed in a number of countries, such as the development of the Lower Mekong River Basin as a joint effort of the Governments of Cambodia, Laos, Thailand and the Republic of Viet-Nam,<sup>351</sup> the multi-purpose river valley development projects, such as the Damodar Valley, the Bhakra-Nagal and Hirahud pro-

jects in India,<sup>352</sup> the Gezira Scheme in the Sudan,<sup>353</sup> the Volta River hydroelectric project in Ghana,<sup>354</sup> the Aswan Dam in the Arab Republic of Egypt,<sup>355</sup> the Plan Lerma in Mexico,<sup>356</sup> and so forth. Colonization plans have been included in the plans of many countries including in Asia: Ceylon,<sup>357</sup> Pakistan<sup>358</sup> and the Philippines.<sup>359</sup> In Indonesia, special programmes of "transmigration" from overcrowded Java to colonization areas in Sumatra were elaborated as part of the country's regional development policy.<sup>360</sup>

143. Although in the plans of most developing countries, highest priority was given to speeding up the overall rate of economic growth, a number of plans contemplated certain measures aimed at a higher degree of income equalization in different regions or the acceleration of development in backward areas. In India's second plan, industrial development programmes which gave special consideration to the investment needs of underdeveloped areas were undertaken.<sup>361</sup> In the third plan, the development of backward areas was further to be enhanced through programmes for the expansion of small industries, the location of new enterprises, and the establishment of rural works programmes, especially in areas of high population density and limited development of natural resources.<sup>362</sup> The second five-year plan of the Republic of Korea, while continuing to promote large industrial complexes, simultaneously encouraged the establishment of medium and small industries in smaller cities.<sup>363</sup> In the plans of Pakistan it was recognized that the rate of development in East Pakistan was not as high as in West Pakistan and accordingly strong emphasis was laid on programmes to increase agricultural produc-

<sup>345</sup> United States, National Resources Committee, *Regional Factors in National Planning and Development* (1935), chap. 9; Tennessee Valley Authority, *TVA-1966* (1967).

<sup>346</sup> Italy, Comitato Interministeriale per la Ricostruzione, *Lineamenti del programma di Sviluppo dell'occupazione e del reddito in Italia* (1956). See also Vanoni, "Development of employment and income in Italy" (1955); Martellaro, *Economic Development in Southern Italy, 1950-1960* (1965); Molinary, "Effects of the policy for the development of southern Italy" (1959); Associazione Bancaria Italiana, "La 'riconsiderazione' dello schema Vanoni . . ." (1959).

<sup>347</sup> Fourastié and Courthéoux, *La planification économique en France* (1968), chap. 8. See also Hansen, *French Regional Planning* (1968); France, Ministère de la Construction, *Plan d'aménagement et d'organisation générale de la Région Parisienne* (1959).

<sup>348</sup> Such as, for instance, the Distribution of Industry Act of 1945 and the New Towns Act of 1946.

<sup>349</sup> Thijsse, "Metropolitan planning in the Netherlands . . ." (1959).

<sup>350</sup> See Zarka, "Policies for promoting labour mobility . . ." (1967) and International Labour Office, *Employment and Economic Growth* (1964).

<sup>351</sup> United Nations, *Programme of Studies and Investigations for Comprehensive Development of the Lower Mekong River Basin . . .* (1953); ———, *Summary of Findings and Proposals on the Economic Development of the Lower Mekong Basin* (1959).

<sup>352</sup> India, Planning Commission, *The First Five-Year Plan, A Draft Outline* (1951), pp. 42-43; ———, *Third Five-Year Plan* (1961), pp. 144-145. See also Prasad, "Regional planning problems in the Damodar Valley" (1959).

<sup>353</sup> Gaitskell, *Gezira, a Study of Development in the Sudan* (1959), chap. 21; United Nations, *Report on the World Social Situation* (1961), pp. 86-87; United Nations, Economic Commission for Africa, *Economic Survey of Africa since 1950* (1959), p. 53.

<sup>354</sup> Ghana, Planning Commission, *Seven-Year Plan for National Reconstruction and Development . . .* (1964), pp. 203-211.

<sup>355</sup> United Nations, *Selected Experiences in Regional Development* (1970), pp. 13-18.

<sup>356</sup> *Ibid.*, pp. 87-96.

<sup>357</sup> Ceylon, Planning Secretariat, *Six-Year Programme of Investment, 1954-55 to 1959-60* (1955), pp. 172-197; ———, *The Ten-Year Plan* (1959), pp. 235-243.

<sup>358</sup> Pakistan, National Planning Board, *The First Five-Year Plan, 1955-1960* (1957), pp. 20-21, 32, 265-268; ———, Planning Commission, *The Second Five-Year Plan (1960-1965)* (1960), pp. 135-136.

<sup>359</sup> Macapagal, *Five-Year Integrated Socio-economic Program for the Philippines . . .* (1962), chap. 13; Philippines, National Economic Council, *Three-Year Program of Economic and Social Development . . .* (1959), p. 63.

<sup>360</sup> Indonesia, Biro Perantjangan Negara, *Report on the Execution of the Five-Year Development Plan, 1956-1960* (1960), pp. 372-377.

<sup>361</sup> India, Planning Commission, *Second Five-Year Plan* (1956), pp. 28-37, 48.

<sup>362</sup> India, Planning Commission, *Third Five-Year Plan, Summary* (1961), pp. 44-48.

<sup>363</sup> Republic of Korea, Economic Planning Board, *The Second Five-Year Economic Development Plan, 1967-1971* (1966), pp. 112, 129.

tion and develop industries in East Pakistan.<sup>364</sup> The second five-year plan of Thailand provided for regional development programmes for five geographical regions of the country and also outlined measures and programmes for the development of remote and backward rural areas.<sup>365</sup> In Africa, the development plan of Kenya noted the problems of balanced development between geographical areas and considered such measures as rural development services, land consolidation and resettlement schemes.<sup>366</sup> In Nigeria, three regional development plans were elaborated together with the Federal Plan.<sup>367</sup> A number of other countries in the region, among them the Ivory Coast, Morocco, Senegal and Tunisia, emphasized in their plans the need for a more effective co-ordination of efforts and programmes at the local, regional and central levels.<sup>368</sup>

144. In Latin America the problem of regional development has received special attention in the case of north-eastern Brazil. The programme for this region contemplated the promotion of industrialization and the expansion of its agricultural boundaries through the expansion of irrigation and the incorporation of unoccupied lands. In order to increase migration to these latter areas, the plan initiated an investment programme in infrastructure and provisions for the transportation, housing and other facilities for the migrant families.<sup>369</sup> Venezuela's plan for 1963-1966 included among its principal objectives the utilization of the resources of the different regions of the country in the most efficient way possible.<sup>370</sup> A specific programme in this connexion was the development of a heavy industry complex in Guayana based on the region's natural resources such as iron ore, hydroelectric power and natural gas. The development of these resources, considered as an integral part of the country's industrialization programme, was expected to draw a large number of workers and other immigrants into the area and especially to the city of San Tomé de Guayana.<sup>371</sup>

<sup>364</sup> Pakistan, National Planning Board, *The First Five-Year Plan, 1955-1960* (1957), pp. 18-21; Pakistan, Planning Commission, *The Second Five-Year Plan (1960-1965)* (1960), pp. 397-408; —, *Outline of the Third Five-Year Plan (1965-1970)* (1964), pp. 77-81.

<sup>365</sup> Thailand, National Economic Development Board, *Summary of the Second Five-Year Plan (1967-1971)* (1966), pp. 10-11.

<sup>366</sup> Kenya, *Development Plan, 1966-1970* (1966), pp. 75-77, 129-154.

<sup>367</sup> Nigeria, *National Development Plan, 1962-1968* (1962), chaps. 6-9.

<sup>368</sup> Ivory Coast, Ministère du Plan, *Loi-plan de développement économique, social ...* (1967), pp. 9-11, 83-91; Morocco, Ministère des Affaires Économiques du Plan et de la Formation des Cadres, *Plan quinquennal, 1968-1972* (1968), vol. 1, pp. 40-43; Senegal, Ministère de la Coopération, *Economie et plan de développement* (1964), pp. 57-75; Tunisia, Secrétariat d'Etat au Plan et à l'Economie Nationale, *Plan quadriennal, 1965-1968* (1965), pp. 106-110; —, Secrétariat d'Etat au Plan et aux Finances, *Perspectives décennales de développement, 1962-1971* (undated) pp. 87, 106.

<sup>369</sup> Brazil, Presidência da República, *The Brazilian Northeast ...* (1962), pp. 1, 16. See also Robock, *Brazil's Developing Northeast—A Study of Regional Planning and Foreign Aid* (1963).

<sup>370</sup> Venezuela, Oficina Central de Coordinación y Planificación, *Plan de la nación, 1963-1966* (1963), pp. xii, xx.

<sup>371</sup> Venezuela, Oficina Central de Coordinación y Planificación, *Plan de la nación, 1963-1966* (1963), pp. 423-425, 436. See also Friedman, *Regional Development Policy ...* (1966), pp. 152-198.

145. Despite the importance assigned to regional development and its planning in many countries, relatively little attention has been paid to the role of demographic factors in the preparation and formulation of plans. This is partly due to the less than complete integration of regional planning with planning in general; it is also partly a consequence of a less than complete understanding and knowledge of the role of demographic factors in regional planning. Nevertheless, recent literature has revealed an increasing interest in and preoccupation with demographic factors in regional development and its planning.

### E. Family planning programmes and development planning

146. High rates of population growth and the characteristics associated with it, as has been noted before in this and the preceding chapters,<sup>372</sup> may constitute a serious challenge to rapid economic development. It is claimed that the unprecedented increase in population taking place in many developing countries not only requires a high rate of economic growth in order to attain sustained and significant raises in levels of income, but also exerts a strong pressure on available resources, thus severely limiting the goals they can set for economic development and social progress. It is for these reasons that a number of countries in the process of development have considered and adopted as part of their development efforts a population policy aimed at reducing the rate of population growth through fertility decline. Since population policies as such will be discussed in another chapter,<sup>373</sup> this section deals only with some general considerations of such programmes in the context of development planning and the practices concerning the incorporation of family planning programmes in national plans in selected countries.

147. Although apart from some pioneering efforts, the incorporation of family planning programmes in national planning is a relatively recent phenomenon and has gained considerable acceptance over the last few years. In the early 1960s, few countries considered family planning programmes as an integral part of their development policies. An inquiry among Governments on problems resulting from the interaction of economic development and population changes at that time revealed that although a considerable number of Governments were concerned with the implications of high rates of growth of population, few had incorporated family planning programmes in their development plans.<sup>374</sup> By the end of the decade, family planning programmes had been initiated in many countries and such programmes formed to an increasing extent an integral part of the national plans.<sup>375</sup>

<sup>372</sup> See especially chapters XIII and XIV.

<sup>373</sup> See chapter XVII.

<sup>374</sup> United Nations, *Inquiry among Governments ...* (1964), pp. 8-12.

<sup>375</sup> See chapter XVII. United Nations, *World Economic Survey, 1968*, part I ... (1969), p. 8, noted that, at least in several of the developing countries, the present official sponsorship of family-planning programmes contrasts with the negative attitude when the question of family planning first emerged.

148. Family planning programmes in the context of national planning have received special attention in relation with the Second United Nations Development Decade. The proposals for the Decade implicitly assumed, in setting its objectives, that measures should be taken to reduce the average birth-rate, as a minimum, at an equal pace with the declining levels of mortality. "What is called for", it is stated, "is the implementation of a population policy which is effectively conceived to influence the main determinants of demographic growth."<sup>376</sup> The action programme for the Second United Nations Development Decade noted in that context that each developing country should formulate its own demographic objectives within the framework of its national development plan. "Those developing countries" it was stated in more general terms, "which consider that their rate of population growth hampers their development will adopt measures which they deem necessary in accordance with their concept of development."<sup>377</sup> Another study,<sup>378</sup> also dealing with the problems of future development, noted that societies which have learned to control mortality have to face the need to control birth and recommended that developing countries, after identifying their population problems, recognize their relevance to their social and economic planning and adopt appropriate programmes. In discussing the developments of the 1960s and the problems in Asia of the Second United Nations Development Decade, it was observed that in view of the rapid growth of population in the majority of the countries of the region, measures to control such growth should not be under-estimated.<sup>379</sup> In connexion with the Development Strategy for the Second United Nations Development Decade (General Assembly resolution 2626 (XXV)) in Latin America, it was noted that a decline in the birth rate would help in attaining the basic objective, that of raising the levels of living of the majority of the population over a shorter time period than otherwise and that programmes for providing the information on means to decide on the size of the family would accelerate the demographic transition.<sup>380</sup>

149. At the same time it has been recognized that family-planning programmes do not themselves solve the problems faced by the developing countries and that such programmes should form part of the national development efforts and planning. In considering some of the issues of development policy in the decade of the 1970s, it was emphasized that family-planning programmes are only one of the complex of measures for promoting human welfare. In particular, it was asserted that such programmes should not be considered substitutes for other measures to accelerate economic growth and social

progress.<sup>381</sup> A similar view is reflected in the discussion with respect to Asia, where it is stated that measures for population control do not replace measures aimed at raising output, but are only one among all policies for increasing economic growth.<sup>382</sup> With respect to Latin America, it was also stressed that the nature and magnitude of the development problems of the region are such that decreasing fertility would in no way do away with the need for rapid economic development.<sup>383</sup>

150. The first among the developing countries to consider an active policy with respect to population within the context of development planning was India. The First Five-Year Plan (1951-1956), taking into consideration the rapid increase in population and the pressure of population on resources, stressed the need for a curb on population growth as an important condition for a rapid improvement in levels of living. The plan formulated a programme in this field which included services; field experiments of different techniques for family planning; education in family planning methods and research on fertility; and the interrelationships between economic, population and social changes.<sup>384</sup> The Second Five-Year Plan (1956-1961) proposed to develop this programme further and to establish one clinic for each 50,000 people in the big cities and major towns.<sup>385</sup> The Third Five-Year Plan (1961-1966) stated that the objective of stabilizing the growth of population must be at the very centre of planned development and that the greatest stress had to be placed on family-planning programmes. Among the major aspects of the family-planning programme, the plan mentions the importance of the organization and of the personnel of the programme, the need to expand family-planning services and the mobilization of available agencies for education and extension work.<sup>386</sup> The Fourth Five-Year Plan (1966-1971) affirmed the recognition of family planning as a key element in the country's development and adopted as the objective of a nation-wide programme the reduction of the birth rate from 40 per thousand at the time to 25 per thousand as soon as possible. The operational goal for achieving this objective was to create facilities for 90 per cent of the country's married population.<sup>387</sup>

151. The First Five-Year Plan (1955-1960) of Pakistan noted the desirability of the extension of family-planning facilities and allocated resources for programmes in this field.<sup>388</sup> The Second Five-Year Plan (1960-1965) recog-

<sup>376</sup> United Nations, *Towards Accelerated Development* ... (1970), p. 7.

<sup>377</sup> United Nations, *International Development Strategy* ... (1970), pp. 3-4, 16.

<sup>378</sup> International Bank for Reconstruction and Development, *Partners in Development* ... (1969), pp. 194-195, also pp. 55-58.

<sup>379</sup> United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East*, 1969 (1970), p. 1.

<sup>380</sup> United Nations, Economic Commission for Latin America, *Economic Survey of Latin America*, 1969 (1970), p. 21.

<sup>381</sup> United Nations, *World Economic Survey*, 1968, part I ... (1969), p. 8.

<sup>382</sup> United Nations, Economic Commission for Asia and the Far East, *Economic Survey of Asia and the Far East*, 1969 (1970), p. 1.

<sup>383</sup> United Nations, Economic Commission for Latin America, *Economic Survey of Latin America*, 1969 (1970), p. 21.

<sup>384</sup> India, Planning Commission, *The First Five-Year Plan* (1952), pp. 218-219.

<sup>385</sup> India, Planning Commission, *Second Five-Year Plan* (1956), pp. 553-554.

<sup>386</sup> India, Planning Commission, *Third Five-Year Plan* (1961), pp. 675-678.

<sup>387</sup> India, Planning Commission, *Fourth Five-Year Plan—A Draft Outline* (1966), p. 346.

<sup>388</sup> Pakistan, National Planning Board, *The First Five-Year Plan, 1955-1960* (1957), p. 192.

nized the need for a conscious population policy and its implementation and accordingly formulated a programme primarily designed to influence social attitudes and practices.<sup>389</sup> The Third Five-Year Plan (1965-1970) set as an objective the halving of the birth rate in the next 25 years and within the third plan period from 55 to 45 per thousand.<sup>390</sup> A number of other Asian countries have considered family planning programmes in their national plans. The Ten-Year Plan of Ceylon accepted the possibility of influencing fertility through public policies and noted that a beginning had been made with a family planning campaign.<sup>391</sup> The First Five-Year Plan of the Republic of Korea (1962-1966) noted the need for population control measures<sup>392</sup> and in the Second Five-Year Plan (1967-1971) the development of an effective family-planning programme was closely associated with the major targets of the plan, which envisaged a fall in the rate of population growth from 2.7 per cent in 1965 to 2.0 per cent in 1971.<sup>393</sup> The First Malaysia Plan (1966-1970) noted that a new policy was to be adopted in the implementation of a positive programme for family planning.<sup>394</sup> The Third Plan of Iran, commenting on the rapid growth of the country's population and its implications for development, concluded that for both economic and welfare considerations family planning should constitute one of the important welfare programmes.<sup>395</sup> The First Five-Year Plan (1963-1967) of

Turkey noted that whereas in the past population policy had aimed at increasing population, existing obstacles to population planning should be removed.<sup>396</sup>

152. The tendency to consider family planning programmes as part of national development policy is also growing in Africa. In the case of Ghana, a population policy and programme were viewed as integral parts of social and economic development policy.<sup>397</sup> The Development Plan (1966-1970) of Kenya noted that the population problem had such serious consequences for future development that strong emphasis would be placed on measures to promote family planning education.<sup>398</sup> The Four-Year Plan (1965-1968) of Tunisia observed the need to take action to educate people and to encourage them to adopt voluntary birth control.<sup>399</sup> Family planning programmes have been actively considered in only a few plans of Latin American countries. The guiding principles for national development in the period 1970-1980 of Panama affirmed that a population policy constitutes a basic factor in the formulation of any development strategy.<sup>400</sup> A similar point of view is found in the Economic and Social Development Plan (1970-1973) of Colombia, which notes, commenting on the population problem of the country, that the existing and future development create the need for adopting a population policy adapted to the society's needs and aspirations.<sup>401</sup>

<sup>389</sup> Pakistan, Planning Commission, *The Second Five-Year Plan, 1960-1965* (1960), pp. 334-335, 360.

<sup>390</sup> Pakistan, Planning Commission, *The Third Five-Year Plan, 1965-1970* (1965), pp. 261-266.

<sup>391</sup> Ceylon, National Planning Council, *The Ten-Year Plan* (1959), pp. 12-13.

<sup>392</sup> Republic of Korea, Economic Planning Board, *Summary of the First Five-Year Economic Plan, 1962-1966* (1962), p. 31.

<sup>393</sup> Republic of Korea, Economic Planning Board, *The Second Five-Year Economic Development Plan, 1967-1971* (1966), p. 66.

<sup>394</sup> Malaysia, *First Malaysia Plan, 1966-1970* (1965), p. 178.

<sup>395</sup> Iran, Planning Division, *Outline of the Third Plan, 1341-1346* (1963), pp. 35-36.

<sup>396</sup> Turkey, Devlet Plânlama Teşkilâtı, *First Five-Year Development Plan, 1963-1967* (1963), pp. 60-65.

<sup>397</sup> Ghana, *Population Planning for National Progress and Prosperity. Ghana Population Policy* (1969), p. 19.

<sup>398</sup> Kenya, *Development Plan, 1966-1970* (1966), pp. 323-324.

<sup>399</sup> Tunisia, Secrétariat d'Etat au Plan et à l'Economie Nationale, *Plan quadriennal, 1965-1968* (1965).

<sup>400</sup> Panama, Dirección General de Planificación y Administración, *Estrategia para el desarrollo nacional, 1970-1980* (1970), pp. 82-84.

<sup>401</sup> Colombia, Departamento Nacional de Planeación, *Plan de desarrollo económico y social, 1970-1973* (1970), vol. 1, chap. 4, p. 13.

## Chapter XVII

### POPULATION POLICIES

1. Among the significant phenomena of the 1960s was the emergence of population matters to a place of paramount importance in the writings of social scientists and in the deliberations of Governments. Questions relating to population policies, in particular, became the focus of much attention. There had been previous periods during which interest in population matters stimulated national and international debates. Especially noteworthy was the nineteenth-century literary exchange that revolved around the writings of Thomas Malthus, who observed that population tended to increase more rapidly than the means of subsistence.<sup>1</sup> But after a secular decline that began in the latter part of the nineteenth century, birth rates fell to unprecedented low levels in most countries of Northern and Western Europe and Northern America under the influence of depressed economic conditions in the 1930s. By this time, concern for high rates of population growth had totally abated and, in fact, it was the spectre of possible declining population in the industrialized nations which engaged the attention of scholars.

2. The increase in the birth rate during and after the Second World War in many of the developed countries allayed concern over low population growth rates in some countries, although others displayed an interest in promoting population growth. The demographic situation in the developing countries, meanwhile, was changing dramatically in the post-war period. The introduction of medical technology and public health measures, along with some improvements in social conditions, brought about substantial declines in mortality in many areas of the developing world, while fertility showed little change, or in some instances increased. The declining mortality coupled with high fertility resulted in rapid population growth, and by the 1960s concern over population problems had come to focus on the developing countries. Anxiety over the consequences of this accelerating population growth gave rise to an international exchange on questions of population policy and the efficacy of alternative action programmes. These discussions on what might be considered as appropriate population policies have reflected differing conditions, philosophies and goals, the state of knowledge about the inter-relationships between demographic, economic and social phenomena, as well as humanitarian considerations and views on what constitutes a population policy.

3. The debates in various United Nations bodies eventually led to a series of decisions such as those set

forth in General Assembly resolution 2211 (XXI) of 17 December 1966 which called for an expanded United Nations programme of activities in population; the declaration of Heads of State or Prime Ministers of thirty Governments presented to the United Nations on Human Rights Day in 1967 which proclaimed as a basic human right the opportunity for parents to decide the number and spacing of their children;<sup>2</sup> and the International Development Strategy for the Second United Nations Development Decade (General Assembly resolution 2626 (XXV)) which, *inter alia*, called upon developed countries and international organizations to provide assistance upon request to developing countries which have adopted measures to modify their rates of population growth. The various resolutions and statements adopted have enunciated several important principles which reflect the diverse demographic situations and attitudes. These principles include the sovereignty of nations in formulating population policies, the free choice of the individual family in determining family size, the role of population policy as an integral component of broad national development policies, and the assurance that international assistance granted to Governments in the implementation of population policies will in no way be a substitute for other forms of development assistance.<sup>3</sup> While international agencies had at an early stage assumed a role in assisting Governments of developing countries in implementing policies in other areas (for example, with respect to health, education and employment), the idea of United Nations assistance to Governments wishing to moderate their population growth has gained wide acceptance only recently.

4. This chapter first considers definitions of population policy and its relationship to social and other policies. It then summarizes the history of policies affecting fertility prior to the Second World War and discusses the content and impact of post-war policies and measures affecting fertility in the developed and developing countries.

#### A. Population policy and its relation to other policies

##### 1. DEFINITIONS OF POPULATION POLICY

5. Policy in general has been defined as a set of objectives along with the measures and means to achieve them.<sup>4</sup> What constitutes a population policy has been

<sup>1</sup> See the discussion in chapter III.

<sup>2</sup> United Nations, *Population and its Relation . . .* (1968), para. 8 and annex I.

<sup>3</sup> United Nations, *Population and the Second . . .* (1971), para. 2.

<sup>4</sup> See, for example, Macura, "Síntesis de las ponencias presentadas" (1972), p. 266.

variously conceived by different writers on the subject, and no generally accepted definition has as yet emerged. Part of the difficulty no doubt stems from the problem of defining the field of demography itself, since some scholars have adopted a narrow definition which includes only the study of the size, distribution and composition of population and its components of change, while to others demography is also concerned with the relationships between population and social, economic and other variables.<sup>5</sup> Similarly, population policy may be viewed either in the narrow sense as being concerned only with efforts to affect the size, structure, distribution or characteristics of the population, or—in recognition of the interrelationships between population and economic and social change—it may be conceived of in the much broader sense of including also efforts to regulate economic and social conditions which are likely to have demographic consequences.<sup>6</sup>

6. Many writers have adopted a definition of population policy which is narrow enough to be capable of focus and orientation within the concept of general economic and social policy-making and planning.<sup>7</sup> In the opinion of Spengler and Duncan, for example, a population policy is a specific set of government objectives relative to the population magnitude and/or composition along with the instruments by which it may be possible to achieve those objectives.<sup>8</sup> This view appears to have wide currency.<sup>9</sup> After reviewing a cross-section of the relevant literature, Eldridge defined population policies as legislative measures, administrative programmes, and other governmental action intended to alter or modify existing population trends in the interest of national survival and welfare. She recognized that many aspects of public policy influence demographic phenomena and considered that population policy embraces those aspects of general social policy that are designed to “counteract unwanted demographic effects of over-all public policy or of other social forces”.<sup>10</sup> Population policy is thus understood, in the more restricted sense, as positive, deliberate action by government taken expressly to facilitate achievement of adopted goals<sup>11</sup> relative to population size, growth and composition in the interest of national well-being.

7. One of the themes running through these definitions is that of “deliberate intent”. The “deliberate intent of a

group to control its size and/or its characteristics” is the criterion singled out by Thompson and Lewis for determining the existence of a population policy.<sup>12</sup>

8. More broadly, some writers have considered economic and social measures which influence population trends to be an aspect of population policy. A summary of an article by Acsádi states that “population policy is conceived nowadays in a broader sense; it includes not only the conscious and direct influencing of the population processes but also all the social and economic measures which exercise an influence—even in an indirect way—over the characteristics and processes of the population. A population policy cannot be abstracted from an economic and social policy, as it has to consider the factors which affect the population changes and also the consequences arising from the population changes.”<sup>13</sup> Sauvy has written that certain objectives of population policy embrace economic, social and cultural policy as well.<sup>14</sup> Hauser has also acknowledged that population policy may, under certain conditions, appropriately comprise social and economic development policy,<sup>15</sup> while Doublet considered that distinctions between demographic and other measures of social and economic significance were frequently artificial.<sup>16</sup> In Boyarsky's view, population policy consists of a system of measures affecting demographic processes, but it should not be separated from general socio-economic policy as it is an aspect of over-all policy.<sup>17</sup>

9. Since population policy is so often considered to be a closely related aspect of general socio-economic policy, specifications of population policy have frequently been integrated into general programmes of economic and social development.<sup>18</sup> This is not to suggest that exclusive reliance on economic and social development is viewed by many as an instrument for implementing population policy. Such development is generally considered to be a goal in itself, although it is known to be frequently accompanied or followed by demographic change.<sup>19</sup>

<sup>12</sup> Thompson and Lewis, *Population Problems* (1965), p. 527. Organski and Organski also emphasize that population policy is deliberate, and add that it is planned and put into effect by national Governments because only in this way can the behaviour of a whole community be influenced. Organski and Organski, *Population and World Power* (1961), pp. 181-182.

<sup>13</sup> Acsádi, “Népességgpolitikai kérdések . . .” (1969), p. 479.

<sup>14</sup> Sauvy, *Théorie générale de la population*, vol. 2 . . . (1966), pp. 371-372.

<sup>15</sup> Hauser, “Non-family planning methods . . .” (1969), p. 65.

<sup>16</sup> Doublet, “Des lois dans leurs rapports . . .” (1949), pp. 40-41.

<sup>17</sup> Boyarsky et al., *Kurs demografii* (1967), p. 32.

<sup>18</sup> See, for example, Ghana, *Population Planning for National Progress and Prosperity* . . . (1969), p. 19; Tunisia, *Plan quadriennal, 1965-1968* . . . (1965), p. 20; Smulevich, “K voprosu o zakone . . .” (1967), pp. 20-26; Notestein, “The population crisis . . .” (1967); Guzevatyi, *Programy kontrolya* . . . (1969), pp. 59-63.

<sup>19</sup> The importance assigned by some scholars to economic development alone as a factor in fertility decline has been questioned. Referring to what she terms the development school of thought, Blake points out that application of socio-economic development as a population policy is “clearly open to objections of both a scientific and practical nature”. Blake, “Demographic science . . .” (1965), p. 42. She emphasizes that modernization alone “has nowhere in the world to date had an abiding and drastically downward effect on family size desires”. *Ibid.*, pp. 43, 59.

<sup>5</sup> Hauser and Duncan used the terms “demographic analysis” and “population studies” to distinguish between the narrow and broad concepts respectively. See their “Overview and conclusions” (1959), pp. 2-3.

<sup>6</sup> Eldridge, *Population Policies* . . . (1954), pp. 4-5.

<sup>7</sup> United Nations, Economic Commission for Latin America, *Social Change and Social Development* . . . (1970), p. 289.

<sup>8</sup> Spengler and Duncan, *Population Theory and Policy* . . . (1956), p. 441.

<sup>9</sup> See, for example, Myrdal, *Population: a Problem* . . . (1962), p. 33; Lorimer, “Issues of population policy” (1945), p. 193; Macura, “International aspects . . .” (1965), pp. 72-74; United Nations, Economic Commission for Latin America, *Social Change and Social Development* . . . (1970), p. 289; and Eldridge, *Population Policies: a Survey* . . . (1954), pp. 4-5.

<sup>10</sup> Eldridge, “Population policies” (1968), p. 381. See also Parkes et al., eds., *Towards a Population Policy* . . . (1970).

<sup>11</sup> Macura, “Síntesis de las ponencias presentadas” (1972).



10. Among the factors which have been frequently mentioned as falling within the scope of population policy are population size, rate of growth, levels of fertility and mortality, proportion married, the regulation of international and internal migration, sex and age structure, the utilization of human resources and the eugenic quality of the population. Some of these factors serve as means for influencing other variables, however, whereas others represent ends in themselves. For example, the lowering of mortality is considered a desirable goal in itself, whereas influencing the level of fertility is desired for its effect on growth rates and population size, and international migration policies may be used to modify population size or characteristics such as sex and age structure.

11. The Population Commission of the United Nations, at its sixteenth session, in 1971, favoured a concept of population policy which "includes not only objectives and measures aimed at fertility regulation, and the supporting family planning programmes, but also objectives and measures designed to extend longevity, i.e., to reduce high mortality and morbidity, in general, and infant and childhood mortality, in particular."<sup>20</sup> As conceived by the Commission, population policy should be concerned not only with the desirable rate of population growth, but also with the structure of the population and its distribution, particularly in urban and rural areas. The definition of population policy promulgated at a 1967 meeting on population policies in relation to development in Latin America specified that such policies may influence "the probable size and growth of the population, its age make-up, mortality rates, the formation and composition of families, the regional or rural-urban distribution of the people, and their admission to the labour force and to education . . .".<sup>21</sup>

12. According to Eldridge, "the major purpose [of population policy] is to control population size, but consideration may also be given to influencing its composition and its geographic distribution".<sup>22</sup> She emphasized quantitative aims of population policy since the inclusion of qualitative aims would make population policy virtually indistinguishable from public policy in general.<sup>23</sup> Sauvy, on the other hand, considers qualitative aims—such as providing satisfactory living conditions for the least fortunate classes—as an appropriate objective of population policy.<sup>24</sup> One recent study has distinguished two types of "population-related" policies: the first, designated as "population-responsive" policies, aims at

qualitative improvements through general development efforts, while the second, termed "population-influencing" policies, attempts to influence one or more of the demographic variables.<sup>25</sup>

13. While writers in the USSR generally consider that population policy may be concerned with influencing the components of population growth, some have particularly emphasized the role of policy in shaping the geographic distribution of the population and its productive employment. Kvasha noted that, while policy concerning mortality has an obvious direction, policy with respect to fertility should be aimed at achieving an optimum replacement of the population. Policy should also be designed to influence the pattern of internal migration to attain an advantageous distribution of labour resources, as well as for the effect of population distribution on the reproduction of the population.<sup>26</sup> Boyarsky wrote along similar lines, calling attention to the fact that conscious population policy can be directed towards either increasing or diminishing the rate of population growth, as well as towards changing the geographic distribution of population.<sup>27</sup> According to Smulevich, scientifically well-founded population policies could play a role both in promoting the rational reproduction of population and the rational utilization of labour resources.<sup>28</sup> Sonin pointed out that, since the means of production in socialist societies are collectively owned, it is possible to consciously plan and regulate national production and its distribution in such a way as to provide for the most rational employment of the labour force in the different branches of the economy and in the different economic regions of the country.<sup>29</sup>

14. The control of population size may theoretically be mediated through any of the three components of population change—fertility, mortality and migration.<sup>30</sup> The mortality component is unique, however, in that the reduction of mortality is a universal aim of Governments, including those whose policy it is to slow down their rate of population growth. To quote Eldridge: "Manipulation of the death rate in order to control the rate of growth is not feasible, because there is only one policy in relation to mortality that is socially acceptable—namely, to reduce it."<sup>31</sup> In her view, measures designed to reduce mortality should not be considered as population policy, but rather as health policy, since their purpose is to improve the health of the population rather than to affect the rate of population growth.<sup>32</sup>

15. Legislation regulating international migration is almost universal among nations. Such legislation may

<sup>20</sup> See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No. 3*, para. 52.

<sup>21</sup> Organization of American States *et al.*, *Meeting on Population Policies in Relation to Development in Latin America . . .* (1967), pp. 6-7.

<sup>22</sup> Eldridge, "Population policies" (1968), pp. 381-382.

<sup>23</sup> *Ibid.* While acknowledging that the biological quality of the population is sometime regarded as the proper concern of population policy, Eldridge believed that the effects of eugenic measures have probably been negligible. On eugenics as an aspect of population policy, see Sauvy, *Théorie générale de la population*, vol. 2 . . . (1966), pp. 338-347.

<sup>24</sup> Sauvy, *Théorie générale de la population*, vol. 2 . . . (1966), pp. 371-372. See also France, Haut comité consultatif de la population et de la famille, *La population française*, vol. 1 . . . (1955), pp. 237-238.

<sup>25</sup> National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications*, vol. 1 . . . (1971), p. 70.

<sup>26</sup> Kvasha, "O nekotorykh instrumentakh . . ." (1968), pp. 65-66.

<sup>27</sup> Boyarsky *et al.*, *Kurs demografii* (1967), pp. 32-38.

<sup>28</sup> Smulevich, "K voprosu . . ." (1967), pp. 25-26.

<sup>29</sup> Sonin, *Aktualnye problemy . . .* (1965), pp. 100-101. See also Valentei, *Teoriia i politika . . .* (1967), pp. 104-105.

<sup>30</sup> See, for example, Organski and Organski, *Population and World Power* (1961), p. 181.

<sup>31</sup> Eldridge, "Population policies" (1968), pp. 383-384.

<sup>32</sup> Eldridge, "Population policies" (1968), pp. 383-384. Some of the measures specifically employed to improve unfavourable health conditions are discussed in chapter V.



influence migration in an upward or downward direction. Population policy may also be directed towards the redistribution of population within national boundaries.<sup>33</sup> Migration policy is more controversial than policies affecting health and mortality in that it may involve coercion and restriction of movement on an individual level, and may create tensions between countries because of quota systems or such phenomena as the outflow of trained professional and technical personnel from one country to another.

16. Since policies aimed at lowering mortality are universally valued, and international migration on a scale sufficient to solve the population problems of developing regions cannot be considered a practical possibility, it is inevitable that present-day population policy should focus on the remaining component of population growth—fertility. Eldridge has pointed out that “practical considerations are such that most of population policy, as it exists today, is directed at influencing fertility...”.<sup>34</sup> Various recent studies have reflected this tendency,<sup>35</sup> and it is with this subject that the present chapter deals. This emphasis is justified by the decision of approximately thirty-five countries to initiate action programmes in this sphere. In addition, many other Governments have been concerned with the implications of their social policies for fertility trends.<sup>36</sup>

17. Measures affecting the biological quality of the population involve almost exclusively the science of eugenics, while such qualitative aims as the one mentioned by Sauvy are more appropriately the target of social, rather than population policy. Both of these aspects of policy are considered beyond the scope of the present text.

18. Even more problematic than delineating the scope of population policy is the question of determining whether or not a population policy exists in various countries. Some of the questions which come to mind in this connexion are the following:<sup>37</sup>

(a) Does there have to be an authoritative statement by a responsible government official or legislative body that a population policy has been adopted?

(b) May the goals of the policy be stated only broadly, or must they be precisely elaborated?

(c) Is a government statement alone sufficient, or must there be evidence that legislative measures have been adopted and machinery has been set up to implement the stated policy?

<sup>33</sup> Policies with respect to internal and international migration are discussed in chapters VI and VII respectively.

<sup>34</sup> Eldridge, “Population policies” (1968), p. 382.

<sup>35</sup> For example, Lyons assumes that “population policy refers primarily to population growth limitation based on a *voluntary fertility regulation concept*...”. See his “Population policies: a world overview” (1971). See also Nortman, “Population and family planning programs...” (1970), p. 12.

<sup>36</sup> United Nations, *The World Population Situation in 1970* (1971), chap. 7; Family Planning Federation of Japan, *Harmful Effects...* (1966); Acsádi, “Népességgpolitikai kérdések...” (1969); Raina, “Possible effects of public policy...” (1965), pp. 100-104.

<sup>37</sup> Several of these questions were suggested by Lyons’ article, “Population policies: a world overview” (1971).

(d) In the absence of a government statement, does Government support for (or non-interference with) the endeavours of private organizations to influence population trends constitute population policy?

(e) If the stated purpose for the establishment of a government family planning programme is to reduce the incidence of illegal abortions or to enable families to have the number of children they desire, rather than to reduce fertility or the rate of population growth, can this be defined as population policy?

(f) Do indirect measures to influence population trends (e.g. through increasing literacy, raising the status of women, and generally promoting social and economic development) constitute population policy?

(g) In the presence of measures tending to have opposing effects on population trends, how can the policy measures—if any—be distinguished from measures adopted for health, social or humanitarian purposes? An example would be a country which provides strong support for the family through family allowances, liberal maternity benefits and services for children, but which at the same time has a permissive policy towards abortion and contraception.

19. Given the various definitions of population policy discussed above, the difficulty of determining whether or not a Government is pursuing such a policy is apparent, as a population policy may remain unarticulated in a formal sense.<sup>38</sup> This does not necessarily imply the absence of an implicit policy, which, for a variety of reasons, a Government may not wish to make explicit. In this connexion, for example, a Government may not take any steps on a governmental level to implement its implicit policies, but may direct funds and other forms of support to private agencies working towards the desired ends. Or, legislative as well as other measures may be adopted to facilitate the desired demographic goals without these goals being spelled out. Another factor which may obscure a Government’s population policy is the fact that the scope of a Government’s activities is very broad, and its social or public programmes may actually result in what it considers to be undesirable population changes, if these programmes have been formulated to satisfy other considerations, e.g. to promote health, social justice and free choice among the population. It may therefore be difficult to disentangle the population aspects of its policy from these other elements.

20. Some writers have pointed out that the absence of specific measures to influence population is in itself a form of population policy. Parkes and his colleagues, for example, proposed that the implied assumption in such cases is that conditions and trends of population “should be taken as given—as a factor, variations in which are simply accepted”,<sup>39</sup> and Lyons has written that it may

<sup>38</sup> Writing of social policies, Kent has noted that while “social policies are sometimes enunciated in legislative acts, court decisions, and executive messages, more often [they]... must be inferred from actions; for social policy means the set of guidelines which people use in selecting courses of action and, by and large, these guidelines are not explicitly stated”. Kent, “Social services and social policy” (1966), p. 202. This statement may also be applied to population policy.

<sup>39</sup> Parkes *et al.*, eds., *Towards a Population Policy...* (1970), p. 7.

be unreasonable to say a Government has a population policy only when it acts, for in fact the inaction of another Government may also strongly imply a deliberate policy.<sup>40</sup>

21. Two recent studies have suggested that the main criteria which ought to be met in order for a Government to be counted as having a population policy are first, that there must be a declaration of policy at a responsible governmental level, and second, that some measures must have been taken to implement the policy.<sup>41</sup> In the present chapter the course adopted is to identify, wherever possible, those countries which have policies to raise or lower fertility as defined by these two criteria. However, it would be unduly restrictive to exclude discussion of programmes and measures which might affect fertility although they were not explicitly framed for policy reasons. Therefore, selected measures and programmes having the potential to significantly influence fertility have been included in the discussion where relevant, irrespective of the purpose for which they were formulated. Such measures may have been designed to facilitate voluntary parenthood, improve maternal and child health, and raise the status of women, to mention a few.

## 2. RELATIONSHIP TO SOCIAL AND ECONOMIC POLICY

22. Because of the close interrelationships between demographic, economic and social characteristics and changes, the formulation of government policies in any of these areas needs to be based on an understanding of the probable effects on other factors. Meade and others have pointed out that, owing to the insufficient attention given to the study of these interrelationships, policies with direct demographic effects (for example, those related to the medical services) and other social policies which have indirect demographic effects (such as those relating to education, family assistance, housing etc.) are determined without full consideration of the economic consequences of the demographic changes which they may cause. At the same time, economic and financial policies are often formulated without due regard for their demographic implications.<sup>42</sup>

23. Since population is only one of a multitude of areas of concern to Governments, it is often difficult, if not impossible, to distinguish the strictly demographic aspects of policy affecting population from the social aspects. At the same time, there may be apparent contradictions between policies formulated with different aims in mind. As an example of the first, a system of family allowances and other benefits to mitigate the burdens of child-bearing and rearing may be instituted to stimulate population growth, for humanitarian reasons, or both. As an example of the second, a Government pursuing a pro-natalist policy by encouraging large families through various incentives may at the same time support policies

which tend to lower fertility. Such a Government may permit or even provide family limitation materials and services to facilitate voluntary parenthood; abortion may be legalized as part of a health programme in order to counteract the health hazards associated with illegal abortion; and the same Government may also promote improvements in the status of women as an element of social policy, and may attempt to engage women in an active economic life as part of an economic policy for maximizing the labour force.

24. Several authors have commented on the inconsistencies which often appear in national policies in the demographic, economic, health and social fields and which result from the fact that policy is formulated in response to a variety of different needs and can rarely serve a single purpose. Eldridge explains that, for a variety of reasons, States are required to violate some of their interests while serving others, and that the decisions with which they are confronted frequently involve the weighing of one desirable aim against another. In her opinion, it is "small wonder that the body of national policy often contains contradictions and inconsistencies some of which are real and some of which are only apparent . . .".<sup>43</sup> Glass observed that "social policy is never single-minded and rarely fully consistent" and noted that "even if there is no inconsistency as regards major objectives, measures may nevertheless be incompatible as regards their effects".<sup>44</sup> The complex nature of society and the demands for democratic processes appear to make inevitable some contradiction of goals, but in order that national policy can reflect a certain degree of coherence, a harmonizing of conflicting interests must be achieved. Myrdal has argued that population policy must be weighed in relation to the many other values and goals of society, and that out of such a process socio-economic and demographic reforms can be fused into a whole.<sup>45</sup>

## 3. ETHICAL ISSUES

25. The right of each sovereign nation to formulate and pursue its own population policies has received wide recognition.<sup>46</sup> Such policies are conceived and implemented for what Governments consider to be the common good: the underlying reasons for a nation's wishing to influence demographic factors generally include the improvement of economic and social conditions, although at times political, military and power objectives have been dominant.

26. As nations have increasingly evolved policies with respect to fertility in recent years, there has been much concern and discussion as to the extent to which Governments may properly interfere in such matters, which involve the most intimate decisions on the part of individuals. A certain broad consensus has been reached that, while Governments have the right to formulate their own

<sup>40</sup> Lyons, "Population policies: a world overview" (1971).

<sup>41</sup> United Nations, *Measures, Policies and Programmes . . .* (1972), chap II, section A-2(a); Lyons, "Population policies: a world overview" (1972). The latter author was concerned only with population growth limitation policies, whereas the United Nations study aimed at identifying countries with pro-natalist policies as well.

<sup>42</sup> Meade *et al.*, "Demography and economics" (1970), particularly p. 25.

<sup>43</sup> Eldridge, *Population Policies: a Survey . . .* (1954), p. 4.

<sup>44</sup> Glass, "Foreword" (1954), p. iv.

<sup>45</sup> Myrdal, *Nation and Family . . .* (1945), pp. 103-104, 111-113.

<sup>46</sup> See, for example, United Nations General Assembly resolution 2211 (XXI); International Conference on Human Rights resolution No. XVIII on human rights aspects of family planning, Teheran, 12 May 1968.

policy in this area, persuasion and education, rather than coercion, should be employed to influence reproductive behaviour. National policies are thus aimed at the voluntary regulation of fertility, and most recent international policy statements emphasize the right of parents to decide the number of children that they will have and the intervals at which they will have them.<sup>47</sup>

27. In considering population policies for the United Kingdom, Parkes and his associates pointed out that the mention of "population policy" may evoke the terrifying prospect of governmental interference with the freedom of individual citizens in their most intimate personal decisions about family building. They proposed as a premise for decisions in this sphere that "any measures of 'population policy' should be based upon the freedom of individual citizens to determine the size of their family, subject only to the influence of such governmental measures as might by legitimate and acceptable means affect citizens' motives to have larger or smaller families".<sup>48</sup>

28. Other scholars have also made clear their opposition to coercive measures to induce the population to adopt contraceptive practice. Ovsienko, for example, has stated: "We are not opposed to producing contraceptive devices and supplying them to people who wish to use them, but we are opposed to the use of compulsion in this regard. In particular, we are opposed to extreme methods of reducing the birth rate, such as sterilization, which robs human beings of their dignity, has significant physiological and psychological effects on them, deprives them of their full worth and interferes with the full development of their personality."<sup>49</sup>

29. It has been emphasized by a number of writers that the freedom of families to have the number of children they desire—a basic precept of most family planning programmes—cannot be expected to yield automatically fertility levels or growth rates considered desirable on a national scale.<sup>50</sup> Coale has written: "We cannot count on the automatic effect of self interest to reduce the growth rate soon enough, even if contraception were universal and virtually perfect."<sup>51</sup> Kingsley Davis has also argued: "By stressing the right of parents to have the number of children they want, [family planning] evades the basic question of population policy, which is how to give societies the number of children they need. By offering only the means for *couples* to control fertility, it neglects the means for societies to do so."<sup>52</sup>

30. Recognizing the strong opposition to compulsory measures, Davis suggests as a solution that attractive

substitutes for family interests be developed. He would encourage factors leading to the postponement or avoidance of marriage, as well as those tending to limit reproduction within marriage. Among the measures mentioned for achieving these ends are a greater rewarding of non-familial roles, and the granting of certain economic advantages to single persons. In addition, he suggests payment to individuals who permit themselves to be sterilized, high fees for marriage licences, free abortion, a tax on children rather than tax exemptions for them, and a reduction of family allowances and of paid maternity leave. The provision of educational and employment opportunities for women equal to those for men would lead to a restructuring of the family and changes in the role of women.<sup>53</sup>

31. While Davis has for the most part avoided suggesting outright coercive measures, some other writers have considered the gravity of the population situation to be such as to warrant mass coercive action on the part of Governments in order to control population growth. Among the measures mentioned have been "mass use of antifertility agents (not yet invented) in the water supply or in staple foods; temporary sterilization of all girls at puberty and of women after each delivery by means of a time-capsule contraceptive . . . ; compulsory sterilization of males with three or more living children; compulsory abortions of illegitimate pregnancies."<sup>54</sup> Notestein, Kirk and Segal have specifically expressed their disapproval of such measures, stating that "coercive measures in control of family size intrude government prerogative into very private areas of life. One has only to recall the Nazi era in Europe to view with the greatest misgiving the adoption of any legislation giving government the authority for compulsory sterilization or mandatory control of family size."<sup>55</sup> Extreme measures have rarely been advocated by demographers, but since population policy is not necessarily formulated by demographers, nor even always based on their recommendations, it is important to take cognizance of all suggestions put forward—including those which may appear bizarre or offensive—for they may at some time receive serious consideration by Governments attempting to implement population policies.

32. It is clear from the various writings on the subject that the ethical criteria against which a given population policy ought to be evaluated have not yet been worked out; much serious and committed thought will be required for their development. The line between coercion and non-coercion is not easily determined, and is drawn

<sup>47</sup> General Assembly resolution 2211 (XXI); International Conference on Human Rights resolution No. XVIII on human rights aspects of family planning, Teheran, 12 May 1968.

<sup>48</sup> Parkes *et al.*, eds., *Towards a Population Policy* . . . (1970), p. 7.

<sup>49</sup> Ovsienko, "Influence of social and economic factors . . ." (1967), p. 91.

<sup>50</sup> See, for example, Sauvy, *La prévention des naissances* . . . (1962), pp. 88-89.

<sup>51</sup> Coale, "Should the United States start a campaign for fewer births?" (1968), pp. 468-469.

<sup>52</sup> Davis, "Population policy: will current programs succeed?" (1967), p. 738.

<sup>53</sup> *Ibid.*, pp. 737-738.

<sup>54</sup> Notestein, Kirk and Segal, "The problem of population control" (1969), p. 164; for a listing of involuntary fertility control measures see Berelson, "Beyond family planning" (1969), p. 2; Dyck, "Population policies and ethical acceptability" (1971). It should be noted that the above authors do not approve of such measures. See also the discussion of involuntary fertility control measures in Ehrlich and Ehrlich, *Population, Resources, Environment* . . . (1970), pp. 254-256.

<sup>55</sup> Notestein, Kirk and Segal, "The problem of population control" (1969), p. 166.

at a different point by different writers.<sup>56</sup> Berelson has raised the question of how much in ethical values a society should be willing to forego for the solution of a great social problem.<sup>57</sup> The problems posed are formidable and involve choosing from among several goods, deciding which is the least of a number of evils, determining how much of a sacrifice the present generation should make for the presumed good of future generations and, in Berelson's words, deciding "how best to reconcile individual and collective interests".<sup>58</sup> Among the propositions advanced for consideration in developing an ethical population limitation policy are that such a policy should move towards compulsion only as a last resort; that it would not penalize innocent children for the mistakes of their parents; and that it would not impose further hardship on the already disadvantaged, by denying them certain benefits if they over-reproduce.<sup>59</sup> While Berelson acknowledged that "the worse the problem, the more one is willing to 'give up' in ethical position in order to attain 'a solution'",<sup>60</sup> Coale has cautioned that "pre-occupation with population growth should not serve to justify measures more dangerous or of higher social cost than population growth itself",<sup>61</sup> and Dyck concluded that "it would be the ultimate irony of history if through our population policies we should lose precisely what we seek to save, namely, human rights and welfare".<sup>62</sup>

## B. History of policies affecting fertility up to the end of the Second World War

33. Until relatively recently in man's history, the natural increase in the population has been slow. Although fertility has been high, mortality has also been high, and

<sup>56</sup> Blake has implied that, in the absence of overt coercion, people may feel that their reproductive behaviour is voluntary. Nevertheless, implicit pro-natalist pressures exist which guide their choices in this sphere. In the face of these existing "pro-natalist incentives and coercions", she suggests a restructuring of choices and rewards so that individuals will "volunteer" for a different type of fertility behaviour. Blake, "Comment" (1970), p. 458.

<sup>57</sup> Berelson, "Beyond family planning" (1969), p. 8.

<sup>58</sup> *Ibid.* In this connexion Callahan has stated: "To decide that a particular kind of policy is needed (e.g. a voluntarist family planning policy or a quasi-coercive population control policy) is to make certain judgments about the relative ranking of important values, as well as to say something about the means appropriate to achieve final ends. All those judgments, in turn, presume that one has decided which values and goods are relatively more or less important for the living of a decent human life." Callahan, "Ethical issues" (1971), pp. 45-46. See also Coale, "Should the United States start a campaign for fewer births?" (1968), p. 471.

<sup>59</sup> Berelson, "Beyond family planning" (1969), pp. 8-9. See also National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications*, vol. 1 . . . (1971), p. 81; Notestein, "Zero population growth" (1970); Day and Day, *Too Many Americans* (1964), p. 243. In Coale's opinion, "A program for increasing the number of children people want is more readily reconciled with humane goals than is a program for diminishing the number they want". This is because a pro-natalist policy usually provides certain benefits to families, whether in cash or in kind, whereas the converse of these measures cannot be considered an ideal means for lowering fertility. Coale, "Should the United States start a campaign for fewer births?" (1968), p. 473.

<sup>60</sup> Berelson, "Beyond family planning" (1969), p. 8.

<sup>61</sup> Coale, "Should the United States start a campaign for fewer births?" (1968), p. 472.

<sup>62</sup> Dyck, "Population policies and ethical acceptability" (1971), p. 636.

as stated in chapter V, the accumulation of many years' natural increase has often been swept away suddenly and rapidly as a result of famines, epidemics and wars. In order to ensure group survival, various customs and practices evolved which were conducive to high fertility. Among these were early and universal marriage, polygamy, and the practice of the levirate. The importance of bearing many children was impressed upon the populace by means of fertility rites as well as divine exhortations to be fruitful and multiply.

34. Official policies concerned with fertility trends appeared somewhat sporadically before the twentieth century, although many laws and measures affected fertility indirectly. Efforts to influence fertility were almost always "pro-natalist", that is, they aimed at increasing the birth rate.<sup>63</sup> The history of such policies is important as much for the light it casts on the conditions which have shaped them as for their demographic effects. These conditions lie partly in demographic trends and partly in changes in ideology, in economic circumstances and in the administrative capacity of Governments. Among the principal elements of pro-natalist policy were propaganda for bringing about the desired behaviour, the proscription of abortion, infanticide and contraception, the encouragement of marriage, and support for parents of large families.

35. Pro-natalist policies have been adopted for a variety of motives, including religious, military and those of power and economic considerations. Religious doctrines and institutions have exercised direct influence on behaviour determining fertility as well as indirect influence upon secular policies in this area. In some periods, such as that of the Middle Ages in Christian countries, the authority of the priesthood pre-empted areas of marital conduct now regulated by secular policy. In the ancient world, doctrines enjoining men to procreation were prevalent in China, India and Persia, though Buddhist and, less conclusively, Hindu thought held celibacy to be a higher ideal, if not one that most could attain.<sup>64</sup>

36. Religious teaching made procreation an element in the spiritual and social welfare of the individual and family as well as of the community. Military authority made it a duty to the State and its ruler. War and empire required, and could sustain, a growing population.<sup>65</sup> In classical Greece the warlike state of Sparta encouraged child-bearing for national ends, though favouring abandonment of unfit infants, while in the more democratic and commercial environment of Athens, and elsewhere, family limitation by abortion and infanticide were apparently practised and sanctioned. A number of Greek writers, most notably Plato and Aristotle, favoured policies for maintaining the population size considered to be most desirable for the city-state.<sup>66</sup>

<sup>63</sup> Glass, "Population growth and population policy" (1965), p. 4; Eldridge, "Population policies" (1968); United Nations, *The World Population Situation in 1970* (1971), chap. 7.

<sup>64</sup> Stangeland, *Pre-Malthusian Doctrines of Population* (1904), pp. 40-55; and Gonnard, *Historia de las doctrinas de la población* (1969), pp. 11-21. See also chapter III, section A.

<sup>65</sup> Gonnard, *Historia de las doctrinas de la población* (1969), p. 19.

<sup>66</sup> Stangeland, *Pre-Malthusian Doctrines of Population* (1904), pp. 18-28.

37. The best known of ancient population policies were those of the Roman emperor Augustus, embodied principally in the *Lex Julia et Papia-Poppea*, enacted between 18 B.C. and A.D. 9. These policies penalized the celibate or childless and favoured parents in the application of inheritance law and eligibility for public office. They were intended to restore the fertility of the senatorial class, and later emperors extended their application.<sup>67</sup> The effects of Roman policy on fertility cannot be determined, for, while the population of the early Empire probably rose, little is known about fertility trends or differentials (see chapter II, section B). Some historians have claimed that these laws were ineffective and they were eventually abrogated in the reign of Constantine.<sup>68</sup> The Augustan laws are most remarkable in that they modified the earlier social structure and hence the social and legal context of marriage and fertility. They served as a model for population policy for later periods.<sup>69</sup>

38. Less is known of population policies adopted by the rulers of other States in the ancient world, although values and customary practices both favourable and unfavourable to fertility were present throughout pre-modern times.<sup>70</sup> Moreover, there is evidence of an awareness of the relationship between population and resources and of the need for adjustment of that relationship.<sup>71</sup> However, the fluctuations of population in response to harvests and disease reduced the need to modify fertility, while the limited administrative capacity of rulers and the inertia of custom hampered the effectiveness of measures intended to alter fertility levels and trends in pre-modern societies.<sup>72</sup>

39. These factors and the influence of the Christian church, which emphasized other-worldly values, the ideal of celibacy, and ecclesiastical against national authority, left little scope for secular population policies in Western countries in the Middle Ages. Christian condemnation of abortion and infanticide may have balanced the advocacy of celibacy and restraint, while at a local level the power of feudal lords and guilds sometimes extended to regulation of marriage,<sup>73</sup> but these influences did not constitute national population policies.

40. Such policies were revived with the growth of more centralized monarchical States in Europe. Heavy mortality caused by the Black Death in the fourteenth century and the slow recovery of numbers encouraged populationist views and policies. In France, tax exemption and other privileges were employed to encourage immigration and fertility beginning in the late thirteenth century.<sup>74</sup> More comprehensive pro-natalist policies emerged in

France and Spain in the seventeenth century, supported by mercantilist doctrines which advocated state intervention to secure the wealth and power believed to derive from a large population (see chapter III, section B). In Spain, an edict of 1623, intended to restore the population losses of the previous century, granted tax exemptions to those who married young and raised large families. Its execution seems to have fallen short of its intention, although it remained in force until the end of the eighteenth century.<sup>75</sup> French policy reached its apogee under Louis XIV's minister, Colbert, whose 1666 edict provided tax exemptions for early marriage and pensions for the fathers of ten or more living legitimate children, and tried to limit religious celibacy. The secular and economic goals of this policy were undermined by poor administration and by the military and religious policies of Louis XIV, which led to the emigration of Protestants and a period of high mortality and population decline following the revocation of Colbert's measures in 1683.<sup>76</sup>

41. Other European States, among them Savoy, Austria, Prussia and other German States, adopted a variety of pro-natalist measures in the seventeenth and eighteenth centuries. These included discrimination in favour of married men or fathers in admission to trades or public offices and in inheritance laws, and the removal of limitations on the right of soldiers to marry, and on the rights of illegitimate children.<sup>77</sup> Abortion and infanticide were forbidden by law in European States and contraceptive practices were condemned by religion, but there is little information on the effectiveness of these policies or on the use of these means to restrict family size.

42. Many Russian statesmen and scientists of the seventeenth and eighteenth centuries generally favoured an increasing population.<sup>78</sup> but it was Lomonosov who outlined and submitted to the Government the first comprehensive population policy.<sup>79</sup> In his memorandum on the "preservation and multiplication of the Russian people" (1761) he suggested that the grandeur, opportunity and wealth of the State lay in its people and their productivity. He pleaded for better conditions for infants in order to lower infant mortality, for improvements in medicine and public health, for health education and education in general. He condemned traditional religious beliefs and prejudices detrimental to health and suggested that adequate nutrition and diet were essential for a healthy population and particularly for youth. Assuming that his reforms would be implemented, he anticipated a more rapid growth of the Russian population.<sup>80</sup>

<sup>67</sup> *Ibid.*, p. 30; Glass, *Population Policies and Movements* ... (1940), pp. 86-89.

<sup>68</sup> Stangeland, *Pre-Malthusian Doctrines of Population* (1904), pp. 35-38.

<sup>69</sup> Nisbet, *Tradition and Revolt* (1968), pp. 211-217.

<sup>70</sup> Carr-Saunders, *The Population Problem* ... (1922), pp. 135-307; and Himes, *Medical History of Contraception* (1936; 1963 ed.), pp. 3-200.

<sup>71</sup> See chapter III on Chinese and Greek thought.

<sup>72</sup> Russell, "Demographic values in the Middle Ages" (1949).

<sup>73</sup> *Ibid.*

<sup>74</sup> Spengler, *French Predecessors of Malthus* ... (1942), p. 7.

<sup>75</sup> Glass, *Population Policies and Movements* ... (1940), pp. 90-91.

<sup>76</sup> *Ibid.*, pp. 92-94; and Spengler, *French Predecessors of Malthus* (1942), pp. 26-27.

<sup>77</sup> Glass, *Population Policies and Movements* ... (1940), pp. 95-96. Knodel, however, pointed out that pro-natalist policies in the German States during this period were not unqualified, and certain restrictions on marriage were imposed, as concern about pauperism developed. See his "Law, marriage and illegitimacy ..." (1967), pp. 279-280.

<sup>78</sup> Valentei, *Problemy narodonaseleniia* (1961), pp. 41-55.

<sup>79</sup> Lomonosov, mentioned in *ibid.*, p. 48.

<sup>80</sup> Valentei, *Problemy narodonaseleniia* (1961), pp. 48-49.

43. In Japan, too, measures designed to stimulate population growth were adopted during the eighteenth and nineteenth centuries, but their effects were to some extent checked by widespread resort to infanticide, abortion and delay of marriage. Neither exhortation, attacks on anti-natalist practices nor positive assistance to parents seems to have been enough to remedy the general stagnation of population in the absence of more fundamental economic and social changes.<sup>81</sup>

44. As mortality began to decline in response to the improved living conditions made possible by the agricultural and industrial revolutions, population pressures built up in certain areas and stimulated efforts to control further growth. In a number of German States, where population was growing rapidly in agricultural areas in the nineteenth century, legislation was enacted empowering the State or the local communities to restrict the right of the poor to marry. These laws seem to have led to small reductions in over-all fertility, at the cost of higher illegitimacy rates, but they were mostly repealed about 1870 when German unification, economic expansion and emigration began to relieve the earlier crisis.<sup>82</sup>

45. Although the work of Malthus inspired remedies for pauperism, his writings and those of later economists reinforced the prevailing governmental *laissez-faire* approach to population questions in the nineteenth century. Moderate rates of natural increase, accompanied by economic growth and emigration, made this a realistic attitude. However, a number of conditions set the stage for a revival of population policies in the twentieth century. The intensification of nationalism and military insecurity after the First World War together with the marked success with which individuals were able to limit family size in the developed countries—with a consequent drop in birth rates to levels which were considered alarmingly low in a number of countries—encouraged measures favouring higher fertility.

46. By the 1930s declines in fertility had caused gross reproduction rates to fall below unity in such countries as Austria, England and Wales, Luxembourg, Norway, Sweden and Switzerland, and to near unity in France and Germany.<sup>83</sup> These trends stimulated concern in some of these countries about eventual depopulation.<sup>84</sup> The economic depression of the early 1930s accentuated the problems of large families and the disincentives to parenthood. The differing political philosophies and goals of Governments shaped a variety of responses to this situation. In many countries no deliberate population policy was adopted, but where action was taken, it generally aimed at encouraging fertility and increasing the capacity of families to raise children in accordance with higher living standards.

<sup>81</sup> Taeuber, *The Population of Japan* (1958), pp. 29-33.

<sup>82</sup> Glass, "Malthus and the limitation of population growth" (1953), pp. 39-47; and Knodel, "Law, marriage and illegitimacy . . ." (1967).

<sup>83</sup> United Nations, *Population Bulletin* . . . (1965), p. 93; and —, *Demographic Yearbook, 1965* . . . (1966), table 30.

<sup>84</sup> Spengler, *France Faces Depopulation* (1938), p. 62; Myrdal, *Nation and Family* (1945), p. 23; Glass, *Population Policies and Movements* . . . (1940), pp. 13, 270.

47. In France, official recognition was given to the pro-natalist movement in 1919 by the establishment of a governmental council whose function it was to study questions bearing on fertility and mortality. One element in official policy was legislation prohibiting distribution of birth control propaganda and devices in 1920 and tightening the prohibition of induced abortion in 1923.<sup>85</sup> In 1932, the Government of France took control of the family allowances system—which had been almost exclusively voluntary up to that date, supported only by employers' contributions—and in 1939 introduced the *Code de la Famille* which incorporated and enlarged existing family welfare and pro-natalist measures.<sup>86</sup> Allowances were extended to all economically active persons, and marriage loans, premiums on the birth of a first child and other forms of aid for parents were provided.<sup>87</sup> The policy of Belgium developed along similar lines in this period, though the measures taken were less comprehensive than those of the *Code de la Famille*.<sup>88</sup>

48. The impact of the policies of Belgium and France on fertility appears to have been small in the period before the Second World War, perhaps because of the insecurity and economic problems of the period and the difficulty of allocating sufficient resources to achieve the desired goals.<sup>89</sup> Spengler concluded after an exhaustive study that the family allowance system had failed, up to 1938, to stimulate an increase in the birth rate of France.<sup>90</sup> This was in accord with the views of other scholars, including Glass, who noted that the reason for the failure was twofold: the allowances were inadequate to cover the cost of child care; and the trend towards smaller families altered economic and cultural patterns and, therefore, was not readily reversible.<sup>91</sup>

49. The policy developed in Sweden in the late 1930s was guided by the recommendations of a government commission appointed in 1935 in response to public concern about low fertility and the economic situation of large families. It differed from that in France and Belgium in that it provided benefits in kind rather than in cash, and it aimed at least to keep population constant. Moreover, despite its pro-natalist intent, it allowed sterilization and abortion under certain strictly defined circumstances, and also permitted the use of contraception, in accordance with its commitment to individual freedom, as well as to facilitate the spacing of children and to

<sup>85</sup> Glass, *Population Policies and Movements* . . . (1940), pp. 150, 159.

<sup>86</sup> *Ibid.*, p. 103; France, Haut comité consultatif de la population et de la famille, *La population française*, vol. 1 (1959), p. 63 and chap. 7.

<sup>87</sup> For details of the development of the policy of France to 1939, see Glass, *Population Policies and Movements* . . . (1940), pp. 99-124, 145-152, 165-172, 212-218.

<sup>88</sup> Glass, *Population Policies and Movements* . . . (1940), pp. 124-142, 152-156, 172-177.

<sup>89</sup> For a discussion of the limitations and effects of French and Belgian policies, see Glass, *Population Policies and Movements* . . . (1940), pp. 177-212.

<sup>90</sup> Spengler, *France Faces Depopulation* (1938), pp. 254-255.

<sup>91</sup> Glass, *Population Policies and Movements* . . . (1940), pp. 204-209, 370-372.



protect maternal health.<sup>92</sup> Measures affecting fertility which were adopted in other Scandinavian countries in the late 1930s and early 1940s were, as in Sweden, less consistently pro-natalist. They reflect greater support for the growth of public services and a more liberal religious climate than existed in many other European countries.<sup>93</sup>

50. In the Soviet Union, policies affecting fertility followed a less clearly defined course in the 1920s and 1930s. Marxist thought has emphasized the dependence of fertility trends on the development of the social and economic system and the status of women and, in accordance with this view, measures taken by the Soviet Union that affect fertility have not been primarily directed at quantitative demographic goals. However, the policies adopted from 1936 to strengthen marriage, aid child-rearing and restrict the practice of abortion, do appear to have been a response to the sharp drop in fertility that occurred in the early 1930s. This drop was at least partly caused by widespread recourse to induced abortion.<sup>94</sup> The birth rate rose again in the late 1930s, but the Second World War caused severe loss of life and reduced fertility and new pro-natalist measures including an expanded system of family allowances and medals for the mothers of large families were introduced in 1944.<sup>95</sup>

51. In Italy from 1926 and in Germany from 1933, pro-natalist measures were linked with the nationalist and expansionist policies of the governments led by Mussolini and Hitler. A policy of discouraging contraception and prohibiting induced abortion was adopted in both countries and applied with great rigour in Germany.<sup>96</sup> German policy also emphasized financial aid to parents via marriage loans which were cancelled after four births, tax discrimination, grants and services for the support of children. In both countries propaganda and material rewards favoured motherhood as a woman's primary contribution to national strength. In Germany, expansionist, eugenic and racial policies were associated with population policy.<sup>97</sup> German pro-natalist measures do seem to have contributed to higher marriage and fertility rates after 1933, although their influence cannot

readily be separated from the effects of general economic recovery.<sup>98</sup>

52. Spain introduced family allowances, with pro-natalist objectives, in 1938.<sup>99</sup> Japan adopted a range of pro-natalist measures in 1941. The legislation was passed after a period of fertility decline that had dissipated fears of overpopulation and after a decade of expansionist military rule.<sup>100</sup>

### C. Policies affecting fertility in the more developed countries after the Second World War

53. The national conditions that constitute the basis for population policies change, leading to modifications in the policies themselves as well as in the measures designed to support them.<sup>101</sup> In most Western countries there was a recovery of the birth rate in the early post-war period, although the onset, magnitude and duration of the recovery varied from country to country. While the increase in fertility may have served to allay some of the earlier fears of eventual depopulation, it could not be known to what extent the increase was a temporary phenomenon possibly to be followed by a continuation of the downward trend in evidence before the war.<sup>102</sup> In general, where population policies were in effect in the developed countries, in the post-war period, they were intended at least to sustain existing growth rates, if not to increase them.

54. As suggested earlier, in the absence of specific government statements concerning population policy, it is often difficult to deduce from an examination of a country's measures, programmes and laws what its population policy is.<sup>103</sup> This difficulty is particularly apparent in the post-war period, which saw a rapid expansion of social security and welfare legislation—including many measures affecting the family which may have had demographic repercussions, although they were often inspired largely by other than demographic motives. Moreover, the development of progressive social policy led to the adoption by Governments of a series of measures which may have been inconsistent so far as their effects on fertility were concerned. Thus, existing side by side might be certain measures which facilitated access to the means of controlling fertility, and which could be considered anti-natalist in effect and, on the other hand, a wide variety of measures aimed at easing the constraints against child-bearing, and thus pro-natalist. The principle

<sup>92</sup> Gille, "Recent developments ..." (1948), pp. 3-4. See also Myrdal, *Nation and Family* ... (1945), particularly pp. 109-111, 116, 165, 197, 205-212.

<sup>93</sup> Glass, *Population Policies and Movements* ... (1940), pp. 314-343; Eldridge, *Population Policies: a Survey* ... (1954), pp. 99-101. For policies in Denmark, Norway and Finland respectively, see the following articles: Doublet, "Politique sociale et démographique au Danemark" (1946); Doublet and Palmström, "Problèmes démographiques en Norvège" (1946); Perdon and Tabah, "La politique sociale et démographique en Finlande" (1947).

<sup>94</sup> Uralnis, *Rozhdaemost' i prodolzhitel'nost'* ... (1963), pp. 23-28. See also Lorimer, *The Population of the Soviet Union* ... (1946), pp. 126-128.

<sup>95</sup> Mauldin, "Fertility control in communist countries ..." (1960), pp. 179-187; Uralnis, *Rozhdaemost' i prodolzhitel'nost'* ... (1963), pp. 29-31.

<sup>96</sup> Smulevich, *Kritika burzhuaznikh teorii* ... (1959), pp. 340-345. Lack of effective enforcement, however, blunted the impact of laws against abortion in most countries, while laws directed against contraceptives were even harder to enforce.

<sup>97</sup> *Ibid.*, pp. 203-208.

<sup>98</sup> On Italian and German policies and their effects up to 1939, see Glass, *Population Policies and Movements* ... (1940), pp. 219-313. On German fertility in the 1930s, see Hajnal, "The analysis of birth statistics ..." (1947). On Austrian policies, see Doublet, "Politique démographique en Autriche" (1947).

<sup>99</sup> Eldridge, *Population Policies: a Survey* ... (1954), pp. 14-15.

<sup>100</sup> Taeuber, *The Population of Japan* (1958), pp. 364-369.

<sup>101</sup> See, for example, United Nations, *Measures, Policies and Programmes* ... (1972), chap. II, section A-3.

<sup>102</sup> In fact, by the late 1960s, the birth rate in some of these countries was approaching or had fallen below that of the 1930s. See United Nations, *Demographic Yearbook, 1970* ... (1971), table 13.

<sup>103</sup> Eldridge has written that even "a nation's stated policy is not necessarily an exact statement of its purposes of the moment". Eldridge, "Population policies" (1968), p. 382.



of voluntary parenthood, which various Governments wished to promote, was often supported by liberal abortion laws (which may have initially been designed as health measures),<sup>104</sup> easy access to contraceptives, and sex education in the schools. As is seen in the following discussion, liberalization in these areas appeared even in some of the countries whose governments favoured an increase, or at least stability, of population growth rates. Among the many measures of social policy adopted either with or without the specific intent to influence demographic trends, were provisions for family allowances, preferential employment for heads of families, reduction of taxation on income as family responsibilities increase, aid to mothers (particularly working mothers), and facilities for the care of school-age and pre-school children.<sup>105</sup> In addition, some of the countries granted marriage loans, subsidized public transportation for children below certain ages, underwrote housing and the cost of clothing, enacted measures to protect illegitimate children, and so on.<sup>106</sup>

# 1. POLICIES AND MEASURES IN SELECTED COUNTRIES

55. France probably comes closer to having implemented a comprehensive national policy aimed at increasing fertility than any of the low-fertility countries. The policy was substantially reconstructed in 1939 with the *Code de la Famille* and strengthened in 1945<sup>107</sup> after the birth rate had fallen below 15 per 1,000 population in 1940-1944.<sup>108</sup> The Government explicitly stressed, as the basis for its policies, the demographic crisis and the need to reverse the decline of fertility.<sup>109</sup> In addition to an extensive family allowance scheme, and various other benefits in aid of the family, there were laws banning the sale, advertisement or distribution of contraceptives and restricting abortion.<sup>110</sup> While the distribution of contraceptives was legalized in 1967 in response to public demand, the regulation against commercial advertisement or propaganda for contraceptives remained in force. But to counteract this relaxation of the laws, in 1969 a revised family allowance scheme providing stronger support for large families was approved.<sup>111</sup>

<sup>104</sup> Taeuber, "Policies, programs, and the decline ..." (1964), p. 100.

<sup>105</sup> Vostrikova has stated that society has a responsibility for enabling women to combine motherhood with an active and creative participation in economic, cultural, and scientific pursuits. Vostrikova, "Female fertility and methods ..." (1967), p. 243.

<sup>106</sup> See United Nations, *Measures, Policies and Programmes* ... (1972), chap. I, section A-4.

<sup>107</sup> France, Haut comité consultatif de la population et de la famille, *La population française*, vol. 1 (1955), pp. 65-95. See also Glass, *Population Policies and Movements* ... (1940), p. 122; Watson, "Population policy in France ..." (1954), pp. 46-54.

<sup>108</sup> United Nations, *Demographic Yearbook*, 1969 ... (1970), p. 262.

<sup>109</sup> France, "Ordonnance n° 45-323 ..." (1945).

<sup>110</sup> Doublet, "Family allowances in France" (1948), pp. 223-239; Girard and Bastide, "Une enquête sur l'efficacité ..." (1958), pp. 39-40; France, *Codes de la Sécurité Sociale* ... (1965), pp. 738, 831; Watson, "Population policy in France ..." (1954); and her "Birth control and abortion ..." (1952).

<sup>111</sup> United Nations, *Measures, Policies and Programmes* ... (1972), chap. II, section A-1.

56. As noted above, a government commission of Sweden, prior to the Second World War, recommended that the nation should aim at least at stability of numbers,<sup>112</sup> but it specified the principle of voluntary parenthood as the focus of its policy. Myrdal acknowledged the conflict, but asserted that the dilemma of wanting both increased birth control and increased fertility was one to which solutions would hopefully be found which were in harmony with humanitarian, democratic practice.<sup>113</sup> Swedish policy, while aiming to keep the birth rate from falling, gives precedence to considerations of individual welfare and voluntary parenthood. Among the measures which support both the pro-natalist aims and personal welfare are family allowances, marriage loans and a system of substantial supplementary services and payments in kind, including maternal and child welfare centres, housing grants, free school meals and compulsory maternity leave. At the same time, contraceptive advice as well as contraceptives are readily available, sex education is a standard part of the school curriculum, and abortion and sterilization may be authorized on rather broadly defined grounds.<sup>114</sup>

57. Other developed countries besides France and Sweden have shown awareness of population problems in a number of ways, including the appointment of commissions to study population questions, and the enactment of legislation which may have implicit demographic aims. Some countries have adopted in varying degrees measures similar to those of France and Sweden. In these measures considerations of welfare often take precedence over demographic considerations, even though the general attitude may be pro-natalist. Such, for example, is said to be the case in Denmark, Finland, Norway and the United Kingdom.<sup>115</sup>

58. In the United Kingdom, where the net reproduction rate barely exceeded unity in the early 1950s,<sup>116</sup> it was deemed desirable to keep fertility at a level which would at least be sufficient to prevent population decline. Acceptance of the principle of voluntary planned parenthood implied, on the one hand, that contraceptive devices should be made freely available and, on the other, that social and economic obstacles to parenthood should, as far as possible, be removed.<sup>117</sup> The Royal Commission on Population had recommended that the provision of family planning advice should be among the duties of the National Health Service,<sup>118</sup> and the National Health Service (Family Planning) Act of 1967 made such services

<sup>112</sup> Sveriges officiella utredningar, *Slutbetönkande* (1938), mentioned in Myrdal, *Nation and Family* ... (1945), p. 168.

<sup>113</sup> Myrdal, *Nation and Family* ... (1945), pp. 103-104, 109-111, 188.

<sup>114</sup> Eldridge, "Population policies" (1968), p. 385; see also Gille, "Recent developments in Swedish population policy", parts I and II (1948); and his "Demographic aspects of Scandinavian family welfare policy" (1955).

<sup>115</sup> Eldridge, "Population policies" (1968), pp. 384, 386.

<sup>116</sup> United Nations, *Demographic Yearbook*, 1965 ... (1966), table 30.

<sup>117</sup> Grebenik, "Population policy in Great Britain" (1955), p. 48. For an earlier statement on population policy see United Kingdom, Royal Commission on Population, *Papers*, vol. 3 ... (1950), pp. 60-61.

<sup>118</sup> Glass, "Western Europe" (1966), p. 205.

available.<sup>119</sup> While advice on family planning is provided free, a charge is made for prescriptions, except in cases where the physician considers that contraception is required for medical reasons.<sup>120</sup> A liberalized abortion act was also adopted in 1967.<sup>121</sup> While social services of a wide variety have been instituted in the United Kingdom, they have generally been intended as welfare measures rather than to achieve any particular level of fertility, and it cannot be said that a population policy has existed. In recent deliberations on population policy in the United Kingdom, a group of scholars stressed that explicit recognition should be given to demographic considerations in the discussion and formulation of official social and economic policies.<sup>122</sup>

59. Yugoslavia in the post-war period adopted a system of family allowances which could be considered moderately pro-natalist.<sup>123</sup> At the same time, however, abortion legislation was gradually liberalized so as to eventually permit termination of pregnancy on social and economic as well as on medical grounds and family planning services and education in family planning were considerably expanded.<sup>124</sup> In April 1969, the Federal Assembly passed a resolution which recognized the right of parents to decide the number and spacing of their children as a basic human right, the attainment of which would benefit both the parents and society. The resolution noted the obligation of society to provide the knowledge and means for family planning, and the need for a wide participation of educational, health, social security and other institutions to realize the stated goals.<sup>125</sup> Concern was expressed about the high incidence of abortion and measures were proposed to encourage contraception as the preferred means of family planning.<sup>126</sup>

60. According to Berent, moderately high rates of population growth were considered desirable by the Socialist countries of Eastern Europe in the post-war period, and many social measures gave support to large families.<sup>127</sup> It was only in the early and mid-1960s, however, that the need for a premeditated population policy began to be felt, partly in response to fertility declines. Citing a Polish source, Berent indicated that the countries committed to an explicit pro-natalist population policy (by 1970) were Bulgaria, Czechoslovakia, the

German Democratic Republic, Hungary and Romania with Poland and the Soviet Union expected to join this group soon.<sup>128</sup> In response to a United Nations inquiry, the Soviet Union stated that its Government was "interested in increasing the total population of the country, since it goes on the principle that under Socialist economic conditions, population increase represents one of the most important factors in the constant growth of social wealth and prosperity of all members of society".<sup>129</sup>

61. As in Sweden and the United Kingdom, the Governments of most of the Eastern European countries and the Soviet Union aim to mitigate the burden that child-rearing imposes upon parents and to aid individuals to space births in accordance with their wishes and limit their progeny to the number desired. Consequently, measures exist to facilitate birth spacing and limitation on the one hand, while on the other, policies are in force which encourage large families. Where policy concern is specified as relating both to the growth of population and to the well-being or quality of the inhabitants,<sup>130</sup> it is not a simple matter to delineate the population aspects of the policy.<sup>131</sup> A clear demographic policy appears to have been in force in Romania, however, since 1966, the aim being to reverse the course of the birth rate, which had dropped to 14.6 in 1965. Among the steps taken to support this policy were the rescission of the previously liberal measures governing abortion and contraceptives; the levying of taxes against childless persons over 26 years old, whether married or not; and the strengthening of family allowances and related measures.<sup>132</sup>

62. Japan occupies a unique position among the world's developed nations because of the rapidity of the decline in its birth rate in the post-war period. In the decade 1947-1957, the birth rate was halved, from 34.3 to 17.2 per 1,000 population.<sup>133</sup> This precipitous decline was accomplished, not by means of an official Government population control policy, but through measures which made the means of birth limitation legal and available to a population which was already very favourably disposed towards birth control.<sup>134</sup> Although the

<sup>119</sup> United Nations, *Measures, Policies and Programmes ...* (1972), chap. II, section A-1.

<sup>120</sup> Fox *et al.*, "Family planning ..." (1970), pp. 34-35.

<sup>121</sup> United Nations, *Measures, Policies and Programmes ...* (1972), chap. II, section A-1.

<sup>122</sup> Parkes *et al.*, eds., *Towards a Population Policy ...* (1970), p. 9.

<sup>123</sup> Eldridge, *Population Policies: a Survey ...* (1954), p. 35.

<sup>124</sup> *Ibid.*, p. 103; Mehlan, "The socialist countries of Europe" (1965), pp. 218-220; Rusinow, *Population Review ...* (1970), pp. 8-9. Recent legislation in Yugoslavia on health insurance authorized the provision of free contraceptives to all citizens. *Ibid.*, p. 9.

<sup>125</sup> United Nations, "Governmental policy statements on population ..." (1970), p. 20.

<sup>126</sup> Rusinow, *Population Review ...* (1970), p. 9.

<sup>127</sup> Berent, "Causes of fertility decline in Eastern Europe ..." (1970), p. 285. Kvasha has suggested that if a moderate rate of population growth is considered to be desirable, policy should be directed towards achieving the three-child family. See his "O nekotorykh instrumentakh ..." (1968), pp. 64-72.

<sup>128</sup> Berent, "Causes of fertility decline in Eastern Europe ..." (1970), pp. 285-287. David has written that the Socialist countries of Eastern Europe all profess to being pro-natalist. See his *Family Planning and Abortion in the Socialist Countries ...* (1970), p. 12. Kučera, while observing that "Czechoslovakia officially pursues a birth-promoting population policy, proclaimed on numerous occasions by the Government and by the political organs ever since 1945 ...", indicates at the same time that proclamations in themselves are of little avail unless accompanied by measures for attaining the desired ends. See his "Population policy of Czechoslovakia" (1968).

<sup>129</sup> United Nations, *Inquiry among Governments ...* (1964), p. 13.

<sup>130</sup> See, for example, Srb, "Population development ..." (1962), pp. 156-157; Kučera, "Populační politika ..." (1968); Mehlan, "Reducing abortion rate ..." (1967); and his "Abortion in Eastern Europe" (1970); Acsádi, "Népességpolitikai kérdések ..." (1969); and Ferenbac, "Creșterea natalității ..." (1967), p. 101.

<sup>131</sup> David, *Family Planning and Abortion in the Socialist Countries ...* (1970), pp. 251-252.

<sup>132</sup> *Ibid.*, pp. 21, 127-135.

<sup>133</sup> Kono, "Demographic glimpses into Japan" (1967), p. 16.

<sup>134</sup> Muramatsu, "Japan" (1966); his "Japan: miracle in East Asia" (1969); and his "Policy measures and social changes ..." (1967).

Japanese Government has never adopted an official anti-natalist policy,<sup>135</sup> high rates of growth in the period following the Second World War gave rise to concern, with the result that efforts of both private and government groups to reduce fertility were permitted beginning in 1951.<sup>136</sup>

63. The first important measure affecting fertility in Japan in the post-war period was the Eugenic Protection Law of 1948 which completely reversed the previous restrictive abortion law. The Law was passed primarily to protect maternal health, which had suffered because of the wide prevalence of illegal abortions, and large numbers of abortions have been performed in accordance with its provisions.<sup>137</sup> In 1952, a programme to promote contraception was instituted with the stated purpose of decreasing the frequency of induced abortion, which was believed to have an adverse effect on health.<sup>138</sup>

64. Commenting on the fact that Japan's total fertility rate and net reproduction rate have been below the minimum for a stationary population since about 1957, Tachi maintains that it is desirable that the net reproduction rate return to one in order to improve the age structure of the population and prevent a rapid fall in the annual labour force increment in the future. To achieve this end, he argues that economic development must be accompanied by certain measures of social development to lighten the financial burden of bringing up children and to improve housing and other living conditions.<sup>139</sup>

65. In the United States, consideration by the Government of the possible desirability of influencing the trend of population through family planning is very recent. At the federal, state and local levels, tax-supported family planning services have until recently been prohibited because of religious and political controversy, and family planning services which existed were carried out mostly by private agencies.<sup>140</sup> In 1963 the United States Congress first authorized support for foreign population programmes; about the same time the Government began to support research in family-planning methods, and funds allocated for this purpose were increased in subsequent years. Legislation enacted in 1967 for the first time emphasized the provision of family planning services, particularly for low-income persons, a trend which has since continued.<sup>141</sup> The President's Committee on Population and Family Planning, established in 1968, urged the expansion of domestic family planning pro-

grammes to make information and services available by 1973 to all women on a voluntary basis.<sup>142</sup>

66. By 1970 the President and Congress had established the Commission on Population Growth and the American Future to provide information and education regarding the implications of population growth. In 1971, resolutions were introduced in the House of Representatives and the United States Senate expressing the view that it should be the policy of the United States to encourage stabilization of the population by voluntary means. By the end of 1971 the United States had adopted no policy which called for the limitation of population growth, though it was increasingly providing services designed to permit parents to achieve the family size they desired by eliminating unwanted births.<sup>143</sup>

67. Canada, a country which has traditionally felt a need for a larger population, has pursued a selective immigration policy in the post-war years. Prohibitions against the advertisement, exhibition, sale or distribution of contraceptives were set out in 1927 legislation, which, however, was rarely invoked.<sup>144</sup> In 1969 the Food and Drug Act was amended to authorize the advertisement of contraceptives under specified conditions,<sup>145</sup> and in 1970 the Minister of Health and Welfare announced a federal government programme involving research, training and public information in family planning. It was the government's belief that the programme, which was to emphasize the right of individuals to exercise free choice in the practice of family planning, would have beneficial effects in reducing the incidence of unwanted births, child neglect and other abuses.<sup>146</sup>

## 2. IMPACT OF MEASURES AFFECTING FERTILITY

68. The decline of fertility in the nineteenth and twentieth centuries in the now industrialized countries is believed to have been closely related to basic changes in economic and social conditions which occurred as part of the process of modernization of these societies. Among the crucial economic and social factors likely to have affected fertility were urbanization, industrialization, social mobility, level of education, rising costs of education and changing family functions and structure (see the discussion in chapter IV, section D). The evidence concerning the relation of such factors as these to fertility levels is far from precise, being drawn for the most part from qualitative studies which provided the basis for various hypotheses.

69. Among the factors believed to have had a bearing on fertility levels were various kinds of economic and social legislation, but no effort has been made to assess the role of such legislative measures in the historical

<sup>135</sup> On one occasion, however, a high Government official—the Minister of Health—linked family planning in Japan to the population problem. See Kunii, "Postwar movement and programme..." (1967), p. 95.

<sup>136</sup> Taeuber, *The Population of Japan* (1958), pp. 367, 378. For a discussion of Japanese population policy in the post-war period, see pp. 371-378 of this publication.

<sup>137</sup> Muramatsu, "Medical aspects of the practice..." (1967), pp. 67-70.

<sup>138</sup> Kunii, "Postwar movement and programme..." (1967), pp. 87 ff.

<sup>139</sup> Tachi, "An opinion on the reproductivity..." (1970). See also his *Jinko mondai no chishiki* (1969); and Boffey, "Japan: a crowded nation..." (1970).

<sup>140</sup> Corsa, "United States" (1965), p. 260.

<sup>141</sup> Woolpert, "Population activities of..." (1971), pp. 8-14.

<sup>142</sup> United Nations, "Government policy statements on population..." (1970), p. 19.

<sup>143</sup> Woolpert, "Population activities of..." (1971), pp. 19 and 22.

<sup>144</sup> Eldridge, *Population Policies: a Survey...* (1954), pp. 84 and 104.

<sup>145</sup> United Nations, "Government policy statements on population..." (1970), p. 18.

<sup>146</sup> Canada, Department of National Health and Welfare, *News Release* (1971).

decline of fertility. Some of these measures, most notably child labour and compulsory education laws, probably had an anti-natalist effect, while existing side by side with them may have been other measures, such as those outlawing abortion or the sale and advertising of contraceptives, which, although they were often primarily moral in intent, may have had a pro-natalist effect. It is the purpose of the present section to consider what evidence exists of the effect on fertility of various measures which the Governments of developed countries have implemented in the post-war period. While some of these measures were enacted with the intent of influencing fertility, others represented the responses of Governments to a great range of economic, social and cultural imperatives.

70. A recent United Nations study, which has attempted a systematic analysis of social, economic, demographic and other measures affecting fertility, classified such measures into four categories:<sup>147</sup>

(a) Measures related to the family, such as family-allowance programmes, systems of taxation on income, aid to maternity and rewards to mothers;

(b) Measures of social reform, including compulsory education and child-labour laws, as well as social-security programmes;

(c) Laws relating to abortion, contraception and sterilization;

(d) Marriage and divorce laws relating to age at marriage, polygamy, divorce and remarriage.

Measures belonging to the first category could be expected to be mainly pro-natalist in effect, those in the second category, anti-natalist, while those in the third and fourth categories might be either, depending upon their specific nature.

71. There do not appear to have been any studies that have established conclusively the relationship between fertility and the various measures that Governments have implemented which may conceivably influence it.<sup>148</sup> Nor does the literature reveal any systematic attempt to analyse the effects of a mixture of measures, some tending to have a positive impact on fertility, while others have a negative one. The studies which have been made pertain to the influence of certain measures, apparently without taking into account the effect that other important elements in the complex of provisions may have.

(a) *Effects of measures tending to increase fertility*

72. There are various types of allowances and presumably such effect upon fertility as any one might have would depend, *inter alia*, upon the measure itself and what it added to the family living standards or way of life.<sup>149</sup> It is considered by many French demographers that the family allowance system had a positive effect

upon fertility in France during the years following the Second World War.<sup>150</sup> Many of the shortcomings of the earlier system appear to have been corrected when the benefits were enlarged in 1946. Thus, Febvay and others found that the scheme did have some success in raising fertility levels after the end of the war, partly because of the comprehensiveness of the programme which gave support to the family in a variety of ways.<sup>151</sup> But the scheme appears not to have yielded the results desired by the French policy-makers. As Sauvy emphasized many years later, the French family allowance system did not produce more large families, its influence being felt mainly with regard to the second and third child.<sup>152</sup>

73. Questiaux doubted that there is a causal relationship between fertility and family allowances. He noted, among other things, that the post-war birth rate rose not only in France, but also in countries where there were no similar measures in aid of the family, and presented data to show that, although the 1965 French and Italian birth rates were nearly identical, the net national income from family benefits was over 40 per cent higher in France.<sup>153</sup> Eldridge, who cautioned against such comparisons in view of the treacherous nature of crude birth rates and the complexity of the subject matter, tended to agree that evidence as to the influence of family allowances on French fertility is far from conclusive.<sup>154</sup>

74. Gille analysed birth rates for young married couples in Norway and Sweden in relation to family allowances in those countries and concluded that, while the possibility that the allowances had had a positive effect upon Swedish fertility after the Second World War could not be excluded, such was apparently not the case in Norway. It will be recalled that the Government of Sweden aimed at a stable, if not increasing rate of population growth. Gille offered as partial explanation the Swedish programme's greater comprehensiveness and the payment of allowances beginning with the first child rather than with the second, as in Norway.<sup>155</sup>

75. In Hungary, a measure was introduced on 1 January 1967 entitling gainfully occupied women to a children's allowance until the child reaches the age of three years, provided that the woman remains at home. It was reported that more than two thirds of employed women having a child in 1967 availed themselves of this allowance. The percentage of first births occurring in 1967 was significantly higher than in earlier years, suggesting that the new measure influenced women to bring forward

<sup>147</sup> United Nations, *Measures, Policies and Programmes ...* (1972), chap. I. For another classification see Hoogenboom, "Population policy and law" (1971).

<sup>148</sup> United Nations, *Measures, Policies and Programmes ...* (1972), chap. I. On the difficulties of isolating effects of particular measures, see Larson, "Summary of findings ..." (1971), pp. 451-452.

<sup>149</sup> *Ibid.* Tax deductions for dependants may be expected to have effects similar to those of family allowances except that individuals may be less aware of the benefits accruing to larger families through tax provisions than in the case of direct allowances.

<sup>150</sup> Girard determined from the results of a 1949 survey that 97 per cent of the respondents were of the opinion that the family-allowance scheme had been an influential agent in the post-war recovery of the French birth rate. Girard, "Le problème démographique ..." (1950), p. 338.

<sup>151</sup> Febvay, "L'évolution de la natalité ..." (1959), p. 58. See also Doublet, "Réflexions sur dix années ..." (1958).

<sup>152</sup> Sauvy, *De Malthus à Mao Tsé-toung ...* (1958), p. 217; and his "Réflexions sur la contribution ..." (1958), pp. 508-509. It is not considered that the allowances created a desire for an additional child, but made it possible for couples to have the number of children normally desired prior to the enlargement of the scheme.

<sup>153</sup> Questiaux, "Family allowances in France" (1968), p. 87.

<sup>154</sup> Eldridge, *Population Policies: a Survey ...* (1954), pp. 76-77.

<sup>155</sup> Gille, "Scandinavian family allowances ..." (1954), pp. 188-189.

the birth of their first child. While the opinion was expressed that these women would probably have more children than women who put off the birth of the first child,<sup>156</sup> it was considered too early to draw conclusions about the long-term effects of the child's care allowance on fertility.<sup>157</sup>

76. Lynes considered that in Great Britain (United Kingdom) allowances were effective as social policy, but not as demographic policy.<sup>158</sup> Heer and Bryden found no relationship between allowances and fertility in the USSR, but considered that the allowances may have been too small to have generated a rise in fertility.<sup>159</sup> Kučera offered a similar explanation for the failure of allowances to encourage higher levels of fertility in Czechoslovakia; they did not provide sufficient assistance.<sup>160</sup>

77. Two small surveys conducted in South Africa and the Netherlands to determine attitudes towards family allowances and to establish their possible influence upon family-size preferences gave conflicting results. Among a sample of married white women under age 50 in Johannesburg, South Africa, the granting of "adequate" family allowances would have increased family-size preferences on the average by approximately one child.<sup>161</sup> Among a group of adults in Leiden, the Netherlands, on the other hand, about 70 per cent thought that an increase in family allowances would have had no effect upon family size.<sup>162</sup>

78. There appears to be no simple answer as to whether and how children's allowances, at various degrees of adequacy, affect family size. In Whitney's view, European plans had not paid enough to cover the cost of child-rearing, and the possibility could therefore not be excluded that there is a payment level at which allowances would stimulate births. Moreover, he held that the influence of allowances can be obscured by other forces within society that bear upon fertility. He concluded, as did Eldridge, that available evidence did not support the contention that such allowances promote fertility.<sup>163</sup>

<sup>156</sup> Szabady, "Gainful occupation and motherhood ..." (1968), pp. 66-67. Acsádi *et al.*, "Népességi helyzetünk ..." (1968), p. 500-501. See also Acsádi, "Népességgazdasági kérdések ..." (1969).

<sup>157</sup> Hungary, Demographic Research Institute, *Allowance for Child's Care* (1969), p. 9.

<sup>158</sup> Lynes, "Family allowances in Great Britain" (1968), pp. 113-114.

<sup>159</sup> Heer and Bryden, "Family allowances and fertility ..." (1966), pp. 156-157. According to Thompson and Lewis, the "policies which have actually most affected population growth in the USSR have not been deliberately planned as population policies", but have been, rather, policies designed to promote rapid economic development. Thompson and Lewis, *Population Problems* (1965), pp. 546, 548.

<sup>160</sup> Kučera, "Populační politika ..." (1968), p. 317.

<sup>161</sup> Higgins, "The bearing of family allowances on family size ..." (1962).

<sup>162</sup> Knibbeler, "Heeft de kinderbijslag in Nederland ..." (1953), pp. 171-172.

<sup>163</sup> Whitney, "Fertility trends and children's ..." (1968), pp. 129-133; Eldridge, *Population Policies: a Survey ...* (1954), p. 76. Freedman found that the relevant literature concerning whether such pro-natalist government measures as allowances can increase fertility is inconclusive. See his "The sociology of human fertility ..." (1961-62), p. 63.

79. Simon argued, on the other hand, that incentives to raise fertility, such as bonuses, child payments and tax deductions for children, necessarily have some positive effect, "because some people must be at the margin of indifference about more or fewer children than they have ..." and the incentive payments may be the decisive factor. He acknowledged, however, that useful data on this subject are practically non-existent.<sup>164</sup>

80. The effects of restrictive abortion legislation on fertility depend partly on the extent to which other forms of birth control are practised. It is evident that the abrupt cessation of a liberal abortion policy can cause a sharp increase in the birth rate. Romania is the much cited example: the change in law, announced abruptly in October 1966, was followed by crude birth rates of 27.4, 26.3, 23.3 and 21.1 in each year from 1967 to 1970 respectively; the 1965 and 1966 rates were 14.6 and 14.3. Only a minor increase in the birth rate followed the restrictive legislation in Bulgaria in 1967: the 1967 rate was 15.0, compared with a crude birth rate of 16.9 in 1968, 17.0 in 1969 and 16.3 in 1970.<sup>165</sup> However, Bulgaria did not ban contraception, but provided increased counselling and aid in conception prevention; nor did it implement other repressive measures in the interest of higher fertility, as Romania did.<sup>166</sup>

81. It has been noted, however, that rescission of legislation against abortion brings about only a temporary increase in the birth rate; Acsádi observed this in respect of the temporary reversal of Hungary's liberal abortion law in 1953.<sup>167</sup> The post-1966 fertility rates in Romania cited above would tend to bear this out, though there are only a few years for which the new trend can be observed, and short-term behaviour of crude birth rates must be interpreted with caution.

82. Little is known of the influence of restrictive legislation relative to contraceptives upon fertility. In France, where contraception is believed to be practised with a high degree of effectiveness after desired family size has been attained, a study has estimated the effects on fertility of the availability of a 100 per cent effective contraceptive. The results suggest that the crude birth rate would be reduced over the short term by from approximately 2 to 22 per cent, this wide range being due to uncertainty regarding several important variables, including the degree of effectiveness with which contraception is currently practised, and the proportion of couples who would adopt the completely effective contraceptive.<sup>168</sup>

<sup>164</sup> Simon, "The effect of income ..." (1969), p. 340. The results of a preliminary study done by the author in the United States showed a substantial relationship between the amount paid by different states to foster parents and the proportion of state-aided children in foster homes.

<sup>165</sup> United Nations, *Demographic Yearbook, 1970 ...* (1971), table 13.

<sup>166</sup> David, *Family Planning and Abortion in the Socialist Countries ...* (1970), pp. 64-67, 129-134.

<sup>167</sup> Acsádi, "Népességgazdasági kérdések ..." (1969), p. 473.

<sup>168</sup> France, Institut national d'études démographiques, "Rapport de l'Institut ..." (1966), pp. 662, 671-672.

(b) *Effects of measures tending to decrease fertility*

83. Various students of conditions in Eastern Europe and the USSR have observed that levels of fertility may be depressed by the rising status of women.<sup>169</sup> However, not enough is known of the ways in which measures to increase the status of women may influence family size. This constitutes an important gap in knowledge of conditions that may be causally related to fertility change.

84. An indicator frequently used by analysts to measure the status of women is employment outside the home, although other indicators may also be used. It is generally acknowledged that this indicator is negatively associated with fertility levels.<sup>170</sup> One of the explanations of this relationship is as follows: from the economic point of view, the greater the discrimination against women in employment, the lower will be the wife's opportunity costs of time spent upon the caring and rearing of children, the lower her incentive for employment outside the home, the higher her fertility, and vice versa.<sup>171</sup> While the employment of women outside the home is associated with fertility levels, it is also related to many other conditions within the society, such as higher education.<sup>172</sup> There is also an element of selectivity involved, in that low-parity women are more likely to seek employment opportunities outside the home.<sup>173</sup>

85. In developed countries practising family planning, laws prohibiting child labour and providing for compulsory education, if enforced, could be expected to have a depressing effect on fertility since they increase the costs which families must bear for the upbringing of children and at the same time deprive the families of income obtained through their employment.<sup>174</sup> However, such a hypothesis was not clearly substantiated by the results of a regression analysis of the relationship between fertility levels and the number of years of compulsory education in a study carried out by Friedlander and Silver. On the other hand, the same authors found quantitative support for the hypothesis that the existence

of social security legislation, which presumably would cause parents to be less dependent upon their children, is associated with lower fertility.<sup>175</sup>

86. Most of the existing knowledge of the demographic impact of a liberalized abortion policy derives from the experiences of Eastern European countries and Japan. The quantitative effects on fertility of such policies are difficult to measure precisely, however, for a number of reasons. An important source of error may be the under-reporting of the number of abortions performed. In Japan in 1955, for example, the completeness of reporting of induced abortions was estimated to be between 52 and 77 per cent.<sup>176</sup> One reason for the unreliability of abortion figures is that private practitioners who perform the operation may not always register it. On the other hand, figures for some countries include abortions performed on visitors from abroad.<sup>177</sup> A further difficulty in measuring the effects of liberal abortion policies on fertility is the lack of knowledge regarding the volume of abortions which would previously have been performed illegally, but which are performed legally under liberalized legislation.<sup>178</sup>

87. In attempting to assess the effects of abortion on fertility, the relationship between the number of abortions and the number of live births must be interpreted critically. Mehlman observed that increased incidence of abortion is associated with increased pregnancy rates.<sup>179</sup> This is because the length of gestation (during which conception cannot occur) is shorter, and because the period of sterility is also shorter following induced abortion than following full-term pregnancy. Thus, according to Potter, an equal number of abortions and live births does not indicate that the birth rate is being halved because "100 artificially terminated pregnancies account for less marriage duration than do 100 pregnancies allowed to go to term".<sup>180</sup> He calculated that, when combined with contraception which is 90 per cent effective, the situation is different: "100 induced abortions now absorb 5,400 months of marriage duration, equivalent to 82 live births in the case of no lactation, and 72 live births in the case of prolonged lactation".<sup>181</sup> According to Keyfitz's calculations, with unprotected intercourse it takes nearly three abortions to prevent one birth, while 1.14 abortions suffice to avert one birth if a 95 per cent efficient contraceptive is used.<sup>182</sup>

88. In addition to the immediate effect of an induced abortion—i.e., the prevention of a live birth after conception has occurred—other effects have been observed. It was found in Japan that the incidence of "secondary

<sup>169</sup> Berent, "Some demographic aspects . . ." (1970), pp. 190-192; Sadvokasova, "Meropriiatie po ogranicheniu rozhdaemosti . . ." (1966), p. 20; Urlanis, "Dynamics of the birth rate . . ." (1967), p. 235; Coale, "The voluntary control . . ." (1967), p. 168; Heer and Bryden, "Family allowances . . ." (1966), pp. 161-162.

<sup>170</sup> Blake, "Demographic science . . ." (1965), pp. 62-67. See also Acsádi *et al.*, "Népesedési helyzetünk . . ." (1968), p. 499; Morsa, "Travail des femmes et natalité" (1959). See also the data given for the USSR in Urlanis, "Dynamics of the birth rate . . ." (1967), p. 235.

<sup>171</sup> Friedlander and Silver, "A quantitative study of . . ." (1967), p. 42. The magnitude of the opportunity costs "depends upon the opportunities that exist for the parents to gain desired goals from other uses of the same time and effort". National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications*, vol. 1 . . . (1971), p. 84.

<sup>172</sup> See Myrdal and Klein, *Women's Two Roles . . .* (1968), pp. 117-119; and Kiser and Frank, "Factors associated with . . ." (1967).

<sup>173</sup> See chapter IV, section F. Blake observed that selectivity could not provide the whole explanation, and presented data for female high school and college students which showed a strong negative association between desired family size and the number of years they intended to work after marriage. See her "Demographic science . . ." (1965), pp. 64-65.

<sup>174</sup> United Nations, *Measures, Policies and Programmes . . .* (1972), chap. I, section B-1.

<sup>175</sup> Friedlander and Silver, "A quantitative study . . ." (1967), p. 55.

<sup>176</sup> Muramatsu, "Effects of induced abortion . . ." (1960), p. 163.

<sup>177</sup> See, for example, David, *Family Planning and Abortion in the Socialist Countries . . .* (1970), p. 88.

<sup>178</sup> Potts, "Legal abortion in Eastern Europe" (1967), p. 243; Tietze, "The demographic significance . . ." (1964), p. 125.

<sup>179</sup> Mehlman, "Reducing abortion rate . . ." (1967), pp. 224-225.

<sup>180</sup> Potter, "Birth intervals . . ." (1963), p. 162.

<sup>181</sup> *Ibid.*; see also Muramatsu, "Effects of induced abortion . . ." (1960); and Frederiksen and Brackett, "Demographic effects . . ." (1968), p. 1001.

<sup>182</sup> Keyfitz, "How birth control . . ." (1971), p. 112.



sterility and habitual abortion and miscarriage" rose after induced abortion.<sup>183</sup> However, Mehlan's data for the German Democratic Republic disclosed that sterility as well as other complications were lower following legally induced abortions than criminal abortions.<sup>184</sup>

89. The difficulties of precise measurement of the effect of liberalized abortion policies notwithstanding, it has been observed that "birth rates have generally declined in countries in which abortion has been legalized and there seems no doubt that abortion played a role in this reduction."<sup>185</sup> Analyses have suggested that these reductions in fertility in Japan and the countries of Eastern Europe were not related to changes in age structure or proportions married, but to changes in marital fertility and, hence, to birth control. Brackett found that, in the Eastern European countries, the birth rate decreased by 40 per cent in the decade or so following liberalization of the abortion laws.<sup>186</sup> According to Mehlan, the fertility decline was not initiated by the changes in the laws, but rather accelerated by them.<sup>187</sup>

90. The Japanese crude birth rate declined precipitously from 33.0 in 1949 (the year following the establishment of the Eugenic Protection Law) to 17.2 in 1960.<sup>188</sup> It was estimated that in 1955 alone, abortions to Japanese women prevented between 1,379,000 and 2,054,000 births; the number of live births actually registered was 1,731,000.<sup>189</sup> According to Muramatsu, induced abortion was the major factor in the decline of Japanese fertility. It has been estimated that, aside from the effect of the postponement of marriage, at least 70 per cent of the birth rate decrease in the post-war period up to 1955 could be attributed to induced abortion, and the remaining 30 per cent to contraception and sterilization.<sup>190</sup> The family planning programme initiated by the Government in 1952 had only a limited effect upon fertility.<sup>191</sup>

91. Citing data for Bulgaria, Czechoslovakia and Hungary, Tietze and Lewit observed that where abortion laws are permissive, legal abortions rise sharply.<sup>192</sup> As to the demographic significance for the Eastern European region, Tietze concluded in another study that the legalization of abortion has had a depressing effect upon the birth rate in most of these countries. He cited as evidence the fact that marked declines in the birth rate had occurred between the early 1950s and early 1960s in all of the countries of Eastern Europe where abortion had been legalized (except the USSR), whereas during the

same period Western European countries and those Eastern European countries which had not legalized abortion experienced either moderate increases in fertility or only slight declines. He noted, moreover, that these two groups of countries were sufficiently similar with respect to patterns of population structure, relative changes in *per capita* income and other indicators of social well-being to have had similar natality trends.<sup>193</sup>

92. Regarding the USSR, it has been noted that the number of registered abortions increased markedly following legalization of abortion in November 1955. An increase of 82 per cent occurred between 1955 and 1956, and the number of abortions continued to increase each year up to 1965, though at a slower rate. In 1966 the number of abortions performed was lower than in 1965. Available data show that the ratio of abortions to live births increased from 1.6 in 1960 to between 2.5 and 3.0 in 1965.<sup>194</sup> Findings from a survey in the Armenian Soviet Socialist Republic (USSR) disclosed that, among the workers, abortion is the principal method of birth control. Among a sample of women undergoing abortion, it was found that the average number of abortions per woman was 4.7. According to Artunyan, this high abortion rate was due not to the failure of contraceptives, but to an insufficient propagation of contraceptive methods as a means of controlling family size.<sup>195</sup>

93. The interpretation of the effect of liberalized abortion laws on fertility trends must also take into account the possible changes in contraceptive practice which such laws may engender. Some authors hold that the legalization of abortion reduces the practice of contraception, since abortion requires only one decision and is based upon certainty rather than supposition. Others maintain that the legalization of abortion leads to increased contraceptive practice. This may be because the population becomes more birth-control conscious and motivated, and also because Governments often attempt to educate the public to use effective contraception rather than abortion as a means of family limitation.

94. Frederiksen and Brackett hold that in some Eastern European countries, particularly Hungary, but also Bulgaria, legalized abortion brought about a reduction in contraceptive practice because pregnancy rates increased sharply along with legal abortion rates, while total fertility declined only slightly.<sup>196</sup> It has been pointed out, however, that before the legalization of abortion in Hungary, the number of illegal abortions performed was very high, and it is therefore difficult to establish the effects of legal induced abortions on fertility. Hungarian experts have concluded that, while the legal abortion system has probably retarded the effective practice of contraception, there are indications that more modern

<sup>183</sup> Muramatsu, "Medical aspects of the practice of fertility regulation" (1967), pp. 76-77.

<sup>184</sup> Mehlan, "Abortion in Eastern Europe" (1970), pp. 307-308.

<sup>185</sup> Brackett, "Demographic consequences of abortion" (1970).

<sup>186</sup> *Ibid.*

<sup>187</sup> Mehlan, "Abortion in Eastern Europe" (1970), p. 313.

<sup>188</sup> Kono, "Demographic glimpses into Japan" (1967), p. 16.

<sup>189</sup> Muramatsu, "Effect of induced abortion . . ." (1960), pp. 162-163.

<sup>190</sup> Muramatsu, "Medical aspects of the practice of fertility regulation" (1967), p. 68.

<sup>191</sup> Kunii, "Postwar movement and programme for family planning" (1967), p. 93. See also Ridker, "Desired family size and the efficacy . . ." (1969), p. 280.

<sup>192</sup> Tietze and Lewit, "Abortion" (1969), p. 25.

<sup>193</sup> Tietze, "The demographic significance . . ." (1964), pp. 123-124.

<sup>194</sup> Sadvokasova, *Sotsialno-gigienicheskie aspekty . . .* (1969), pp. 116-117; Serenko, *Prepodavanie sotsialnoy gigieny i organizatsii . . .* (1969), p. 34.

<sup>195</sup> Artunyan, "Nekotorye osobennosti planirovaniia . . ." (1968), p. 39.

<sup>196</sup> Frederiksen and Brackett, "Demographic effects of abortion" (1968), pp. 999-1003; Szabady, "The legalizing of contraceptives . . ." (1971).



and effective methods are spreading among younger couples.<sup>197</sup>

95. In Japan, contraceptive practice appears to have increased steadily in the years following the liberalization of abortion. Based on a series of surveys, the proportion of contraceptors among wives under 50 years of age rose from 19.5 in 1950 to 51.9 in 1965.<sup>198</sup> Studies by Aoki and Muramatsu, for example, showed that in Japan between 1955 and 1965 the role played by contraception in preventing births increased, whereas that of induced abortion diminished.<sup>199</sup> Diggory and his colleagues hold that the experience of both Japan and Eastern Europe "has shown that improvements in contraceptive practice can and do occur concurrently with easy access to abortion".<sup>200</sup>

96. After reviewing the experience of Sweden, Japan and the Eastern European countries, Frederiksen and Brackett concluded that the effect of the legalization of abortion on patterns of contraception varies from country to country. In countries where contraception is already widely practised, a proportion of the population may, as a result of the ease of obtaining legal abortions, practise it less effectively, thus increasing abortion rates without substantially affecting birth rates. Conversely, where abortion is widespread, the introduction of contraception may contribute to declines in both abortion rates and fertility rates.<sup>201</sup>

97. The literature does not show that any effort has been made to examine differences in national laws governing marriage, divorce and separation in the developed countries to determine if they are related to variations in fertility. Eldridge observed that "where differences are not striking, it seems reasonable to suppose that other factors have a more profound effect on the average age at marriage and perhaps also on the rate of marriage dissolution than do legal ones". A change in the minimum age at marriage is not likely to have much effect on fertility in countries where large proportions of the population marry later than the minimum age established by law.<sup>202</sup>

98. The effect of divorce on fertility is unclear, since it depends on prevailing customs concerning remarriage and on the relative strength of different influences. In some cases childless marriages which result in divorce may be replaced by marriages which produce children, and some persons who otherwise would have remained single are, because of divorce, able to marry and bear children. On the other hand, many divorced persons may

not remarry. It has been pointed out that, while liberal divorce laws may increase the disposition to marry, they also reduce the stability of marriage.<sup>203</sup>

#### D. Policies affecting fertility in developing countries

99. In the developed Western countries, the transition from high to low fertility occurred in the absence of birth limitation policies, and sometimes in spite of pro-natalist policies.<sup>204</sup> In the vast majority of today's developing countries, however, mortality declines that were effected by improved medical care and public health measures, especially after the Second World War, have not as yet been followed by a commensurate downward course in the birth rate. Rather, in most of these countries, fertility has generally remained stable at a high level and, with the consequent broadening of the gap between birth and death rates, the population has been growing at unprecedented rates. The problems engendered by this so-called "population explosion" have stimulated Governments to formulate policies which aim to curb excess population growth by lowering fertility levels.

##### 1. REASONS FOR MODERATING POPULATION GROWTH

100. The retarding effect of rapid population growth on economic and social development has led increasing numbers of government officials and scholars to conclude that the regulation of such growth is not only plausible, but imperative.<sup>205</sup> Most nations which have embarked upon a policy aimed at attaining a lower level of fertility have emphasized such reasons as the necessity of reducing population growth to a rate that is more compatible with accelerated progress in economic and social development.<sup>206</sup> In a review of conditions and policies in 67 developing countries, Nortman observed that the "ultimate objective of such [population] policies is a higher standard of living, to which Governments, as a general principle, have always been committed". But she noted that now, as opposed to the past, nations are less willing to tolerate abysmally low standards of living.<sup>207</sup> In writing about the role of a fertility policy in economic development, Coale and Hoover have maintained that a reduction of fertility immediately reduces the burden of dependency; and that fewer consumers (especially children) permit greater flexibility in the mobilization of resources for economic growth, facilitating the use of savings and tax

<sup>197</sup> Acsádi, Klinger and Szabady, *Family Planning in Hungary* ... (1970), pp. 28-32; also Szabady, "Családtervezési trendek ..." (1968).

<sup>198</sup> Muramatsu, "Medical aspects of the practice of fertility regulation" (1967), pp. 57-58.

<sup>199</sup> Aoki, "Kazoku keikaku no shussyo ..." (1967); Muramatsu, "An analysis of factors ..." (1970).

<sup>200</sup> Diggory, Peel and Potts, "Preliminary assessment ..." (1970), p. 291.

<sup>201</sup> Frederiksen and Brackett, "Demographic effects of abortion" (1968), p. 1,008.

<sup>202</sup> Eldridge, *Population Policies: a Survey* ... (1954), p. 120.

<sup>203</sup> United Nations, *Measures, Policies and Programmes* ... (1972), chap. I, section D-3; Eldridge, *Population Policies: a Survey* ... (1954), pp. 120-121.

<sup>204</sup> See the discussion of factors related to the decline of fertility in industrialized nations in chapter IV, section D.

<sup>205</sup> See, for example, United Nations, *Inquiry among Governments* ... (1964), p. 8; Coale and Hoover, *Population Growth and Economic Development* ... (1958), pp. 304-335; Notestein, Kirk, and Segal, "The problem of population control" (1963), particularly p. 141; Krašovec, "Stihijnost ili kontrola ..." (1970).

<sup>206</sup> See, for example, Malaysia, *First Malaysia Plan* ... (1965), p. 15; Pakistan, Planning Commission, *The Second Five-Year Plan* ... (1960), p. 334; ———, *The Third Five-Year Plan* ... (1965), p. 261; Turkey, State Planning Organization, *First Five-Year Development Plan* ... (1963), p. 60; Colombia, *Plan de desarrollo económico y social* ... (1970), vol. I, p. IV.12.

<sup>207</sup> Nortman, "Population and family planning programs ..." (1970), p. 4.

receipts in such a way as to raise national output, as less is required for consumer needs and social overhead. They cautioned that "to postpone the reduction of fertility [in low-income countries] is to forgo the opportunity for a more rapid rise in immediate well-being, and to shrink the potential growth in incomes *per capita* for the indefinite future".<sup>208</sup>

101. A number of Governments have specified particular problems which would be mitigated by slower population growth. Thus, some have mentioned the need to reduce the rate at which the labour force increases in order to lighten the task of providing new employment opportunities and to alleviate unemployment and underemployment.<sup>209</sup> In addition, the benefits of slower population growth for meeting development requirements in such areas as education,<sup>210</sup> housing<sup>211</sup> and social welfare services<sup>212</sup> have been mentioned by some Governments.

102. Other reasons often mentioned as being important in the decision of Governments to implement a policy of fertility regulation have been the promotion of human dignity, the well-being of the family in general, and the health of mothers and children.<sup>213</sup> The health factor in particular has been stressed, the rationale being that fewer births at longer intervals will enhance the health of mothers and children and alleviate some of the problems of raising and caring for children.<sup>214</sup> The adverse effects upon health of widespread illegal abortion have also been a consideration in some countries.<sup>215</sup>

103. Because Governments of developing countries must allocate their scarce resources among a large number of projects, some knowledge of the economic benefits to be derived from investment in population programmes, as compared with other developmental schemes, is an important factor in policy-making. One approach in

this sphere is the cost-benefit analysis developed by economists, which, when applied to population, attempts to estimate the value of births averted by population programmes in relation to their cost.

104. Much of the discussion in this field revolves around Enke's estimates that the value of a birth prevented in a developing country is one to two times the annual *per capita* income of that country, and his assertion that 1 per cent of total development budgets spent on reducing births could be as effective in raising output per person as the other 99 per cent of the budget.<sup>216</sup> Enke, as well as others, suggests that such a saving has further policy implications, namely in the awarding of monetary incentives by Governments to couples for abstaining from child-bearing.<sup>217</sup>

105. Various writers have taken issue, either with Enke's basic approach, or with specific arguments or assumptions. Leibenstein argued that deficiencies in the formulation of such models tend to invalidate them, and maintained that there were biases in the analysis which led to the expectation of unduly favourable results for birth control programmes. Moreover, he presented a model based on other assumptions which gave results opposite to those of Enke's.<sup>218</sup> Krueger and Sjaastad criticized Enke's model mainly for its reliance on economic factors as the sole criteria of welfare, thus omitting the non-economic desires of individuals.<sup>219</sup> Demeny agreed with the theory and even with the order of magnitude of Enke's estimates of the value of a prevented birth, but considered that Enke erred in exaggerating the effectiveness of bonus payments in raising *per capita* income.<sup>220</sup> Reviewing the debate over the findings of cost-benefit analysis, Ohlin concluded that while "precise estimates are out of the question", investments in family planning are likely to result in "spectacular benefits".<sup>221</sup> Other economists have presented a case for investments to reduce fertility without attempting to quantify the economic value of a prevented birth.<sup>222</sup>

<sup>208</sup> Coale and Hoover, *Population Growth and Economic Development* ... (1958), p. 335. See also pp. 314-334; and Coale, "Population and economic development" (1963).

<sup>209</sup> See, for example, Kenya, Legislative Council, *African Socialism and its Application to Planning* ... (1965), p. 31; Pakistan, Planning Commission, *The Third Five-Year Plan* ... (1965), p. 261; Turkey, State Planning Organization, *First Five-Year Development Plan* ... (1963), p. 64. See also United Nations, *Inquiry among Governments* ... (1964), pp. 20-21.

<sup>210</sup> Kenya, Legislative Council, *African Socialism and its Application to Planning* ... (1965), pp. 51-52; Pakistan, Planning Commission, *The Third Five-Year Plan* ... (1965), p. 261.

<sup>211</sup> Pakistan, Planning Commission, *The Third Five-Year Plan* ... (1965), p. 261; Kenya, Ministry of Economic Planning and Development, *Development Plan* ... (1966), pp. 51-52.

<sup>212</sup> Kenya, Legislative Council, *African Socialism and its Application to Planning* ... (1965), p. 31.

<sup>213</sup> For examples of government statements which indicate a wide spectrum of objectives, see Ghana, *Population Planning for National Progress and Prosperity* ... (1969), particularly pp. 18-19; Kenya, Ministry of Economic Planning and Development, *Development Plan* ... (1966), pp. 51-52.

<sup>214</sup> Fiji, Medical Department, *Report of the Year 1965* (1966), p. 10; India, Planning Commission, *First Five-Year Plan* (1953), p. 218; Kenya, Ministry of Economic Planning and Development, *Development Plan* ... (1966), pp. 51-52; Malaysia, *First Malaysia Plan* ... (1965), p. 178; Pakistan, National Planning Board, *The First Five-Year Plan* ... (1957), p. 192; Costa Rica, *La gaceta* ... (1967).

<sup>215</sup> See, for example, the statements of the representatives of Chile and Colombia, in World Health Assembly, "Health aspects of population dynamics" (1967), pp. 360 and 364.

<sup>216</sup> Enke, "Economic programmes ..." (1967), p. 314. See also his "The gains to India ..." (1960); "The economics of government payments ..." (1960); "Government bonuses for smaller families" (1960); "Some reactions to bonuses ..." (1961); "The economic aspects of slowing ..." (1966). For a critical review of the literature on cost-benefit analysis, see Robinson and Horlacher, "Population growth ..." (1971). For an earlier calculation of the value of a prevented birth, see Meier, *Modern Science* ... (1959), pp. 76-87.

<sup>217</sup> In addition to the works by Enke, see, for example, Simon, "The value of avoided births ..." (1969); Leasure, "Some economic benefits ..." (1967).

<sup>218</sup> Leibenstein, "Pitfalls in benefit-cost analysis ..." (1969).

<sup>219</sup> Krueger and Sjaastad, "Some limitations of Enke's ..." (1962). Raulet has also cautioned against assessing fertility strictly in economic terms. See his "Family planning and ..." (1970), p. 229. See also Enke, "Some misconceptions of Krueger and Sjaastad ..." (1962).

<sup>220</sup> Demeny, "The economics of government payments ..." (1961). See also Enke, "A rejoinder to comments ..." (1961). Using a different method, based on an economic growth projection similar to that of Coale and Hoover, Demeny calculated that where *per capita* income is \$U.S. 100, the value of a birth averted may be from \$U.S. 125 to several times more. See his "Investment allocation and population growth" (1965), pp. 221-222.

<sup>221</sup> Ohlin, *Population Control* ... (1967), pp. 115 and 120.

<sup>222</sup> See, particularly, Coale and Hoover, *Population Growth and Economic Development* ... (1958), part V.

## 2. THEORETICAL BASIS FOR POLICIES AND MEASURES TO REDUCE FERTILITY

106. To meet with some degree of success, a country's policies, programmes and measures for controlling fertility must be based on an understanding of the complex interrelationships between population trends and economic and social conditions and cultural patterns.<sup>223</sup> Unfortunately, knowledge of these interrelationships is still grossly deficient. The information which does exist regarding the relation between fertility reduction and other societal factors pertains, for the most part, to present-day industrialized countries, and the conclusions drawn may have only limited applicability for the high-fertility developing regions. Moreover, even these data have given rise to divergent interpretations on the part of scholars. Various theories relating to factors affecting fertility have been discussed extensively in chapter IV, sections D and E. A brief summary of some of the major factors believed to influence fertility trends, together with a discussion of how theories about fertility change affect the formulation of policies and measures to bring about such change, is presented in this section.

107. It is widely held that the secular decline in fertility in the now industrialized, low-fertility countries was the result of a variety of factors intricately interrelated with socio-economic development, or of what is generally referred to as the modernization of society.<sup>224</sup> Coale finds support for this view in the fact that all modernized societies have low fertility, though he points out that no single indicator of modernization is itself manifestly related to controlled fertility.<sup>225</sup>

108. Although there is a consensus that fertility declines once the forces of modernization are under way, different authors emphasize different factors in the development process as being of particular relevance. It has been observed, for example, that a secular decline of mortality generally occurs before large numbers of individuals make efforts to control fertility.<sup>226</sup> Freedman holds as a speculative hypothesis that "family planning is unlikely to be widely adopted in any country until there has been a significant mortality decline and until there has been enough social and economic development to lessen dependence on local and familial institutions and make

smaller families more rewarding than larger families".<sup>227</sup> The spread of education and literacy, particularly among women, is believed by some to be fundamental to changes in human reproductive behaviour. Improvements in the status of women in general have been stressed as having marked influence upon fertility,<sup>228</sup> but, as mentioned above, the precise nature of this association has not been established.

109. While many writers agree that fertility will decrease only in a *milieu* in which some measure of economic and social development is evident, there has not yet evolved any systematic theory as to how such development affects the individual motives that produce fertility change.<sup>229</sup> Some scholars consider that reproductive behaviour is strongly influenced by the cultural and social *milieu* and that, hence, changes in attitudes, values and motivation as regards reproduction necessarily involve prior or concurrent social change.<sup>230</sup>

110. The available evidence shows that there still exist substantial differences in desired family size between the populations of industrialized and developing countries, and thus it is unlikely that the provision of contraceptives and education in their use would alone be sufficient to achieve low fertility levels.<sup>231</sup> In addition, many scholars hold the opinion that the motivation required to attain even the moderate family size, for which preference is sometimes expressed, is largely lacking among these populations.<sup>232</sup> As knowledge of factors influencing motivation is crucial to understanding behavioural change in this sphere, many studies have examined values and

<sup>227</sup> Freedman, "Fertility—statement by the moderator" (1966), p. 45. See also his "The transition from high to low fertility ..." (1965), particularly p. 418. On conditions favourable to fertility decline in developing countries, see also Kahl and Stycos, "Filosofia de la política ..." (1964), pp. 433-434.

<sup>228</sup> Podyachikh, "Impact of demographic policy ..." (1968), pp. 246-247; Sadvokasova, "Birth control measures ..." (1967), pp. 111-113; Vostrikova, "Female fertility and methods ..." (1967), pp. 239-240; Szabady, "Gainful occupation ..." (1969), p. 66; Freedman, "Fertility—statement by the moderator" (1966), pp. 39-41; Blake, "Demographic science ..." (1965), pp. 64-66; Myrdal and Klein, *Women's Two Roles* ... (1968), pp. 117-119; Bernard, "The status of women ..." (1968), p. 10; Eldridge, *Population Policies: a Survey* ... (1954), p. 121; Kozlov, "Some causes of the high fertility ..." (1967), p. 158; and Sauvy, *La prévention des naissances* (1962), p. 112.

<sup>229</sup> United Nations, *Measures, Policies and Programmes* ... (1972), introduction, sections B-1 and B-2; Coale, "The voluntary control ..." (1967), pp. 168-169.

<sup>230</sup> Hauser, "Non-family planning methods ..." (1969), pp. 60-61; and his "On design for experiment ..." (1962), pp. 464-465. See also Muramatsu, "Action programmes of ..." (1965), p. 75.

<sup>231</sup> See the discussion in chapter IV, section E. Tabbarah, after a review of existing surveys, estimated that in most of Asia and North Africa the majority of married couples desired between four and eight children, while in Africa south of the Sahara the range was still higher. See his "Toward a theory of demographic development" (1971), pp. 262-263. To improve knowledge of the relationship of economic factors to reproductive behaviour, Easterlin proposed a theoretical framework based on the theory of household choice, expanded to include "taste" factors. According to his formulation, reproductive behaviour is determined by a balancing of preferences relating to children, goods, leisure etc., on the one hand, and various constraints, such as the price of child care, on the other. Easterlin, "Towards a socio-economic theory ..." (1969), pp. 138, 150.

<sup>232</sup> See chapter IV, section E.

<sup>223</sup> Boyarsky, for example, has proposed that economic, social and demographic analysis covering long periods of time would be necessary for a comprehension of the factors relevant to the formulation of population policy. Boyarsky *et al.*, *Kurs demografii* (1967), p. 37.

<sup>224</sup> A summary and review of the literature is provided by Freedman, "The sociology of human fertility ..." (1961-1962); see also his "Fertility—statement by the moderator" (1966), pp. 36-49; Coale, "Factors associated with the development ..." (1967), pp. 207-208; Davis, "The theory of change ..." (1963); Urianis, "John Graunt's offspring ..." (1967), pp. 6-7; Sadvokasova, "Birth control measures ..." (1967), p. 111; Macura, "International aspects ..." (1965), p. 78; and Gyllenswärd, "Extinction or explosion ..." (1967), particularly p. 209.

<sup>225</sup> Coale, "The voluntary control ..." (1967), p. 168.

<sup>226</sup> For a survey of relevant literature, see Freedman, "The sociology of human fertility ..." (1961-1962), pp. 67-68.

goals with respect to family size in relation to various economic and social characteristics of the population surveyed.<sup>233</sup>

111. Since knowledge of the conditions required to bring about a decline in fertility is so inadequate, opinions of scholars differ in regard to the degree of economic and social development necessary before a family planning programme can achieve much success, although few writers on the subject maintain that initiation of family planning programmes should await an advanced stage of economic development.

112. Macura holds that it is untenable to attempt modifications of reproductive behaviour separately from modifications in the social and economic structure, in marital patterns, and in education and mortality, for it is the combination of these that influences rationality in reproductive behaviour.<sup>234</sup> According to Tabbarah, family planning programmes would be effective only at a stage in a country's demographic development where two conditions are met: (1) a large proportion of couples wish to limit their births (and this is not at present the case in many developing countries), and (2) these couples lack adequate birth control knowledge and/or supplies and facilities.<sup>235</sup> In Raina's view, the national family planning programme of India can be effective only if it is implemented within the context of substantial economic and social change. He holds that, in addition to the popularization of birth control, the essential tasks are raising standards of living, improving public health and ameliorating problems of unemployment, aging, illiteracy, and the like.<sup>236</sup> Glass summarized his position as follows: "Direct programmes for spreading the use of birth control are . . . only a small part of the action in which developing societies will require to engage. The largest part will have to consist of planned economic and social development. . .".<sup>237</sup>

113. Sauvy has written that a purely economic solution cannot suffice, and a demographic solution requires preliminary, or at least simultaneous, economic development. Both solutions must therefore be considered.<sup>238</sup> According to Urlanis, birth rates in developing countries "will be reduced to a certain extent as a result of women's participation in production, a higher level of culture and the development of industry", but he added that "a demog-

raphic policy specifically aimed at smaller families may be of great significance".<sup>239</sup> Guzevaty observed that "the overwhelming majority of newly liberated States are planning their economic development, but this cannot be achieved unless population factors are taken into account and efforts are made to influence them so as to ensure a better combination of population growth and economic progress".<sup>240</sup>

114. Some proponents of family planning have put less emphasis on modernization and development as prerequisites for fertility decline, holding that the vast majority of high-fertility groups are desirous of limiting family size and will do so if given the knowledge and means. A leading adherent of this view is Bogue, who believes that essential social change has already taken place even in the more remote rural areas of developing countries and that these populations are now receptive to the idea of limiting births.<sup>241</sup> Stycos has also expressed optimism concerning the success of family planning programmes, pointing to the desire for moderate-sized families that exists in less developed countries and the fact that nowhere have such programmes encountered active opposition on the part of the target population.<sup>242</sup> Notestein, Kirk and Segal have argued that there is no need to rely on the gradual changes in society that occur with modernization to bring about eventual fertility decline, and that while social inertia is an obstacle to the rapid spread of family planning, it is not an insuperable obstacle.<sup>243</sup> Berelson, while acknowledging that development or modernization programmes in general will have a favourable impact on the spread of contraception, urges that "direct effort on contraception is worth while in itself, as a contribution to the speeding-up of this element in the over-all development equation".<sup>244</sup>

115. The notion thus persists that national family planning programmes are likely to facilitate such change as will encourage at least some segments of the population voluntarily to regulate fertility. And it is due to the force of this opinion that a steadily increasing number of Governments are adopting such programmes—usually in conjunction with intensified development efforts—as the principal instrument of a policy that advocates lower fertility.

116. Several authors have disagreed with the prevailing optimism concerning the possible contribution of family

<sup>233</sup> See, for example, Blake, "Demographic science . . ." (1965), p. 65; and her "Population policy for Americans . . ." (1969), p. 524; and Freedman, Baumert and Bolte, "Expected family size . . ." (1959), pp. 144-150.

<sup>234</sup> Macura, "International aspects . . ." (1965), p. 77. See also United Nations, *Social Change and Social Development Policy . . .* (1970), pp. 287-288; International Bank for Reconstruction and Development, *Partners in Development . . .* (1969), p. 198.

<sup>235</sup> Tabbarah, "Toward a theory of demographic development" (1971), pp. 274-276; see also his "Birth control and population policy" (1964). A basic question which warrants research is: at what point in the development process of a given country would the introduction of a family planning programme be most propitious? Lapham, "Population policies in the Maghreb" (1971), p. 43.

<sup>236</sup> Raina, "Possible effects of public policy . . ." (1967).

<sup>237</sup> Glass, "Population growth and population policy" (1965), p. 23.

<sup>238</sup> Sauvy, *De Malthus à Mao Tsé-toung* (1958), pp. 289-290.

<sup>239</sup> Urlanis, "John Graunt's offspring . . ." (1967), p. 7.

<sup>240</sup> Guzevaty, "Population problems in . . ." (1966), p. 58.

<sup>241</sup> Bogue, "The demographic breakthrough . . ." (1964), p. 450.

<sup>242</sup> Stycos, "Population and family-planning . . ." (1964), p. 174. In assessing the probable contribution of family-planning programmes in fertility decline, Coale sees as favourable factors the desire on the part of populations of developing countries for smaller families than those actually attained, and the inclusion in the programmes of provisions for influencing attitudes and motivation. Coale, "The voluntary control . . ." (1967), p. 169.

<sup>243</sup> Notestein, Kirk and Segal, "The problem of population control" (1969), pp. 144-145 and 147. In another article, Notestein called attention to certain conditions favourable to fertility decline which now exist in developing countries, among them the spread of national policies favouring family planning, public interest in limiting child-bearing and the recent improvements in contraceptive technology. Notestein, "The population crisis . . ." (1967), p. 170.

<sup>244</sup> Berelson, "National family planning programs . . ." (1969) p. 369.

planning programmes. According to Podyachikh, birth control is unlikely to be adopted in the developing countries until they achieve a certain measure of economic and social advancement. Moreover, family planning programmes are unnecessary, inasmuch as a fertility decline will occur once the major economic and social problems have been mastered.<sup>245</sup> Valentei has written that attempts to reduce fertility in a relatively short period by "artificial" means (i.e., family planning programmes) are doomed to failure. In his view, the achievement of the desired goal, i.e., lower fertility, requires that the Government undertake concerted action for economic and social development.<sup>246</sup>

117. Kuznets views efforts to reduce the birth rate as having only limited potential for solving the economic growth problems of disadvantaged areas, although he is not opposed to such efforts as long as they do not deflect resources from other essential development programmes. He considers that a high rate of population growth is only one, and not necessarily the most important, of many problems facing developing nations, and if the other problems are not solved, a slowing down of population growth will have only a moderate effect, in the next decade or two, on *per capita* product. The solution of the economic growth problems lies rather in policies directed at changing economic, political and social institutions—changes which will at the same time result in more moderate population growth.<sup>247</sup>

118. Blake has argued that neither the "economic development" approach nor the "family planning" approach is adequate when taken alone or in combination. What is needed are policies directly related to family roles which affect the motivational framework of reproduction by providing satisfying alternatives to child-bearing.<sup>248</sup> In view of the recognition of the need for changing family-size norms and increasing individual motivation for family limitation, elaborate systems of communication designed, *inter alia*, for this purpose, are often

<sup>245</sup> Podyachikh, "Impact of demographic policy ..." (1968), pp. 240, 242, 250.

<sup>246</sup> Valentei, *Teoria i politika narodonaseleniâ* ... (1967), pp. 177-183. A similar view has been expressed by Burnashev in "Aktualnye voprosy rosta naseleniâ ..." (1970). Taking into account the relationship between modernization and fertility, some Governments have attempted to accelerate modernization in crucial economic and social spheres in what appears to be an aspect of population policy. Concerning such policies in Algeria, see Lapham, "Population policies in the Maghreb" (1971), pp. 40-42.

<sup>247</sup> Kuznets, "Population and economic growth" (1967), pp. 189-190. See also Raulet, "Family planning and population control ..." (1970). It has been suggested, however, that Kuznets has underestimated the importance of rapid population growth as a deterrent to economic development. See Organisation for Economic Co-operation and Development, *Population Programmes and Economic and Social Development* (1970), pp. 23-24.

<sup>248</sup> Blake, "Demographic science ..." (1965), pp. 67-68. See also her "Reproductive motivation ..." (1971). Davis, "Population policy ..." (1967); and his "Will family planning solve ..." (1968). Lorimer has also emphasized the fundamental role of personal motivation in fertility regulation, but he believed that government programmes could influence attitudes in this area. Lorimer, "Issues of population policy" (1945), p. 179.

integrated into family planning programmes.<sup>249</sup> Moreover, it is being increasingly emphasized that the techniques of communication for motivation in family planning must be tailored to the culture of the people.<sup>250</sup>

### 3. PREVALENCE OF NATIONAL POLICIES DESIGNED TO REDUCE FERTILITY

119. Once the desirability of reducing population growth was accepted by some of the developing countries, fertility became the focus of attention, since it is the only component of national population growth whose regulation to achieve desired ends is both practicable and acceptable. Emigration on the scale necessary to alleviate the problem of rapid growth is not feasible, except in the case of countries with very small populations, and continued mortality declines are universally desired. A number of countries therefore took the decision to pursue a fertility-reduction policy, and some Governments provided for its implementation within the context of a comprehensive national economic and social development scheme. (See chapter XVI, section E.)

120. The Governments of India and Pakistan established national family planning programmes for the purpose of reducing fertility levels in the early and mid-1950s. These programmes were gradually expanded, and by the 1960s they were operating with greatly increased resources, widespread publicity and various improvements geared to achieve a more satisfactory public response.<sup>251</sup> Information from a variety of sources suggests that China adopted a policy and supporting measures to control births in the mid-1950s, with a view to reducing the rate of population growth, although the policy appears to have been temporarily abandoned after a short time, and then later resumed. Official statements explaining the purpose of the policy have at different times emphasized control of population growth rates, health reasons, and the emancipation of women. The birth-control measures have been pursued with varying degrees of intensity since adoption of the policy.<sup>252</sup>

<sup>249</sup> According to Coale, the fact that many family planning programmes utilize modern techniques of communication to influence attitudes and motivation was one reason for considering that they may achieve success. Coale, "The voluntary control ..." (1967), p. 169. Davis, however, considered that "mass-communication" techniques could not solve the motivation problem and that basic changes in social structure were required. See his "Population policy ..." (1967), particularly p. 733. For a review of communications aspects of family-planning programmes of countries in the ECAFE region, see United Nations, Economic Commission for Asia and the Far East, *Communications in Family Planning* ... (1968), pp. 11-17.

<sup>250</sup> For example, see United Nations, Economic Commission for Asia and the Far East, *Communications in Family Planning* ... (1968), p. 11; United Nations, *Measures, Policies and Programmes* ... (1972), chap. V.

<sup>251</sup> See the summary of provisions for family planning in successive development plans of India and Pakistan in chapter XVI, section E. See also United Nations, Economic Commission for Asia and the Far East, *Administrative Aspects of Family Planning* ... (1966), pp. 7 and 9.

<sup>252</sup> Chen, "China's birth control action programme" (1970); Organski and Organski, *Population and World Power* (1961), pp. 215-222; Han, "Family planning in China" (1971); Tchang, Mao and Hou, "La loi de population en régime socialiste ..." (1959). See also China, *Proposals of the Eighth National Congress* ...

(Continued on next page)

121. Iran and the Republic of Korea adopted a policy of regulating births in the early 1960s, and a few years later three other Asian countries—Ceylon, Malaysia and Singapore—and Turkey, which has both Asian and European influences, took similar action.<sup>253</sup> Thus, nations of Asia, where problems of development were among the most critical, played a leading role in shaping world opinion as to the merits of regulating births as an aid to national and individual well-being.<sup>254</sup> By 1966 eight countries of other regions had undertaken a similar policy and made provisions for implementing it. In addition to Barbados, Fiji and Jamaica, these countries included five in Africa—Kenya, Mauritius, Morocco, Tunisia and the United Arab Republic.<sup>255</sup>

122. By the end of 1966, the regulation of fertility had become official policy in at least sixteen developing countries, one half of which were in Asia. These countries contained about 31 per cent of the 1966 population of the world's developing regions. But if China, about whose policy there was some question, is added, the figure would be about 59 per cent.<sup>256</sup>

123. Important increases occurred in the late 1960s in the number of countries adopting a policy to lower the birth rate. This trend was undoubtedly influenced by the international concern for problems of development and by the deliberations within the United Nations and its specialized agencies during the years 1962 to 1966.<sup>257</sup> The dialogue not only generated increased awareness of the interrelationship between the population factor and economic and social development, but also helped to crystallize opinion relevant to policy formulation.<sup>258</sup>

124. As a result of the increased momentum, around the middle of 1970 thirty-three countries could be said to have adopted official policies aimed at facilitating the spread of birth control on a voluntary basis.<sup>259</sup> The

(Footnote 252 continued)

(1956), p. 99; Freeberne, "Birth control in China" (1964); Thompson and Lewis, *Population Problems* (1965), pp. 556-561. In an interview with Premier Chou En-lai in 1964, the journalist and author Edgar Snow was told that the Government of China hoped to see its annual rate of population growth fall below 2 per cent by 1970. Snow, "Population care and control" (1971), p. 8.

<sup>253</sup> Government statements regarding family planning extracted from the development plans or other official sources of these countries are contained in United Nations, "Governmental policy statements . . ." (1970).

<sup>254</sup> See the discussion in United Nations, Economic Commission for Asia and the Far East, *The Asian Population Conference, 1963* (1964), particularly pp. 52, 54-55.

<sup>255</sup> See the government statements reproduced in United Nations, "Government policy statements . . ." (1970).

<sup>256</sup> Thompson and Lewis have indicated that, because of the sudden changes in China's population policy, "it is necessary to make a very significant reservation as to the proportion of the population in the under-developed countries . . . that will be consistently assisted by their governments . . ." in controlling population growth. Thompson and Lewis, *Population Problems* (1965), p. 562.

<sup>257</sup> See United Nations, *The World Population Situation in 1970* (1971), chap. 7.

<sup>258</sup> These views are reflected in United Nations, *Inquiry among Governments . . .* (1964); ———, Economic Commission for Asia and the Far East, *The Asian Population Conference, 1963* (1964), pp. 29-35.

<sup>259</sup> Such policies also existed in Taiwan and in the French Overseas Departments. See United Nations, "Governmental policy statements . . ." (1970), p. 17.

combined population of these countries amounted to about three fourths of the total in developing regions.<sup>260</sup> Included are eight countries in Africa—Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria and Tunisia; fourteen in Asia—Afghanistan, Ceylon, China, India, Indonesia, Iran, the Republic of Korea, Malaysia, Nepal, Pakistan, the Philippines, Singapore, Thailand and Turkey; ten in Latin America—Barbados, Chile, Colombia, Costa Rica, the Dominican Republic, Honduras, Jamaica, Nicaragua, Panama and Trinidad and Tobago; and Fiji in Oceania.<sup>261</sup>

125. The regulation of fertility, however, is as yet far from commonplace in most of these countries, as the announcement of a policy merely implies that the government is committed to making available the knowledge and means whereby individuals who so desire may control the number and spacing of births.<sup>262</sup> In actuality, family planning facilities are often unevenly distributed throughout a country so that not all segments of the population have equal access to them.<sup>263</sup> On the other hand, family planning programmes have been carried out on a fairly large scale and with government support in some countries where no official declaration of policy has been made.<sup>264</sup> All in all, despite the rapid growth in the number of countries adopting policies aimed at reducing birth rates, the vast majority of the population of developing regions still lacks the knowledge and means for birth control.

#### 4. THE NATIONAL FAMILY PLANNING PROGRAMME

126. Governments which have adopted a policy of bringing about a voluntary reduction of births have typically established a national family planning programme. Such programmes have also been adopted or supported by some Governments which do not have a formal population-limitation policy. Family-planning programmes are relatively new and still in the process of evolving, and are intended to fulfil a number of requirements simultaneously. These include inducing behavioural change on a voluntary basis; providing individuals with the means of achieving desired family size; improving the health and well-being of family members, particularly mothers and young children; and facilitating a reduction of population growth rates. Some of these aims are overlapping, or even conflicting in certain respects. The main reasons why family planning is usually the first step taken

<sup>260</sup> If China, whose policy at particular times has been somewhat uncertain, is not included, the figure drops to about 47 per cent.

<sup>261</sup> It should be noted that the Government of Ceylon later shifted from a policy of reducing the birth rate to a position of providing support for family planning programmes in the interest of maternal and child health. See Nortman, "Population and family planning programs . . ." (1971), p. 20.

<sup>262</sup> United Nations, *Measures, Policies and Programmes . . .* (1972), chap. II, sections A-2(a) and A-3. Although the programmes in these countries are based upon the principle of voluntary parenthood, abortion is still restricted in most of them, so that in the case of contraceptive failure the principle may not find support.

<sup>263</sup> United Nations, *1967 Report on the World Social Situation* (1969), p. 19.

<sup>264</sup> *Ibid.*, pp. 19-20; United Nations, *Measures, Policies and Programmes . . .* (1972), chap. II, section A-2(b).



in a population-control policy have been suggested by Berelson. He indicates that family planning is likely to be acceptable from a political standpoint because it can be perceived as a health measure, because it is voluntary, and because it promotes personal freedom by enabling couples to have the number of children desired. In addition, it is a gradual effort, and can be relatively inexpensive.<sup>265</sup> Family planning programmes are not, as many have stressed, considered by the Governments as alternatives to economic and social development.<sup>266</sup>

127. It is worth noting that in contributing to the improved health of women, family planning programmes may exert certain influences favourable to higher fertility. By emphasizing birth spacing, they may help to alleviate sub-fecundity and secondary sterility and to lower the incidence of prematurity. Pathological conditions that afflict the reproductive organs, such as venereal disease, may also be detected and treated when patients seek assistance with fertility problems.<sup>267</sup>

#### (a) Some salient features

128. The national family planning programmes are often elaborate schemes, designed to obtain maximum use of available resources for spreading knowledge about the value and means of family-size limitation and birth spacing, and for providing at little or no cost birth-limitation services and supplies. Although the programmes differ in organization, scope and provisions from country to country, depending, *inter alia*, upon the level of economic and social development and the size of the country, some or all of the following activities are involved: (a) acquisition and maintenance of buildings and equipment; (b) staffing of clinics and administrative offices and the recruitment and training of medical, para-medical, clerical, administrative and other personnel; (c) the setting of targets as to the number and characteristics of persons to be reached by the programme, and their recruitment; (d) provision of medical, social and related services pertaining to the adoption and use of contraceptives or other methods of birth control; (e) selection of contraceptive method(s) to be used, and provision for their supply and distribution; (f) the development of effective communications, including the use of mass media, to supply information and influence motivations; (g) allotment of financial and other resources at local, regional and national levels; (h) record-keeping, for example of

the characteristics of clients and the services rendered to them, as well as of the performance of staff; (i) processing, publishing and feeding back the recorded information to those staff who require it; and (j) evaluation of the performance of staff, of the machinery, and of the demographic impact of the programme. Such an endeavour involves a number of government departments, e.g., health, social welfare, education, and finance, but authority rests more often with the Ministry of Health. Some Governments have established a separate family-planning agency.<sup>268</sup> Normally, and particularly in the larger countries, responsibilities for implementing the programme are carried out at local, regional and national levels, with the smaller units reporting to the next larger unit.<sup>269</sup>

129. National family planning programmes generally promote the use of contraceptives as the most suitable means of regulating fertility. None of the countries that has implemented such a programme has on its statutes a law restricting their availability or use. On the contrary, the intention of such programmes is to have all women at the risk of pregnancy choose the means that will enable them to control conception.<sup>270</sup> It is therefore desirable that a number of methods be offered, and the trend in fact has been towards a multimethod approach, although a few programmes still rely heavily upon a single method.<sup>271</sup> The means of family limitation offered to acceptors of family-planning programmes—i.e., contraception, sterilization and, in rare instances, abortion—may also be available and legal in the private sectors of countries with family planning programmes, as well as in countries which do not have such programmes.

130. Generally, induced abortion is illegal in the developing countries,<sup>272</sup> and few countries with family planning programmes have included induced abortion among the approved methods of spacing and limiting births. In some, however, abortion within the programme is tolerated, if not encouraged.<sup>273</sup> Tunisia has enacted legislation that permits abortion for women within three months after conception provided they have at least

<sup>265</sup> Berelson, "Beyond family planning" (1969), p. 1.

<sup>266</sup> United Nations, *Report on an Evaluation of the Family Planning Programme of the Government of Pakistan* (1969), particularly p. 11; ———, *An Evaluation of the Family Planning Programme of the Government of India* (1969), particularly pp. 9, 28; Nortman, "Population and family planning..." (1970), p. 4; Raina, "Possible effects of public policy..." (1967).

<sup>267</sup> World Health Organization, *The Organization and Administration...* (1969), pp. 19-20; United Nations, Economic Commission for Africa, *Report of the Seminar on Application...* (1969), p. 18. Husein reported that about one third of new family-planning clinic patients in the United Arab Republic programme requested treatment for sterility. Husein, "Evaluation of progress in fertility..." (1967), p. 143. Commenting on zones of low fertility in Africa, Dow observed that since they result from sterility rather than voluntary birth limitation, improved conditions are likely to lead to higher fertility. Dow, "Fertility and family-planning in Africa" (1970), p. 447.

<sup>268</sup> The following articles are among many which describe some features of family-planning programmes in particular countries. Kanagaratnam and Pakshong, "Population programme in Singapore" (1969); Chandrasekhar, "How India is tackling..." (1968); Jafarey *et al.*, "Use of medical - paramedical personnel..." (1968); Povey and Brown, "Tunisia's experience..." (1968); United Nations, Economic Commission for Asia and the Far East, *Administrative Aspects of Family Planning...* (1966), pp. 6-13; United Nations, *Report on an Evaluation of the Family Planning...* (1969). For more general discussions of various aspects of family-planning programmes see Wishik, "Community programs to modify..." (1965); Freymann, "Organizational structure..." (1966); Yang, "Planning the program" (1966); Fişek, "Problems in starting a program" (1966); Hsu, "Personnel problems in family planning programs" (1966), pp. 335-343.

<sup>269</sup> On the administrative organization of family planning in Pakistan, for example, see United Nations, *Report on an Evaluation of the Family Planning...* (1969), particularly pp. 22-23.

<sup>270</sup> For a discussion of the advantages and disadvantages of different types of contraceptives, see Segal and Tietze, "Contraceptive technology: current and..." (1969).

<sup>271</sup> Potter, "Inadequacy of a one-method..." (1971), p. 1.

<sup>272</sup> Ledbetter, "Abortion as social policy..." (1971), p. 10.

<sup>273</sup> Potter, "Inadequacy of a one-method..." (1971), p. 1.



five living children, or if their health would be threatened by the continuation of the pregnancy.<sup>274</sup> Morocco has a similar legal provision.<sup>275</sup> China (except Taiwan) permits abortion for humanitarian reasons, provided that the period of gestation is three months or less and the woman did not have an abortion within the previous twelve months.<sup>276</sup> Liberalized abortion laws in aid of fertility regulation were enacted in Singapore in 1969,<sup>277</sup> and in India in 1971.<sup>278</sup> China (Taiwan) has considered, but not enacted legislation to permit a liberalization of abortion laws. Officials in some of these countries have expressed reservations as to the adequacy of medical resources to meet the health demand that more lenient abortion laws would create.<sup>279</sup>

131. Sterilization as an instrument of family limitation is still controversial in many parts of the world. It is one of the methods of birth control employed in some measure by national family planning programmes for example, in Ceylon, China (Taiwan), Hong Kong, India, Malaysia, Nepal, Pakistan, the Republic of Korea, Thailand and Tunisia;<sup>280</sup> and it may also be available outside, or in the absence of, a family planning programme.

132. The laws permitting sterilizations vary. In some of the countries, it is stipulated that a woman or couple must have had a certain number of children, or that a man must be within a certain age category or have had at least a specified number of children, while in others there are no such qualifications.<sup>281</sup> However, Presser found, on the basis of an extensive survey, that sterilization for birth-control purposes has so far been practised only on a very limited scale except in India, through the national family planning programme, and in Puerto Rico, which does not have a national family planning programme.<sup>282</sup>

#### (b) Policy considerations affecting programme impact

133. The measure of success achieved by national family planning programmes is affected by policy considerations relating to most of the various activities involved in these programmes, which have been enumerated earlier. For example, a decision to promote a programme of birth spacing rather than of the limitation of completed family size may influence efficiency of contraceptive

practice, and, hence, of programme impact. Potter has found that couples desiring two children, for example, will practice contraception more effectively if they have the two children that they want than if they have one child or no children. He suggested that as long as spacing is the purpose of contraception, its effectiveness is low, possibly because "a substantial minority of couples" take chances.<sup>283</sup>

134. The contraceptive method chosen as the primary one to be offered in a programme is another policy measure that can influence contraceptive practice and its efficiency. The methods vary in respect to effectiveness, and rates at which couples continue to apply a contraceptive also appear to depend upon the type of method, among other things.<sup>284</sup> It has been shown, for example, that the continuation rate for the pill is considerably lower than that for intra-uterine contraception.<sup>285</sup> In a study which compared the effectiveness of oral and intra-uterine contraception, however, Tietze concluded that the former is much more effective in preventing pregnancy than the intra-uterine device (IUD). Analysing data on over 477,000 woman-months of IUD use and on 270,000 cycles of oral contraceptive medication, he found that IUD users had a pregnancy rate of two to three per 100 women during the first year of use, while the users of oral contraceptives had a pregnancy rate per 1,000 women per year which varied from 0.7 to 1.4, depending upon the type of medication.<sup>286</sup>

135. A decision to emphasize voluntary sterilization, rather than contraception in family planning programmes can also influence the birth-rate.<sup>287</sup> Narain has shown that in India the average age of women at sterilization is higher than at adoption of the IUD, for example. He found that 62.8 per cent of Indian couples with four or more living children adopted sterilization, while 55.7 per cent adopted the IUD. Also, when sterilization was the method of choice, the average age of females was 32.2, whereas initial adoption of the IUD occurred when the woman was, on the average, 29.4 years old.<sup>288</sup> However, the IUD obviously has lower use-effectiveness and continuation rates.

136. Provisions as to the number of living children, age at sterilization, and choice of spouse for the operation are additional important policy decisions. Both wide prevalence and early timing appear to be requirements if voluntary sterilization is to have a notable impact. Citing Puerto Rico, Presser points out that, both in the late 1940s, when only small percentages of women had been

<sup>274</sup> Tunisia, "Loi No. 65-24 du 1<sup>er</sup> juillet 1965 (2 rabia I 1385), relative à l'avortement" (1965), p. 826.

<sup>275</sup> Morocco, *Bulletin officiel* (1967), pp. 773-774.

<sup>276</sup> Tien, "Induced abortion and ..." (1963), pp. 40-41.

<sup>277</sup> Singapore, "The Abortion Act, 1969" (1970).

<sup>278</sup> International Planned Parenthood Federation, "Abortion law reform in India" (1971), p. 3.

<sup>279</sup> United Nations, *Measures, Policies and Programmes ...* (1972), chap. I, section C-1. See also United Nations, *An Evaluation of the Family Planning Programme ...* (1969), p. 43.

<sup>280</sup> Presser, "Voluntary sterilization ..." (1970), pp. 10-13.

<sup>281</sup> Van Camelbeke, "La régulation des naissances ..." (1963), pp. 2217-2218; Presser, "Voluntary sterilization ..." (1970), pp. 30-31.

<sup>282</sup> Presser, "Voluntary sterilization ..." (1970), p. 1. On attitudes towards sterilization among different segments of the population of India see, for example, Chitre, Saxena and Ranganathan, "Motivation for vasectomy" (1964) and Gupta, "Attitude towards sterilisation ..." (1965).

<sup>283</sup> Potter, "Application of life table techniques ..." (1966), p. 302.

<sup>284</sup> See, for example, Tietze, "The clinical effectiveness ..." (1959); Southam, "Contraceptive methods ..." (1966), pp. 385-386; see also Chandrasekaran and Kuder, *Family Planning ...* (1965), particularly chaps. 10 and 12.

<sup>285</sup> Worth *et al.*, "Korea/Taiwan, 1970 ..." (1971), p. 64.

<sup>286</sup> Tietze, "Oral and intra-uterine contraception" (1968), pp. 378-382.

<sup>287</sup> Presser pointed out that estimates of births prevented by sterilization in Puerto Rico far exceed estimates of births prevented elsewhere by use of the IUD or oral contraceptives. See her "Voluntary sterilization ..." (1970), p. 17.

<sup>288</sup> Narain, "India: the family planning ..." (1968), p. 3.

sterilized, and in 1953-1954, when sterilization had reached significant proportions but generally occurred after a relatively large number of pregnancies, the demographic impact was minimal. By 1965, however, the role of sterilization as a control agent had achieved greater importance; at that time about one third of women aged 20 to 49 years who had ever been married were found to have been sterilized, and to have had an average of 3.9 births. The median age at sterilization was about 26 years. On the other hand, in India and Pakistan the operation is usually performed at higher age and parity. Various studies conducted in these countries suggest that the wife is generally in her early thirties at the time of sterilization, which occurs on average when she already has about four or five living children. Presser poses these differences as being among the important reasons for the greater impact of sterilization in Puerto Rico than in the other countries.<sup>289</sup>

137. It has been argued that family planning programmes are likely to be more successful if they are combined with maternal and child health services. A number of reasons have been advanced for this position. In the first place, such a system ensures contact with the most fertile segment of the population and makes it possible to reach the women at a time when they are highly receptive to family planning, during the post-partum period. Moreover, acceptance of family planning is believed to be closely related to reductions in foetal, infant and childhood mortality which can be achieved through the improved health care provided to mothers and children. Finally, the personnel and facilities needed for family planning work are similar to those required for maternal and child care services and it is more convenient for the pregnant woman with children to visit one place for medical care and family planning services than several different ones.<sup>290</sup>

### (c) *Impact of the national family planning programme*

138. The statistical tools and data for measuring, with a reasonable degree of accuracy, the effects of family planning programmes on fertility levels in the community or nation as a whole are as yet insufficiently developed.<sup>291</sup> As Kirk and Hauser among others, have pointed out, there are no satisfactory methods at present for measuring small, short-term fertility changes in most developing countries, where vital statistics are generally of unsatisfactory quality. Moreover, in those few countries where

statistical data of fairly good quality confirm that a fertility decline is under way, such a trend was already evident before the family planning programme was introduced and may be more attributable to economic and social advancement than to the family planning programme. In view of the difficulties of assessing what would have happened in the absence of a programme, no precise measurement of the effects of the programme seem possible.<sup>292</sup> Pointing out that cause and effect can never be proved in the social field with the certainty that applies in the exact sciences, Wolfers urged the adoption of a "principle of greatest probability", according to which a specific programme operating in the midst of other changes of a non-specific nature may be credited with a large share of the specific effects.<sup>293</sup>

139. In the absence of reliable data and techniques by which to assess the effects upon fertility of the family-planning programmes, a wide range of opinions has emerged regarding the extent to which they have achieved the goals set for them. A few writers such as Bogue maintain that the programmes have demonstrated their effectiveness as a means of reducing birth-rates in developing countries and that, with expeditious efforts on the part of administrators, the control of rapid population growth will soon be accomplished.<sup>294</sup>

140. At the other extreme are those who hold that national family-planning programmes cannot sufficiently curb excess population growth, as the programmes usually emphasize the right of the parents to decide the number and spacing of children, and the collective wishes and resultant behaviour of individuals may not add up to what is considered to be the common good. Davis argues that merely making contraception available to all will not reduce fertility to desired levels in the absence of changes in family size desires. Motivation for smaller families depends on changes in family structure, in the position of women and in sexual mores—all of which are outside the scope of family planning programmes.<sup>295</sup> According to the same author, "it is difficult to prove that present population policies have even speeded up a lowering of the birth rate . . .".<sup>296</sup> Blake also has found family planning programmes to be ineffective in lowering fertility among the masses in developing countries because of their superficiality and the fact that they do not aim to deflect people from familial roles, thus passing up the chance to reduce motivation for small families.<sup>297</sup>

141. Few writers, however, subscribe fully to either of these opposing views. Borrie has criticized what he

<sup>289</sup> Presser, "Voluntary sterilization . . ." (1970), pp. 11, 13, and 16; and her "The role of sterilization . . ." (1969). In one study of tubal sterilization in Pakistan, Roberts and his colleagues found that the women were on average 29 years old at the time of sterilization. Roberts *et al.*, "A post-operative study . . ." (1964), p. 98. On the other hand, studies for India and Pakistan which pertained to male sterilizations showed that the average age of the wife was somewhat higher. These findings suggested to Presser that in the case of female sterilizations, the woman was likely to be younger than the wife of a sterilized man at the time of his sterilization. Presser, "Voluntary sterilization . . ." (1970), p. 13.

<sup>290</sup> World Health Organization, *The Organization and Administration . . .* (1969), pp. 18-22; Taylor and Berelson, "Comprehensive family planning . . ." (1971), pp. 22-23.

<sup>291</sup> While new techniques have recently been developed, for example, for measuring the relative effectiveness of different contraceptives, many difficulties remain. Raulet, "Family planning and population control . . ." (1970), p. 227.

<sup>292</sup> Kirk, "Natality in the developing countries . . ." (1969), p. 90; and his "Prospects for reducing natality . . ." (1967), pp. 57-58; Hauser, "Non-family planning methods . . ." (1969), p. 59; and his "Family-planning and . . ." (1967), pp. 405-406. See also Borrie, *The Growth and Control of World Population* (1970), p. 276.

<sup>293</sup> Wolfers, "The means of measurement . . ." (1969), p. 451.

<sup>294</sup> Bogue expects that, owing mainly to family-planning activities, the world population crisis will have been largely solved by the year 2000. See his "The end of the population explosion" (1967), p. 11. A more cautious optimism is expressed by Berelson in "National family planning . . ." (1969), pp. 367-374.

<sup>295</sup> Davis, "Population policy . . ." (1967), pp. 732-734 and his "Will family planning solve the population problem?" (1968).

<sup>296</sup> Davis, "Population policy . . ." (1967), p. 734.

<sup>297</sup> Blake, "Demographic science . . ." (1965), pp. 67-69.

considers Bogue's overly optimistic faith in the capacity of contraceptive technology and crash birth-control programmes to bring population growth under control in the near future in the absence of social and economic change, and given the generally desired family size of around four children. At the same time, Borrie believes that Davis has overstated the case against family planning programmes, which, according to Borrie, aim to reduce growth rates "as a necessary first step in the process of social and economic change".<sup>298</sup>

142. Other writers have commented on the problems of determining the impact of family planning programmes in specific situations. Mauldin has offered the hypothesis that when a secular decline in fertility is not under way, any decrease immediately after initiation of a programme may be attributed to the programme.<sup>299</sup> A programme may also give impetus to a fertility decline which is already in progress.<sup>300</sup> This seems to have occurred in Taiwan and probably also in Hong Kong.<sup>301</sup> Writing of the Taiwan programme, Potter and his associates concluded that birth control practice was increasing before the programme had begun, and birth control outside of the IUD programme had been increasing since. They asserted with some confidence that the several hundred thousand participants in the Taiwan programme had dramatically increased their birth control practice and decreased their fertility since entering the programme.<sup>302</sup> To what extent this would have occurred in the absence of the IUD programme, however, could not be established. Path analysis has been used by Hermalin and others as a means of isolating the effect on declining fertility in Taiwan of the family planning programme from that of changes in some social and economic factors taken to represent modernization. The results were interpreted as showing that the programme had an additional significant effect beyond that of the social and economic factors.<sup>303</sup>

<sup>298</sup> Borrie, *The Growth and Control of World Population* (1970), pp. 273-274.

<sup>299</sup> Mauldin, "Births averted by ..." (1968), p. 2.

<sup>300</sup> Stycos, "Population and family-planning ..." (1964), pp. 170-171.

<sup>301</sup> Concerning Taiwan, see, for example, Chow, "Evaluation of a family planning ..." (1968), p. 307. Freedman and Adlakha considered it plausible that the substantial real decline in marital fertility which took place in Hong Kong between 1965 and 1966 could be accounted for by the introduction of the IUD through the family planning programme. See their "Recent fertility declines ..." (1968), pp. 189-192. Muramatsu has speculated that the Government's efforts in diffusing knowledge of family planning probably speeded the fall of fertility in Japan. Muramatsu, "Policy measures and social changes ..." (1967), p. 98. It was considered that by 1968 the family planning programme had contributed very little to fertility decline in Tunisia. Vallin and Lapham, "Place du planning familial dans l'évolution ..." (1969).

<sup>302</sup> Potter, Freedman and Chow, "Taiwan's family planning program" (1968), pp. 852-853.

<sup>303</sup> Hermalin, "An area analysis ..." (1970), p. 350. See also Freedman *et al.*, "The family planning ..." (1969), pp. 329-339; Freedman and Takeshita, *Family Planning in Taiwan ...* (1969), pp. 308-310. A similar conclusion regarding the impact of the family planning programme in Taiwan was reached by Schultz, who, in addition, attempted to evaluate the effects of different programme inputs, defined in terms of man-months of employment of different types of medical and health workers. Schultz, *Effectiveness of Family Planning ...* (1969), particularly pp. 31, 34-35.

143. In order to evaluate the impact of family planning programmes, various scholars have devised measures of the number of births averted by the programmes. These estimates vary considerably owing to different methods of calculation, as well as for different methods of birth control.

144. Rather widely differing estimates have been obtained concerning births averted by the IUD. Based on experience in Taiwan, Chow estimated that six IUD insertions would prevent one live birth per year.<sup>304</sup> Lee and Isbister estimated that in the Korean programme 1.1-1.9 births would eventually be prevented by each IUD insertion, the range of estimates reflecting different assumptions concerning the ages of women at the time of insertion, and the duration of use of the IUD before its removal.<sup>305</sup> Using a more refined technique and taking account of the fact that some women who adopt the IUD are substituting it for other birth-control methods, Potter obtained lower estimates of births averted than did Chow or Lee and Isbister. His estimate of 0.94 births averted per first IUD insertion was reduced to 0.64 or 0.43, depending on assumptions concerning the methods for which the IUD was substituted.<sup>306</sup>

145. Using an approach somewhat similar to that of Potter's, and based on a study of post-partum women in Singapore, Wolfers calculated that one IUD insertion averted approximately 0.1 births in the first year, 0.23 in the second year and 0.2 in the third year. When account was taken of the fact that women accepting the IUD might have adopted contraception even in the absence of the programme, these estimates were slightly reduced.<sup>307</sup> Chang and his colleagues evaluated the demographic impact of an IUD programme in Taiwan by comparing the fertility decline for IUD acceptors with that for a group of non-acceptors matched with respect to age, education and other characteristics. The resulting estimates of the net effect of the IUD, while lower than in some other studies, were still found to be substantial. The authors concluded that the decline in the fertility rate of the acceptors was about 80 per cent as compared with an average decline of only 48 per cent among the "matches".<sup>308</sup> It must be emphasized that estimates derived from different studies are not comparable because of the different methods and assumptions used.

146. Various scholars have calculated the effects of hypothetical sterilization targets on the birth-rate in India, with widely differing results. Gopalaswami argued, for example, that acceptance of sterilization by 5 per 1,000 population annually could reduce the Indian birth-rate by 12 points in a decade.<sup>309</sup> Others, such as Agar-

<sup>304</sup> Chow, "Evaluation of a family planning ..." (1967), p. 269.

<sup>305</sup> Lee and Isbister, "The impact of birth control ..." (1966), p. 748.

<sup>306</sup> Potter, "Estimating births averted ..." (1969), pp. 428-432.

<sup>307</sup> Wolfers, "The demographic effect ..." (1969), p. 140.

<sup>308</sup> Chang, Liu and Chow, "Study by matching ..." (1969), pp. 140-143. The study covered persons accepting the IUD for the first time in 1964, 1965 and 1966, the cut-off date for the period of observation being 31 December 1967.

<sup>309</sup> Gopalaswami, "Family planning ..." (1962), pp. 77-78. For other estimates of the effect of a large-scale sterilization campaign, see Sarma, "Demographic effects ..." (1963).

wala, however, held such estimates to be overly optimistic. His own calculations suggested a more likely decline of only about 5.5 points in ten years.<sup>310</sup>

147. Very few estimates have been made of births averted by oral contraceptives and by conventional contraceptives, partly no doubt because of the difficulties in establishing use-continuation rates for these methods of birth-control.<sup>311</sup> Potter has attempted to make such estimates, however, using a theoretical model incorporating various assumptions regarding the conditions and circumstances of oral contraceptive use. Depending on such assumptions as whether the pill is used alone, in place of another contraceptive, or as a supplement to another contraceptive, births averted by one segment of contraception (that is, for the period of usage between initiation and interruption) were found to vary from 0.09 to 0.74.<sup>312</sup>

148. As mentioned above, abortion has only rarely been included as an approved method of birth limitation in family planning programmes of developing countries, and in the few countries having such provisions there are as yet no studies of the impact on the birth-rate. However, some theoretical studies have recently been developed to estimate the effect of abortions in reducing births (see section C above).

149. Ridker, after reviewing the programmes of several countries, concluded: "While there can be no doubt that current family planning programmes will have some significant impact, it is very unlikely that by themselves they can achieve anything like what has come to be considered an acceptable target. Methods with a sharper cutting edge must be added."<sup>313</sup> These findings are generally supported in the writings of several scholars, including Hauser, who stated: "To achieve fertility control, present family planning programmes must recognize the role of abortion as supplementary to conception control; must adopt the objective of ... [inducing] couples to desire a replacement level number of children; and may have to consider the abandonment of voluntarism in favour of sanctions and incentives."<sup>314</sup>

## 5. NON-FAMILY PLANNING MEASURES TO REDUCE FERTILITY

150. Because of the magnitude of the problems posed by rapid population growth and the relatively slow rate at which fertility is declining in response to family plan-

<sup>310</sup> Agarwala, "Sterilization as a population ..." (1964), p. 1,091; Agarwala, "The arithmetic of sterilization in India" (1966), p. 213. See also Haynes *et al.*, "A study on the effectiveness of sterilizations ..." (1969).

<sup>311</sup> Concerning estimates of continuation rates for the oral pill, see Jones and Mauldin, "Use of oral contraceptives ..." (1967), p. 5. An attempt has been made in Pakistan to develop methods for estimating "couple years of protection", taking into account the extent of use of conventional contraceptives, IUD's, vasectomies and tubal ligations. See Mauldin, "Births averted by ..." (1968), p. 6.

<sup>312</sup> Potter, "Births averted by ..." (1970), pp. 251, 269.

<sup>313</sup> Ridker, "Desired family size and the efficacy ..." (1969), p. 279. The author expressed the view that more efforts are required to increase motivation for small families, and suggested monetary incentives as a possibility.

<sup>314</sup> Hauser, "Non-family planning methods ..." (1969), p. 66.

ning programmes alone, a broader approach to the question of population control has been advocated by some writers on the subject and a variety of proposals for limiting population growth have been made which go "beyond family planning".<sup>315</sup> Among such proposals have been: "higher legal age at marriage; greater educational, recreational, and employment opportunities for women; bonus payments for periods of non-pregnancy; tax incentives not to have children; tax penalties for too many children; societal tolerance of deviant sexual behavior such as homosexuality; compulsory sterilization after a certain number of children; and so on".<sup>316</sup> As can be seen, these proposals vary as to financial costs, the degree of coercion involved, the extent to which they are compatible with existing cultural patterns, the feasibility of putting them into practice, their potential for success in terms of lowering fertility etc. A few of the more moderate proposals, some of which have been adopted or are under consideration in some countries, are discussed below.

151. Among laws relating to marriage, divorce and remarriage that have implications for fertility conditions and trends, the most important are those governing legal age of consent to marriage and the conditions in which parents may permit marriage at ages below that of legal consent.<sup>317</sup>

152. Several countries have raised the minimum marriageable age in the interest of reducing population growth rates. The Government of China had raised the minimum ages to 18 for females and 20 for males in 1950.<sup>318</sup> In Pakistan, the minimum age at marriage for girls was advanced from 14 to 16 years in 1961.<sup>319</sup> The Government of India in 1949, advanced the marriageable age for girls from 14 to 15.<sup>320</sup> Other countries such as Ghana have also indicated their intention of considering modifications in policy regarding age at marriage.<sup>321</sup> Among the legal reforms enacted in Tunisia as part of its population programme which began in 1964 were the prohibition of polygamy and the advancement of marriage age to past 20 for men and 17 for women.<sup>322</sup> In a recommendation

<sup>315</sup> For a summary, see Berelson, "Beyond family planning" (1969).

<sup>316</sup> Nortman, "Population and family planning problems ..." (1970), p. 4. For a discussion of specific proposals see, for example, Blake, "Reproductive motivation ..." (1971), pp. 219-220; Robinson and Horlacher, "Population growth ..." (1971), pp. 31-32.

<sup>317</sup> A discussion is provided in Eldridge, *Population Policies: a Survey* ... (1954), pp. 119-121; and United Nations, *Measures, Policies and Programmes* ... (1972), chap. I, section D-1.

<sup>318</sup> Chen, "China's birth control action programme ..." (1970), p. 153; Huang, "Birth control education campaigns" (1971), pp. 25-26; Chen, "Birth control, late marriage ..." (1957). Around 1970, the "recommended" minimum age at marriage was 25 for women and 28-30 for men. Although these recommendations had not been embodied in law, society exerted pressure for conformity. See Snow, "Population care and control" (1971), p. 6; Han, "Family planning in China" (1971), p. 21.

<sup>319</sup> Pakistan, *The Muslim Family Laws Ordinance* ... (1961), p. 4.

<sup>320</sup> Sastry, *The Child Marriage Restraint Act* ... (1949), p. 5.

<sup>321</sup> See Ghana, *Population Planning for National Progress and Prosperity* ... (1969), p. 21.

<sup>322</sup> Daly, "The basic aspects of population programmes in Tunisia" (1970), p. 48.

to the Government of Mauritius regarding means of reducing fertility in that country, Titmuss and Abel-Smith proposed, *inter alia*, a marriageable age of 18 for girls; the age at that time (1960) was 15.<sup>323</sup>

153. In view of the difficulties of enforcing laws relating to age at marriage, passage of legislation altering the minimum marriage age is not necessarily an indication that changes will take place.<sup>324</sup> Students of Indian demography have been particularly interested in the possible effect upon fertility of measures raising the minimum marriageable age in that country, a step which the Government has taken as part of its policy to lower fertility rates.<sup>325</sup> Although there is wide disagreement in India and elsewhere as to the quantitative effects of such measures, there nevertheless appears to be some accord that age at marriage does influence fertility levels where contraception is not widely or effectively practised.<sup>326</sup>

154. There is no evidence that nations pursuing a policy aimed at lowering fertility have enacted laws or implemented measures relative to divorce, legal separation or marriage as instruments of this policy. In India, the Hindu Marriage Act of 1955 required that both wife and husband should wait at least one year before remarriage after a divorce has been granted,<sup>327</sup> but this appears to represent social rather than population policy.

155. Most of the Governments of developing countries which have enunciated a policy to reduce fertility include within their broad plans for economic and social development various measures which may indirectly support their population policy aims. These include, *inter alia*, programmes to eradicate illiteracy and raise educational standards, and efforts to promote industrialization which may open employment opportunities for women in a setting more conducive to lower fertility levels. A few Governments have specifically called attention to the relation between such aspects of their development programmes and their population problems. Thus, the Governments of both India and Pakistan have cited advancements in the education of women and the provision of more employment opportunities for them as being likely to promote family planning.<sup>328</sup> It has been stated that the family planning programme in Tunisia should be viewed as an integral part of the move towards emancipation of Tunisian

women.<sup>329</sup> There appear to be few instances of Governments adopting measures to improve the status of women for the purpose of reducing fertility levels. In fact, owing to the lack of adequate studies, little is known of the ways in which improvements in the status of women may influence family size.

156. In general, there appears to have been little recourse by Governments to the application of various economic incentives and disincentives as a means of inducing couples to control fertility. There are a number of reasons for this. To begin with, most developing countries provide relatively little in the way of children's benefits. Moreover, their discontinuance where they do exist would inflict a hardship on children in large families,<sup>330</sup> and would represent retrogressive social policy. Tax reforms directed at lowering fertility have been deemed of little importance, because most families in developing regions have incomes well below the taxable level.<sup>331</sup> Finally, the effect of such measures in bringing about the desired fertility changes has been questioned. For example, Sauvy holds that family allowances in developing countries do not increase birth rates, which are "already maximal".<sup>332</sup> Similarly, Whitney has observed that whether or not a developing country has a form of family or children's allowance is apparently unrelated to the level of fertility.<sup>333</sup> On the other hand, it has been argued forcibly that incentive payments to families that limit births would have the desired effect.<sup>334</sup>

157. Some Governments have implemented, or studied the feasibility of instituting, such measures, however. The Government of India in 1965 eliminated a tax discrimination against unmarried persons.<sup>335</sup> Tunisia limits family allowances to the first four living children for wage-earners.<sup>336</sup> The Government of Ghana proposed, in a very comprehensive population policy statement, to re-examine and, if necessary, to modify policy awarding maternity benefits and tax benefits for large families and to implement other disincentives to building large families.<sup>337</sup> In recommending a population policy for Mauritius, Titmuss and his colleagues proposed a series of integrated social incentives as well as disincentives for lowering fertility. In order to encourage later marriage,

<sup>323</sup> Titmuss and Abel-Smith, *Social Policies and Population Growth* . . . (1961), pp. 242-243. These experts also proposed inducements that would in many cases advance the age to 21.

<sup>324</sup> See, for example, Majumdar and Das Gupta, "Marriage trends and . . ." (1969), p. 499 and United Nations, *Report on the Family Planning Programme in India* (1966), p. 86.

<sup>325</sup> The following are among the many articles on this subject: Agarwala, "Effects of a rise in female marriage age . . ." (1967); Basavarajappa and Belvalgidad, "Changes in age at marriage . . ." (1967); Talwar, "A note on changes in age . . ." (1967); Majumdar and Das Gupta, "Marriage trends . . ." (1969); Das, "A note on the effect . . ." (1967).

<sup>326</sup> See for example, Coale and Tye, "The significance of age-patterns . . ." (1961), p. 645 and Ryder, "The character of modern fertility" (1967), p. 30.

<sup>327</sup> Lal, *Law of Marriage and Divorce in India* (1956), p. 32.

<sup>328</sup> See the statements extracted from the government development plans in United Nations, "Government policy statements . . ." (1970), pp. 5, 7.

<sup>329</sup> Daly, "The basic aspects of population programmes in Tunisia" (1970), p. 49.

<sup>330</sup> Notestein, Kirk and Segal, "The problem of population control" (1969), p. 164.

<sup>331</sup> United Nations, *Measures, Policies and Programmes* . . . (1972), chap. I, section A-2. See also Berelson, "Beyond family planning" (1969), p. 10.

<sup>332</sup> Sauvy, *De Malthus à Mao Tsé-toung* . . . (1958), p. 217.

<sup>333</sup> Whitney, "Fertility trends and children's allowance programs" (1968), p. 133.

<sup>334</sup> See, for example, Enke, "The gains to India . . ." (1960), p. 175. Simon proposed that bonuses should be used to supplement information campaigns and urged that research be undertaken to determine their effects. See his "The role of bonuses . . ." (1968), p. 410.

<sup>335</sup> Raina, "Possible effects of public policy . . ." (1967), p. 102.

<sup>336</sup> Daly, "The basic aspects of population programmes in Tunisia" (1970), p. 48.

<sup>337</sup> Ghana, *Population Planning for National Progress and Prosperity* . . . (1969), p. 21.

they proposed the payment of a "marriage benefit" to the father of a bride, provided that both bride and groom were at least 21 years old, and that certain other conditions were met. Among their other proposals were the payment of maternity benefits under conditions that would encourage birth spacing, and a revision of the family allowance system so that there would be no increase in payments to families with more than three children.<sup>338</sup>

158. Much more attention has been given to the impact of demographic measures than to the influence of social and economic measures upon fertility, with the result that less is known of the effect of the latter. This constitutes an important gap in knowledge, and points to the considerable need for systematic research in this sphere.

## 6. PRO-NATALIST POLICIES

159. A few of the economically less advanced nations have specified a variety of conditions for which a higher rate of population growth is considered to be advantageous. These nations are mainly in Africa, and include Madagascar, Malawi and Zambia. In general, the view is that a higher rate of population growth, including a growing labour force, would be an aid to the development of resources. Sparse settlement and attendant difficulties of providing an adequate infrastructure have also been cited.<sup>339</sup>

160. The measures employed in support of pro-natalist policies differ somewhat among developed and developing nations. In the former, as noted in section C above, extensive family allowances, favourable taxation, awards for motherhood and other inducements to large families are coupled with restrictions against birth control measures, usually contraceptives and abortion. But while some pro-natalist developing nations provide allowances for children,<sup>340</sup> restrictive measures are more common, possibly because large-scale social programmes are economically unfeasible. In this connexion, it is of interest that some countries of Africa south of the Sahara have banned the import and sale of contraceptives,<sup>341</sup> and that these countries are characterized by a high to very high birth rate. However, it appears that the existing high levels of fertility in these countries are more closely

related to their very modest level of development than to the restrictive legislation concerning contraceptives, and even if contraceptives were readily available, it is unlikely that the demand for them would be very great. Whitney has pointed out that the availability of modern contraception—such as that banned by the African nations in question—is not likely in itself to result in falling birth rates.<sup>342</sup> As Freedman and others have observed, fertility will ordinarily not decline in the circumstances that prevail among the vast majority of people in these countries.<sup>343</sup>

## E. Conclusion and outlook

161. Although the subject of population policy is much broader, the present chapter focuses on the evolution of policies affecting fertility, particularly during the past twenty years. Such a time perspective is rather narrow, since it must be recognized that a profound modification of demographic trends, as further interrelated with the concurrent changes in the age structure of the population, will probably require a long time to mature.<sup>344</sup>

162. While current developments must be viewed in the framework of an extensive time perspective, the events of the 1950s and 1960s mark a radical change in public attitudes vitally affecting long-run prospects in the progress and development of the body of mankind. Prior to 1950 there had hardly ever been an explicit policy aiming at the restriction of human fertility,<sup>345</sup> though there have been, and still exist, many policies, mores and religious attitudes tending in the opposite direction. By 1970 Governments involved in the destiny of more than one-half of the world's inhabitants have pronounced themselves in favour of measures by which the increase in human numbers should be brought progressively under control. This response is remarkable when it is considered that throughout past history the size and growth of a population were nearly always considered as evidence of good government.

163. This almost sudden emergence of a new public disposition is related to the recent large acceleration of population growth in many countries. No such acceleration occurred between 1920 and 1950, but then, within a short time, an unsuspected growth potential was

<sup>338</sup> Titmuss and Abel-Smith, *Social Policies and Population Growth* ... (1961), pp. 130-135.

<sup>339</sup> United Nations, *The World Population Situation in 1970* (1971), para. 311; ———, Economic Commission for Africa, "Report of the Seminar on application ..." (1969), p. 16. It has been pointed out also that policies adopted by densely populated, low-income countries may not be appropriate for all of Latin America. See United Nations, *Social Change and Social Development* ... (1970), pp. 287-296.

<sup>340</sup> For a survey of family allowance programmes in different countries, see United States, Social Security Administration, *Social Security Programs Throughout the World* (1967) and Iyer, "Degree of protection ..." (1966), pp. 484-485.

<sup>341</sup> Two of these are the Ivory Coast and Upper Volta. United Nations, *The World Population Situation in 1970* (1971), chap. 7. The importation of contraceptives has also been made difficult in a number of other countries of Francophone Africa. Heisel, "The emergence of population policies ..." (1971), p. 33; United Nations, *Measures, Policies and Programmes* ... (1972), chap. II, section A-2(c).

<sup>342</sup> Whitney, "Fertility trends and children's ..." (1968), p. 125.

<sup>343</sup> See the discussion earlier in this section.

<sup>344</sup> See Bourgeois-Pichat and Taleb, "Un taux d'accroissement nul ..." (1970). The authors argue that on the optimistic assumption of the attainment of mortality and fertility levels consistent with an eventual stationary population by a less developed country within thirty years, the eventual stability of the population will be attained only in the course of a century, by which time the size of the population may still grow about fourfold. The crucial factor in the attainment of stability is the eventual rise in the crude death rate as a consequence of the increased proportion of the population at advanced ages, resulting from low fertility in the long run.

<sup>345</sup> Customs such as human sacrifice in ancient Carthage and pre-Hispanic Mexico, the exposure of weak children in ancient Sparta, the separation of the sexes among populations kept in a state of slavery or indentured labour and the dedication of each oldest son to celibate monkhood in pre-modern Mongolia may be cited as having had restrictive effects on population growth. A deliberate intent of population limitation, however, has not been apparent in any of those practices.



released and brought into public awareness. Mortality declines which might have been technically and organizationally feasible in the 1930s and 1940s failed to occur because of the dislocation of financial resources in the former period and the disorganization caused by war in the latter period. Then within a few years following the end of the Second World War an entire battery of new public health methods were brought into operation in wide areas of the world.

164. It is a certain fact that no biological growth, whether of an individual specimen or of an entire species, can continue forever. Even if growth is slow, it must come to a halt at some time. Whether in the near, or only in the remote future, the long-term average rate of world-population growth will eventually have to fluctuate around zero.<sup>346</sup> How long such conditions are likely to be postponed, and how much population growth can still be sustained, cannot be clearly foreseen because of unknown reserves in resources which may still be exploited and incalculable environmental controls which may be established. It seems likely that, concurrent with rapid advances in economic, social and physical development, some multiple of the present size of the world's population can still be accommodated under living conditions which will not appear intolerable. If not, then phases of population growth would inevitably have to alternate with setbacks of a magnitude greater than those ever known in history. In view of man's present and potential future social and cultural attainments, contemplation of such huge catastrophes is almost unbearable.

165. "Zero population growth" in modern times has been witnessed temporarily in France and Austria and, partly owing to net emigration, in Ireland. Because of an unusual age structure, the death rate now exceeds the birth rate in West Berlin. But in the developed countries as a whole, although decisive fertility declines have occurred, population growth still continues at an average

<sup>346</sup> Durand suggests that current population projections are consistent with declining growth rates in the developing regions after the end of the century, and that these rates may decline to about 10 per cent per decade by the year 2040, at which time the world's total population might be around 10,000 million. Even then, the twenty-first century may witness an addition to the world's population greater than that of the twentieth century. Durand, "The modern expansion ..." (1967), p. 145. Commenting along similar lines, the author of a recent study of the Organisation for Economic Co-operation and Development pointed out that for a time declining population growth rates would be offset by increasing absolute numbers, and that only by the second half of the twenty-first century could a substantial absolute decline in population growth be expected. Moreover, world population might reach 14,000-15,000 million before stabilization is achieved. Organisation for Economic Co-operation and Development, *The Food Problem...* (1968), pp. 95-96.

annual rate of nearly 1 per cent—a moderate rate when compared with the growth in less developed countries. With this comparison in view, the authors of a recent study recommend as a goal for high-fertility countries the attainment within two decades of a rate of natural increase of less than 1.5 per cent annually.<sup>347</sup>

166. As pointed out by Davis, however, the attainment of even a moderate rate of population growth is insufficient in the long run.<sup>348</sup> Since this is the level now reached in those countries where individuals are comparatively well-informed and free in their choice of alternatives, it cannot be concluded that family planning programmes, as presently understood, will suffice in solving the population problems of the world at large. The possibility cannot be discarded that more may have to be done eventually so as to commit nations and individuals to the adoption of family norms below those resulting at present from free choice.<sup>349</sup> It is possible, on the other hand, that with further population increases, social and ecological conditions will change so much as to result in individual and public preferences for even a smaller number of children than would be required to ensure stability of numbers. The experience with current family planning programmes has been too short to support any definite opinion regarding their possible long-range development. Since these programmes date back only a few years, their impact has yet to be ascertained.

167. As noted earlier, the field of population policy is broader than that of family planning, and it merges imperceptibly with various other fields of economic and social policy. It is evident, for instance, that under the combined effects of accelerated population growth and rising levels of urbanization, cities and urban regions are very rapidly growing to unprecedented sizes, producing a vast transformation in the form of the human habitat. With the growing complexity of economic systems, there will also have to be closer co-ordination of educational policy, manpower planning, housing and environmental plans, and other programmes, all of them involving population quantities. It seems likely that in the coming years population policy will extend beyond the concern with numbers to embrace also such aspects as the structure and geographic distributions of population.

<sup>347</sup> National Academy of Sciences, *Rapid Population Growth: Consequences and Policy Implications*, vol. 1 ... (1971), p. 95.

<sup>348</sup> Davis, "Population policy ..." (1967).

<sup>349</sup> According to such writers as the Ehrlichs, the explosive growth of human population has already reached a crisis state, and it is questionable whether the drastic measures needed to provide solutions will be adopted in time. Ehrlich and Ehrlich, *Population, Resources, Environment* ... (1970), particularly pp. 321-324.



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