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Aging of populations: Future trends

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Summary

Two questions seem to be of paramount importance with regard to the future trends in the aging of populations. Firstly, is the process of aging likely to continue in the economically advanced and already comparatively aged populations? And secondly, is it likely to extend to the populations which are at present characterized by high mortality and fertility levels and by a comparatively young age composition?

The paper discusses briefly the likely course of mortality and fertility trends in these two types of population, as well as their effect on the number and proportion of old people. For the purpose of illustration some relevant population projections are shown which have been borrowed from recent demographic literature.

The following conclusions have been reached:

The answer to the first question seems to be in the affirmative. Apart from the effect of the expected further decline in mortality at old ages, the aging process will also continue on account of the nature of the present age-composition of these populations.

The prognostication with regard to the less advanced countries is more speculative. Whilst it does not seem that these populations will experience any substantial degree of aging within the life-time of the next generation, the outlook for the more distant future is uncertain, mainly on account of the unpredictability of the future fertility trends.

1/ The author of this paper is a member of the Secretariat of the United Nations. The views presented are his own and not necessarily those of the Secretariat.

* General distribution of this document is limited to the introductory summary. Participants who have been invited to take part in the meeting referred to above will receive also the full text of the paper. Other participants in the Conference will receive the full paper upon request.

Pour la traduction française voir au verso.

Le vieillissement des populations : tendances futures

par Jerzy Berent^{1/}

Résumé. Deux questions semblent présenter une importance capitale en ce qui concerne les tendances futures du vieillissement des populations. En premier lieu, faut-il s'attendre à ce que le processus de vieillissement se poursuive dans les populations économiquement développées et comparativement déjà âgées ? En second lieu, ce processus doit-il s'étendre aux populations qui, à l'heure actuelle, se caractérisent par des taux de mortalité et de fécondité élevés et par une structure relativement jeune ?

Ce document contient une étude succincte de l'évolution probable de la mortalité et de la fécondité pour ces deux types de population, ainsi que de leurs conséquences sur le nombre et la proportion des personnes âgées. Aux fins d'illustration, on a indiqué certaines perspectives démographiques empruntées à de récents ouvrages démographiques.

L'auteur a abouti aux conclusions suivantes :

Il semble qu'on puisse répondre à la première question par l'affirmative. Le processus de vieillissement se poursuivra, non seulement parce que les **taux de la mortalité aux âges élevés accuseront sans doute un nouveau fléchissement**, mais encore étant donné la structure par âge actuelle de ces populations.

En ce qui concerne les pays moins avancés, les pronostics ont un caractère plus spéculatif. Il ne semble pas que, dans ces pays, on doive escompter un vieillissement sensible des populations au cours de la prochaine génération, mais on peut difficilement prédire quelle sera la situation dans un avenir plus éloigné, les tendances futures de la fécondité étant difficilement prévisibles.

^{1/} L'auteur de ce document est membre du Secrétariat de l'Organisation des Nations Unies. Il expose ses vues personnelles qui ne sont pas nécessairement celles du Secrétariat.

^x Seule la présente analyse d'introduction fait l'objet d'une distribution générale. Les participants qui ont été invités à assister à la séance mentionnée ci-dessus recevront en outre le texte intégral du document. Les autres participants au Congrès recevront le texte intégral sur leur demande.

by Jerzy Berent *

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The analysis of historical trends in the age composition of various populations, presented in other papers at this session, has revealed that the aging of populations is one of the most characteristic demographic phenomena encountered in the economically developed countries of the world. At the same time it appeared that the so-called under-developed countries, which still occupy most of the world area and cover the overwhelming majority of the world population have, until now, maintained their comparatively "young" age structure.

It would seem then, that the discussion of the future prospects of aging should be focused on two questions: First, is the process of aging likely to continue in the economically advanced and already comparatively "aged" populations? And secondly, is it likely to extend to the populations which are at present distinguished by high mortality and fertility levels and by a comparatively "young" age structure?

The problems and difficulties encountered in the present analysis are essentially the same as those involved in any projection of population, but the emphasis will be put here on the resulting age structure and in particular on the changing numbers and proportions of old people rather than on the total size of the projected population and its rate of growth. Aging is conceived here in terms of changes at the apex of the age-pyramid. It is usually accompanied and always preceded by a relative increase in the proportion of "older adults" to "younger" adults, i.e., by the phenomenon usually referred to as aging of the labour force.

In order to answer the two questions posed above the likely course of future fertility and mortality trends in populations characterized at present by low mortality and fertility levels and in those where both mortality and fertility are

* The author of this paper is a member of the Secretariat of the United Nations. The views presented are his own and not necessarily those of the Secretariat.

still high will be briefly discussed. In each case the discussion of future trends will be followed by the analysis of their effect on the age-composition of the population and the issues will be illustrated by examples borrowed from the recent demographic literature. The net volume of migration which may also appreciably influence the future age composition will be left out of the analysis for two reasons. First, because prediction of the future number of migrants by age is too hazardous, and secondly, because the incidence of this factor varies enormously from country to country so that no generalized assumptions are possible.

A. Populations characterized by low mortality and low fertility levels.

Mortality

The countries characterized at present by low mortality have experienced, during the last hundred years or so, great reductions of mortality rates at all ages. This decline of mortality was not, however, spread uniformly through all ages but affected young age-groups to a considerably higher degree than the older ones. In fact, the increase in survivalship at young ages obtained by the middle of the present century in most of the "Western" countries reached such dimensions that even a complete elimination of deaths at these ages would not materially affect the numbers surviving.

The situation is different with respect to older age-groups where there is still room for substantial improvement. There are certain grounds for optimism with regard to the future trends of mortality at these ages. It seems, for instance, that the beneficial effects of anti-biotics, to the introduction of which the post-war drop in mortality of older persons has mainly been attributed, have not yet been fully exhausted. At the same time some progress has recently been made in the diagnosis of such degenerative diseases affecting mainly the old, as cancer and diseases of the heart, and in the treatment of diabetes mellitus. Furthermore, it must be remembered that the old people of tomorrow will consist of generations which had lived in better economic and sanitary conditions than the old people of today and may therefore be

expected to be on the average healthier. Finally, the realization of the phenomenon of aging of populations has itself stimulated interest in the welfare and health conditions of old people, and the increasing concern of the society with the well-being of the old may contribute to the lengthening of many lives.

Since the future decline of mortality will affect the older age-groups to a higher extent than the younger ones, its effect will be to increase the expectation of life at higher ages and will ipso facto contribute to the further aging of populations.

Fertility

Future fertility trends are not easily predictable. The continuous decline in fertility rates experienced by the "western" countries over a period varying from about fifty to more than a hundred years came to a stop during the pre-war period, whilst the post-war period witnessed sharp increases in the annual numbers of births. Opinions differ as to whether the "baby-boom" of the 40's is a reflection of an intrinsic change in the family-building habits or whether the phenomenon represents only short-term fluctuations explainable in terms of an abnormal concentration of marriages and of spacing of births.

The downward trend of fertility seems to have been associated with the spread of birth control. It can be argued that to the extent to which this spread is not yet complete, a further decline of fertility may be expected. Furthermore, methods of birth control have not yet been perfected and, as shown in a number of surveys in various countries, the numbers of "unwanted" children born are still considerable. Wider application of improved contraceptive measures may thus bring forth a further reduction of family size. Some demographic factors act also in the same direction.

However, in the long run the crucial point at issue is the attitude towards family size on the part of the parents. This attitude is likely to be influenced by a multitude of considerations, such as the economic situation and outlook, the cost of

education, the status of women, etc. Although the available evidence indicates that on the whole the attitude towards parenthood is at present not undergoing any substantial changes, it is clearly impossible to predict future trends with any degree of accuracy. In the circumstances the best that can be achieved is to evaluate the effect of the fertility factor on the future age structure on the basis of a number of assumptions as to the future average family size.

As to the effect of the changing fertility pattern on the age structure, it is necessary to make a careful distinction between the short and long-term situation as well as between the effect on the absolute numbers of persons in various age-groups and their relative distributions. For instance, an increase in the number of annual births has the immediate effect of raising the proportion of children and therefore tends, other things being equal, to lower the proportion of the old. At the same time the numbers of the old remain, of course, unaffected. On the other hand, the long term consequences of the increase in the annual flow of births depend on how long the trend continues. If it is only temporary, then it may result, after the period of 60 years or so, in an increase in the relative numbers of the old, since the number of survivals at ages, say above 65, is to a large extent a function of the number of births more than 65 years before.

Age structure

The age structure of a population has been compared to a mirror in which the past trends in the main components of population growth are reflected. It can be said that both the present and the future age composition of a given population is explainable in terms of past fertility, mortality and migration trends. Since, however, the population at a not too distant future will to a large extent consist of the survivors of the present generations (the extent declining with time), it is convenient and instructive to think of the current age distribution as one of the determinants of the subsequent pattern.

As the result of their demographic history, the age composition of the populations characterized at present by low fertility and mortality levels, have tended

to assume the shape resembling a barrel rather than a pyramid, indicating thus greater relative numbers at middle ages than at young ages. As time goes on, this bulge is bound to move up the scale inflating the numbers at old ages. At the same time the proportion of "young adults" is likely to decline, within the next decade or so, in relation to "older adults", when the group now under 20 moves into the 20-40 age interval. These short-term effects will in fact be comparatively little affected by the future mortality and fertility levels. In the long run, on the other hand, when the survivors of the present young generations reach old age, a decline in the numbers of old people can be expected. Whether this decline in numbers will be accompanied by a reduction in the proportion of the old depends, of course, on the fertility and mortality rates in the intervening period.

Aging of the population of Great Britain, 1947 - 2047

For the illustration of the future trends in aging in the populations characterized by low mortality and fertility, the projections prepared by the Royal Commission on Population have been chosen. Out of 16 combinations of assumptions presented by the Commission, the following four have been selected for the present analysis:

	<u>Projection</u>	<u>Mortality</u>	<u>Fertility</u>	<u>Migration</u>
A.	10	Declining	Low ("Falling")	Nil
B.	8	"	Medium ("5% above 1935-38")	Nil
C.	11	"	High ("Rising")	Nil
D.	6	Constant at 1942-44 level	Medium ("5% above 1935-38")	Nil

The descriptions of fertility levels given in parentheses refer to the terminology employed in the Report of the Commission with regard to fertility assumptions. The latter are based on the concept of marriage duration specific rates. For methodological details the reader is referred to the Papers of Royal Commission on Population (Volume II).

The hypothesis of declining mortality assumes that the age specific deathrates

will decline from 1947 to 1977 in accordance with the trends recorded over the past 50 years, after which the level of mortality will remain constant. This assumption involves an increase in the expectation of life at birth from 62.7 years in 1942-44 to 69.0 in 1978 for males and from 67.4 to 76.2 years for females. It is important to point out here that a rather moderate decline of mortality rates at high ages was postulated in the projections. Should expectation of life at older ages increase more substantially - and it was suggested before that this is likely to happen - then the extent of aging will be stronger than it is indicated by the projections.

The relative age distributions of projected populations by three broad age-groups are shown in Table 1. The trends in the proportion of persons aged 65 or more are also illustrated in Fig. 1. It appears that the variation in the proportion of the old during the next hundred years can be split into five distinct stages:

1. During the next twenty years or so, the proportion of the old will increase from about 10 per cent in 1947 to about 13-14 per cent in 1967, irrespective of assumptions as to the future mortality and fertility. This short-term effect is in accordance with the previously foreseen effect of the "current" age structure. Under any assumption the upward moving bulge of the age pyramid will cause an increase in both the numbers and proportions of the old.
2. In the period 1967 to 1987 the upward trend will still continue, but the range of variation will widen according to fertility and mortality assumption. It is interesting to note, that even if a "rising" fertility is postulated, the proportion of the old will further increase from about 13 per cent in 1967 to about 16 per cent in 1987. A similar increase takes place on the hypothesis of constant mortality. Thus the "age structure effect" is still strong and acting in one direction.
3. During the following twenty years (1987 to 2007), the aging process will come to a halt. In fact, according to all assumptions save the declining fertility, the proportion of the old may even slightly decrease. This is the period during with the "dent" in the age-pyramid at young ages, caused by past declines in fertility, will have moved

to the apex of the pyramid and offset the aging effects of fertility and mortality in the intervening period.

4. In the years 2007 to 2017, a rather steep but short lived jump in the proportion of the old is foreseen. These are the years during which the persons born in the "fertile" years between 1942 to 1952 will have reached or exceeded the age of 65. So the "baby-boom" of the past will have caused some increase in the proportion of the old.

5. By 2017 the effects of the current (1947) age composition will wear off so that the subsequent trend will be solely the outcome of the postulated fertility and mortality conditions during the preceding decades.

Conclusions with regard to Great Britain and other countries of the "Western culture" area

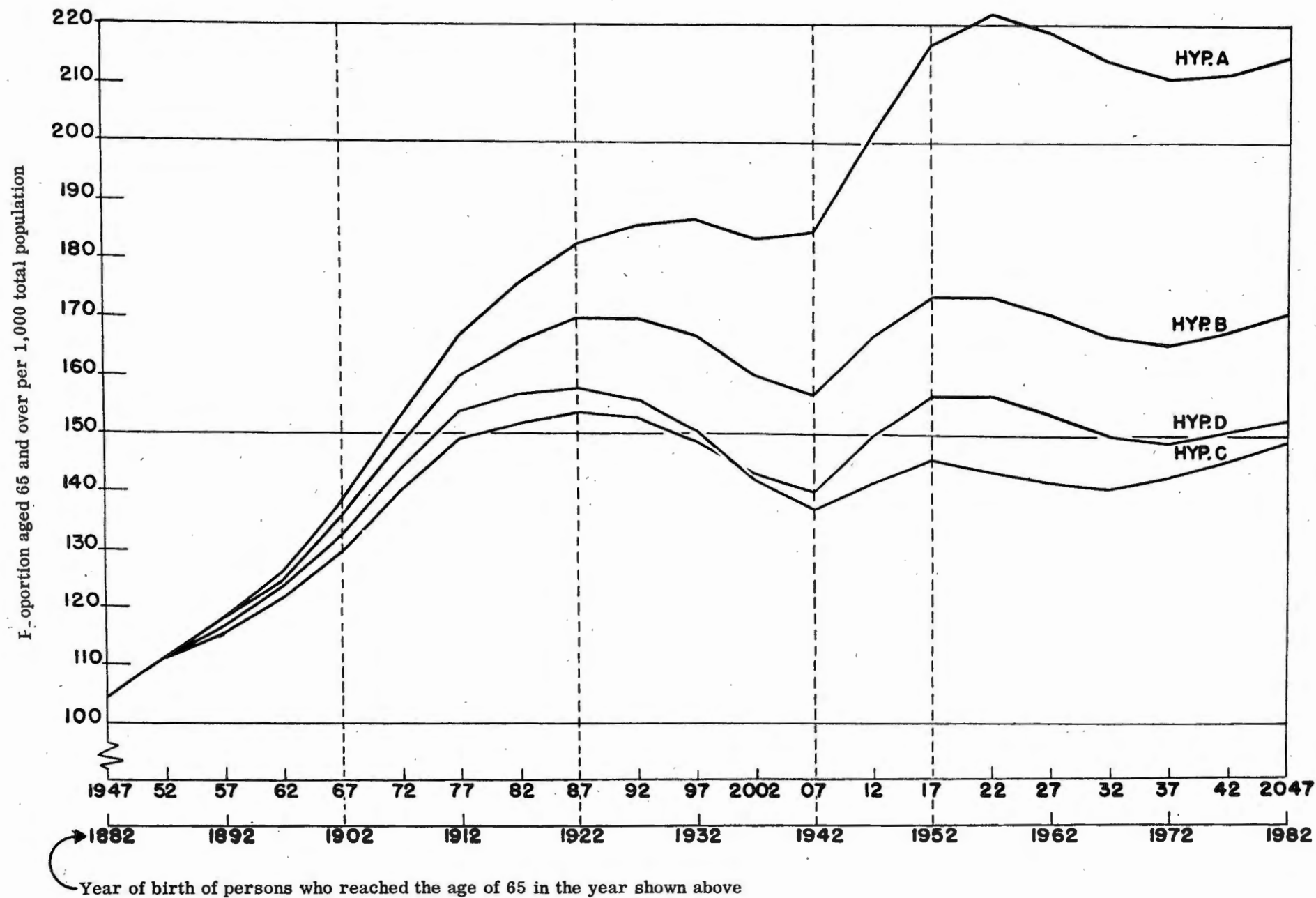
There is no doubt that, during the next 50 years or so, the population of Great Britain will be subjected to further aging. During this period the proportion of persons aged 65 or more can be expected to increase from about 10 per cent to about 15-17 per cent. The implications of the present age structure will be of paramount importance in this development.

With the passage of time the effects of the present age composition will gradually taper off so that the trend in the first half of the 21st Century will depend mainly on the future fertility and mortality levels. Should the decline in fertility materialize, as foreseen in hypothesis A, then the proportion of the old will oscillate in the period 2012-2047 around the high figure of 21 per cent. On the other hand, very little aging will take place if the present family building habits do not change radically.

It seems on the whole that the effect of the mortality factor on future aging will be small, but it must be borne in mind that a relatively small drop in the mortality at high ages was envisaged.

Owing to the overriding importance of the age composition and the fact that a

Fig. 1. Proportion of persons aged 65 and over per 1,000 of total population. Great Britain, 1947 - 2047.



1947 to 2047, by three age-groups.

[illegible]

barrel-shaped age structure is a common characteristic of the populations in the "Western culture" area, it is perhaps permissible to generalize the example of the population of Great Britain for other countries of this area. Barring a spectacular increase in the fertility rates, it can be said with certainty that further aging will take place among these populations at least during the next few decades.

B. Countries of high mortality and high fertility

Future mortality and fertility trends

Even where the data on past trends of the components of population growth are available, the estimation of future size and age distribution presents difficult problems. The situation is a fortiori worse where no such information exists. This is actually the case with regard to the areas of high fertility and high mortality, i.e., with regard to the populations which are in the initial stage of demographic development. The majority of the world population is still in this category.

Nevertheless, the task of predicting in broad terms the future course of population movement in these countries is perhaps less speculative than it would appear at the first glance. It is perhaps not unreasonable to assume, though opinions may differ on the subject, that these populations will follow the path of evolution established by their more advanced neighbours, which is often referred to as "demographic transition". Among the arguments to support the view that the countries characterized at present by high mortality and high fertility levels will experience first a decline in mortality and, at a later stage, also some decline in fertility, the following may be quoted.

The reduction of mortality is everywhere taken as a primary objective of social policy. The rise in the standard of living which is characteristic of many under-developed countries today, is always accompanied by improvements in public health and sanitation which are immediately reflected in better morbidity and mortality conditions. In some less advanced countries, the application of more modern health

measures is actually preceding the economic improvement. The work of some international agencies, notably that of the World Health Organization, has certainly been beneficial in reducing the incidence of epidemics and infectious diseases. It is comparatively easy for the under-developed countries to take advantage of the progress in medical science achieved by the countries of Western civilization over a period of centuries and use their experience in combating various diseases. For these reasons, the prospects for an imminent decline of mortality in many hitherto under-developed areas seem fairly good.

On the other hand, it is rather unlikely that the reduction in death-rates will immediately be accompanied by a substantial decline in the birth-rates. Numerous examples can be quoted of populations in the region of Latin America or in Eastern Europe to show empirically that it is usual for fertility to persist for some time at a high level even though mortality declines. The spread of family limitation was associated in "Western" countries with such factors as a high standard of living, extensive industrialization, high educational standards, etc. Not before these conditions are fulfilled can one expect any spectacular drop in the birth-rate. On the other hand, some decline in fertility may be expected in under-developed countries in the not too distant future, if only on account of the increasing knowledge of birth control methods. Another argument in support of this view is based on the supposition that the increasing survivalship at young ages, due to the reduction in infant and childhood mortality, will make it less necessary for the parents to "replace" the children who did not or who might not survive.

L. T. Badenhorst's projections of the Bantu population of South Africa, ^{1/} shown below, illustrate the consequences with regard to aging of the case where a population is assumed to undergo a period of declining mortality, followed by a period of declining fertility. Another illustration, which takes into account also

^{1/} L. T. Badenhorst, "The future growth of the population of South Africa and its probable age distribution", Population Studies, Vol. IV, No. 1, June 1950.

the possibility of fertility to remain constant at a high level is provided by the projections of the populations of Central America, prepared recently by the United Nations Population Division. ^{1/}

The Bantu population of South Africa

Badenhorst postulated that the Bantu population ^{2/} will experience a gradually declining mortality during the period 1946 to 1980, so that by the end of this period the mortality will reach the levels reflected in the life table for South African Asiatics ^{3/} in 1940-42 (expectation of life at birth: 52.9 years for males and 54.1 for females). ^{4/} With regard to fertility, a general fertility rate (total births per 1,000 women aged 15-49) of 160.0 was assumed to remain constant in the period 1946 to 1965. After this date it was assumed to drop by 5% per quinquennium until 1980.

The resulting changes in the age composition of the Bantu population in the years 1950, 1965 and 1980 are shown in Table 2. It will be seen that the percentage of the old will increase only very slightly from about 3.4% in 1950 to 4.6% in 1980.

Table 2. Bantu population of S. Africa by age in 1950, 1956 and 1980

Age Group	Percentage distribution			N u m b e r s :			% change 1950-1980
	1950	1965	1980	1950	1965	1980	
0-14	38.1	38.3	36.4	3,162.5	4,198.8	5,292.8	67.4
15-39	40.5	39.1	39.4	3,366.7	4,297.5	5,717.0	69.8
40-64	18.0	18.5	19.6	1,494.1	2,030.4	2,864.9	91.7
65+	3.4	4.1	4.6	281.1	450.9	677.5	141.0
All	100.0	100.0	100.0	8,304.4	10,977.6	14,552.2	75.2

^{1/} See United Nations, Population Division, "Future population estimates by sex and age: I. The population of Central America (including Mexico), 1950-1980". Population Studies No. 16 (forthcoming).

^{2/} Pure-blooded aboriginals. Main tribes are: Zulu, Basuto, Xosa, Pondo, Barolong, Shangaan, Fingo, Mashona and Bechuana.

^{3/} Natives of Asia and their descendants, almost all Indian.

^{4/} It was assumed that the current mortality was at the level indicated by the life table for the Coloureds in 1935-37 (expectation of life at birth: 40.17 years for males and 40.85 years for females).

Although no appreciable aging can be envisaged, a trend towards aging is nevertheless discernible in the comparison of the relative changes of the numbers at various ages (the last column of Table 2). The Bantu population as a whole shows an increase by about 75% during the next 30 years. At the same time the number of the children and "young adults" will increase by less than 70%, whilst that of the "older adults" and of the old by about 90% and 140%, respectively.

The region of Central America (including Mexico)

The recently prepared projections of future populations in Central America may serve as an illustration of future aging in this part of the world. For these projections, which also cover the period 1950 to 1980, a rather steep decline in mortality was postulated which would result in the expectation of life at birth reaching by 1975/80 the level of about 65 years in most countries concerned. As to the fertility, three sets of assumptions were made: I. Maintenance of birth rates at the present high level; II. Gradually declining rates; and III. Rapidly declining rates. ^{1/}

Table 3 summarizes the trends in the proportion of persons aged 65 or more for the whole region. It will be seen that the percentage of the old will increase very slightly from 2.89 in 1950 to 3.33 in 1980 under the high fertility assumption. At the other extreme, the low fertility hypothesis would cause a more significant increase from 2.89% to 4.44%. Although such changes in age structure are not very substantive, it is interesting to note that, similarly as in the case of the Bantu population, the numbers of the old will, under any hypothesis, increase at a faster rate than the total population. Should fertility fall, as under hypothesis III, the number of the old will nearly treble, whilst the total population will less than double.

^{1/} For methods adopted see op.cit.

Table 3. Central America (including Mexico).
Per cent of persons aged 65 or more to the total population,
1950 to 1980

	Fertility Hypothesis	1950	1960	1970	1980	Per cent change Total pop.	1950-1980 65+ pop.
I.	"High"	2.89	2.92	3.27	3.33	149.6	188.1
II.	"Medium"	2.89	2.99	3.52	3.87	115.1	188.1
III.	"Low"	2.89	3.07	3.77	4.44	87.2	188.1

Conclusions with regard to areas of high mortality and high fertility.

It can be stated on the basis of the evidence presented above that the age structure of populations of under-developed countries will not change much within the next generation. In particular, the relative numbers of the old will increase very little, so that by 1980 these populations will not be more "aged" than the populations of advanced countries were at the turn of the present century. On the other hand, the aging process seems to be setting in and it is likely, though the supposition is more speculative, that the more remote future will bring about the quickening of this trend.

Summary of Conclusions

In order to summarize the conclusions, let us go back to the two questions raised in the introduction to this paper. The first question asked was whether it is reasonable to expect the continuation of the aging process among the countries which are economically and demographically advanced. The answer seems to be in the affirmative. Apart from the effect of the further decline in mortality at old ages, a further aging will take place as the outcome of the present age-composition of these populations.

With regard to the under-developed countries, the prognostication is more difficult. Whilst it can be said, with some degree of certainty, that these countries will not face the problems of an aged population within the life-time of the next generation, the outlook for the more distant future is by necessity more speculative. Even if the broad pattern of "demographic transition" is accepted, the scope and the timing of the processes involved are unpredictable, so that any attempt at foreseeing their consequences is largely a matter of a more or less intelligent guesswork.