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Mortality trends in India

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Summary

The system of registration of vital statistics in India being very deficient, mortality trends may be traced from the pace of population growth shown by the past nine censuses, as the factors of migration and changes in natality were inconsequential. The alternating periods of marked and negligible population growth recorded before 1921 point to a widely fluctuationing mortality in the period. It was due to the visitations of famines and epidemics. The three decades following 1921 registered a steady but accelerated population growth, there being no major country-wide calamity. The reciprocal of expectation of life given by the Indian Life Tables and the supporting estimates based on the "Reverse Survival" method indicate that before 1921 the death rate level was well above 40 per thousand but that now it is near about 30 per thousand. The progressive internal and external currents, flowing from a wide-awake administration of the country and medical advances, are likely to control some of the important causes of high mortality, such as food scarcity, outbreak of epidemics, malaria, water-borne diseases and bad nutritional status. It is considered that not so much the expansion of medical facilities as better and assured food supplies may further slice off preventible mortality. This is also indicated by the considerations of sex-age composition. Any reduction in mortality must eventually entail a lowering of fertility.

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Tendances de la mortalité dans l'Inde

par S.P. Jain (Inde)

Résumé. Etant donné les imperfections notables du système d'enregistrement des statistiques de l'état civil dans l'Inde, on peut déduire les tendances de la mortalité d'après le rythme d'accroissement de la population, qui ressort des neuf derniers recensements; les migrations et les variations de la natalité ont été, en effet, négligeables. Les alternances d'accroissement rapide et d'accroissement insignifiant de la population, qui caractérisent les années antérieures à 1921, sont l'indice d'importantes fluctuations de la mortalité au cours de cette période, fluctuations imputables aux famines et aux épidémies. Les trois décades qui se sont succédées depuis 1921 ont été marquées par un accroissement régulier, mais qui a été en s'accélérant, aucun fléau d'importance majeure n'ayant frappé l'ensemble du pays. La réciproque de l'espérance de vie donnée par les tables de mortalité de l'Inde et les estimations justificatives fondées sur la méthode de "survie inversée" montrent que jusqu'en 1921, le taux de mortalité dépassait largement 40 pour 1.000, mais qu'il est à présent proche de 30 pour 1.000. L'administration éclairée dont bénéficie le pays et les conquêtes réalisées par la médecine engendrent des forces génératrices de progrès, dont l'action, exercée sur tous les plans, semble devoir venir à bout de certaines causes importantes de la forte mortalité, telles que la pénurie de denrées alimentaires, les épidémies, le paludisme, les maladies propagées par l'eau et la mauvaise nutrition. Pour réduire encore davantage la mortalité, il ne s'agit pas tant, estime-t-on, de développer les installations et les ressources médicales que d'assurer le ravitaillement alimentaire et d'en améliorer la qualité. L'étude de la composition par sexe et par âge de la population aboutit à des conclusions analogues. Toute réduction du taux de la mortalité doit, en dernier ressort, entraîner un abaissement de la fécondité.

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* 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.

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MORTALITY TRENDS IN INDIA

By
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India has a system of registration of births and deaths dating back well before the commencement of the present century, but the records are so grossly deficient that apart from showing up any abnormal mortality, they cannot form a basis for assessing mortality trends in India. Evidence in the matter has, therefore, to be collected from indirect sources. There is a fairly detailed record of population enumerations at the nine decennial censuses starting from the first spread over 1867-72, the latest being for 1951. The Indian censuses lack the precision attained in the Western advanced countries. Nevertheless, they are reliable enough to indicate the pace of population growth. During the period covered by the censuses, migration was not of any significance numerically, and this pace has largely been determined by the excess of births over deaths. There is no evidence of Indian natality having been subjected to the influences observed in the West.On the other hand, as shown later, there is reason to believe that Indian natality did not undergo any substantial changes during the period. Thus,trends in mortality are reflected in the pace of the population growth.

2. The growth of Indian population as shown by the various censuses is given in Table 1. The figures of percent increase upto 1901 shown there are substantially affected by the two extraneous factors of extension of census operations to new areas and increased efficiency of enumeration. It is estimated that the first three figures in column 4 should be changed to 9.4, 1.0 and 6.1, and the increase during 1871-81 should be of the order of 1%, if allowance is made for these two factors. In any case, the above

Table 1

Year (1)	Population in millions		% increase	
	Undivided India (2)	Indian Union (3)	Undivided India (4)	Indian Union (5)
1867-72	203.4	--	--	--
1881	250.1	--	--	--
1891	279.4	235.9	11.8	--
1901	283.9	235.5	1.5	- 0.2
1911	303.0	249.0	6.8	5.7
1921	305.7	248.1	0.9	- 0.4
1931	338.1	275.5	10.6	11.0
1941	389.0	312.8	15.0	13.5
1951	--	356.9	--	14.1

table unmistakably shows that upto 1921 the Indian population growth was chequered. It is only during the last three decades that the population increased rapidly with a more or less even pace. This shift may be due to a greater increase in natality and/or a sharper decline in mortality. From the reported births, Kingsley Davis has calculated the average birth rates for the successive quinquenniums between 1911 to 1945 to be 39.0, 34.7, 33.0, 33.8, 34.6, 33.5 and 28.3. The birth registration system gave way due to the impact of wartime emergencies. There is little doubt that the low figure of birth rate for 1936-45 shown here is due mainly, if not wholly, to a greater deficient registration. Otherwise, the efficiency of registration apparently changed very little during this time. The actual natality trend during the period may be taken to be adequately reflected by that shown by these registered birth rates, which is that there was no marked fluctuation in Indian natality. Thus, it does not appear unreasonable to read in the figures of population growth indications of fluctuations in mortality.

Prior to 1921, India experienced severe famines and pestilences. To start with, there was the great Indian Famine of 1876-78. The history of

the decade 1891-1900, particularly during 1898-1900, is replete with vivid accounts of severe famines in the greater part of the country. Bubonic plague made its first appearance in Bombay City in September 1896 and spread over to the other parts of India. Some areas were ravaged by famine and plague at the same time. There were localised severe outbreaks of malaria and kala-azar also in fairly extensive areas. The decade 1901-1910 was comparatively normal. This merely means that scourges like drought, floods, epidemics of cholera, smallpox and plague, malaria and the like, which continue to visit one or the other part of the country even to this day, though with much reduced fatality, did not create any serious havoc in any large tract. The most outstanding catastrophe of the next decade 1911-1920 was the Great Influenza Pandemic of 1918. On a conservative estimate, it exacted a toll of 12 to 13 million lives in India. It is mainly responsible for the small population growth during the decade. To this end, no doubt, other calamities contributed substantially. In 1911 epidemics of cholera, plague and malaria were widely active. In the wake of the First World War came two successive bad seasons and extensive failures of crops. The epidemics of cholera, plague and kala-azar raged heavily in several parts. Malaria also was very active in certain areas.

The ravages of famines and epidemics described above are reflected in the alternation of periods of marked and negligible population growth before 1921 in Table 1. Conditions responsible for a heavy mortality may also cause a lowering of birth rate due to impaired vitality of the people but abnormal mortality has a dominant role in keeping down population increase. This statement is supported by the fact that the areas, which experienced particularly heavy mortality, are precisely the ones which recorded a low population growth.

The next three decades were periods of steady population growth, there

being no major calamity on a country-wide scale. The absence of such catestrophes may be attributed to the wide-awake administration of the country. The Government, with the experience gained and the advances made in in other directions, was better able to grapple with the problems of droughts and floods and to institute measures for food scarcity relief, epidemic control and treatment of the common diseases. In the decade 1941-50, there occurred certain major calamities such as the Bengal Famine and the Partition of the country. The Bengal Famine is estimated to have cost between 1.5 to 3 million lives. The population increase during the decade would have been somewhat higher, if these calamaties had not occurred. However, these events have only localised importance, and their significance in the all India context is not so great as may bepopularly believed. India is a subcontinent and it would be unusual, if, in the course of a decade in some part or the other, there be no major catastrophe, such as would draw world-wide attention. The Great Bihar Earthquake of 1934 is a case in point, but it is hardly recounted in a survey of the events affecting the Indian population growth. The above account, in short, shows that the accelerated population growth after 1921 was mainly due to a sharp decline in the abnormal mortality. An idea of the mortality levels in the various decades is given in the next paragraph.

3. India has a series of official Life Tables, which were prepared by eminent British and Indian actuaries. Official Life Tables for the decades 1911-20 and 1931-40 were not prepared, but Kingsley Davis has given abridged Tables. It fell to the lot of the writer to prepare the latest Life Tables for the decade 1941-50. The Indian Life Tables are based on a comparison of cohorts at two successive censuses as shown by the age distributions. Obviously, the method is not as reliable as that employing the observed age-specific death rates given by registration records. However, the Tables

are good enough for indicating the mortality level during the decade covered by them. The reciprocal of expectation of life at birth gives the crude death rate in the stationary Life Table population, when subjected to its age-specific mortality. This figure, as indicating the mortality level of the Life Tables, is given in column 4 of Table 2. The figure of death rate shown for 1891-1900 is incongruously low. It should be much higher, considering the abnormalmortality prevalent during this decade. It is so due to the fact that in his quest to get at what he considered to be the normal mortality of the times, Sir George Hardy took special care to eliminate the abnormal mortality of the period from his Life Tables. In the Actuarial Report (1951 Census) the writer has given some evidence to show that the Life Table for 1931-40 compiled by Kingsley Davis gives a lighter mortality for certain age sectors than what was actually experienced. It, thus, appears that the Life Table death rates for 1891-1900 and 1931-40 are understated.

Another estimate of the experienced death rates is obtained by the method of 'Reverse Survival'. By applying the Life Table age specific mortality rates, the number of births in the individual years of a decade, whose survivors were enumerated as children below age 10 at the ensuing census, can be estimated. Thus, total births and, hence, the birth rate for the decade can be calculated. The difference between this birth rate and the known population growth rate gives the death rate. The figures of birth and death rates obtained by this method are shown in columns 2 and 3 of Table 2. These are due to Kingsley Davis, except those for 1941-50, which were calculated by the writer. The details are explained in an annexure to appendix II to 1951 Census Report. In this annexure, yet another direct estimate of death rate has been made from the consideration that persons enumerated as over age 10 at the 1951 Census

were the survivors of 1941 population after allowing for any migration change. The estimates for the individual States lead to an estimated death rate of 27.4 per thousand for all-India. The corresponding birth rate of 39.9 per thousand agrees well with the rate of 39.2 obtained by the 'Reverse Survival' method. As a matter of interest, the registered birth and death rates also are shown in columns 5 and 6 of Table 2 given below. The difference between the birth and death rates shown in columns 2 and 3 of Table 2 is less than the percent increase given in column 4 of Table 1. It is due to the fact that the difference conforms to the concept of mean decennial growth rate rather than that of percent increase. While the

Table 2

Decade	Estimated		Life Table	Registered	
	B.R.	D.R.	D.R.	D.R.	B.R.
(1)	(2)	(3)	(4)	(5)	(6)
1881-90	48.9	41.3	40.0	--	--
1891-00	45.8	44.4	42.0	--	34
1901-10	48.1	42.6	43.7	--	37
1911-20	49.2	48.6	49.8	34	37
1921-30	46.4	36.3	37.3	26	33
1931-40	45.2	31.2	31.5	23	34
1941-50	39.9	27.4	31.2	20	28

figures of birth rate show a drop only in the last decade, the set of figures of death rate in any of the columns 3, 4, or 5 unmistakably shows a sharp decline in mortality over time. The drop in the death rate during 1921-30 is striking, but it appears more spectacular, since it comes immediately after the decade of abnormal mortality. Before 1921, the death rate level was well above 40 per thousand but during the last three decades there has been a substantial and steady decline. At present, the mortality rate is at the level of 30 per thousand. It still ranks one of the highest contemporaneously recorded by any country.

4. The main factor responsible for the abnormal mortality prior to 1921 was the prevalence of food scarcity due to droughts and floods in large tracts of the country. The recent examples of rushing supplies to the afflicted areas have clearly demonstrated that political barriers are not allowed to stand in the way of alleviating any large scale human suffering on account of food shortage. Countries have no longer to face their problems in isolation. The resources of the world may be counted upon to come to the succor. The Government has evolved by experience an effective technique to combat the problems of food shortage and giving relief to the people in case of a breakdown. It is also fully alive to the need for developing the country's food resources on a long term plan. The vast irrigation projects, when completed, will not only increase the food supplies but will also add to the prosperity of the people. This, in itself, would raise the nutritional status of the people and enable them to enjoy a better health, which should lead to a reduced mortality. In any case, the occurrence of any large scale famine in India is likely to be a thing of the past.

The recent advances in the medical and public health have a more direct impact on the future mortality experience. India even now features as the home of cholera, smallpox and plague. For reasons unknown, mortality from plague has been very largely reduced, as is shown by the fact that 5116 thousand deaths from plague were registered in the decade 1901-10, whereas in the last prepartition decade of 1936-45 there were only 190 thousand deaths. The figures for the subsequent years show a similar low mortality. The levels of incidence of cholera and smallpox, though considerably reduced, are still high enough to cause continuous anxiety to the public health authorities. During 1901-10, a total of 932 thousand deaths was registered under smallpox and 3742 thousand deaths under

cholera as against 812 thousand and 2157 thousand deaths, respectively, during 1936-45. These epidemic diseases attract a lot of notice due to the panic they create, but in the context of total mortality, they are really not so important. Taken together, they rarely account for more than 5% to 10% of total deaths. The most important disease, which takes a heavy toll of death and saps the vitality of the people, leaving them easy victims to other fatal diseases, is malaria. Owing to the absence of proper statistics it is difficult to make a more precise statement beyond that its incidence and the resultant loss of life are very high. Very important advances in the control and cure of the disease have been made, and India is making concentrated efforts to derive full benefit from them.

Among the other important causes of abnormal mortality in India are the water-borne diseases like typhoid, dysentry and diarrohea, besides cholera. Out of 17% of India's population, which resides in the urban areas, only 60% is served by protected water supply. Such supplies are concentrated mainly in big cities, and a majority of smaller towns are without this amenity. The vast rural population has to rely for the water supply to a considerable extent on open tanks and running streams, the number of wells and pumps being inadequate. The Five Year Plan in its health programme has given first priority to water-supply and sanitation. The Government is already alive to the need for ensuring a safe water supply to the people and success in this effort is bound to result in slicing off the abnormal mortality experienced at present due to the water-borne diseases. There is a considerable mortality due to the respiratory diseases. Medical experts will have us believe that there is a big tuberculosis problem in India, but one may venture to express doubts, as the opinion is not based on any proper statistics. Nearly

83% of the people live in villages of vast sunny open spaces with an even flow of simple life, unsoiled by the usual strains of a complex urban character. These conditions are unlikely to harbour tuberculosis on any large scale. The extent to which the discovery of antibiotics and sulpha drugs will help in reducing preventible mortality will depend on how far medical services would reach the people. It would perhaps be too optimistic to expect much from this development, considering the magnitude of the problem and the limitations of the resources. The nutritional status of the people is low, and this makes them easy prey to the varied diseases prevalent in India. It is to behoped that reductions in mortality will come not so much due to the expansion of hospitals and dispensaries as due to better and assured food supplies. The above account would seem to show that factors other than purely medical are at work and that they are likely to lead to a substantial reduction in the preventible loss of life.

The age structure of Indian population and the levels of the corresponding specific mortality rates would seem to support the view that a reduction in mortality may be expected in future. High natality and mortality keep the Indian population very young. According to 1951 Census, 47.5% of the population was below age 20 and this is roughly equally distributed in the four quinquennial age sectors with a greater concentration on the younger side, e.g., a proportion of 13.3% was below age 5. India has an abnormally heavy infant and child mortality. According to registration statistics, nearly 20% of total deaths are among infants and another 18% occur in the age group 1-4. Other countries have succeeded in very considerably reducing infant and child mortality. There appears to be no strong reason why, in due course, India, too, should not be able to bring down the abnormal mortality in this sector. Some improvement is already visible. There is a fairly convincing evidence that infant

mortality rate, which was running well above the level of 200 per thousand live births in the early part of the century, is now between 125 to 150 per 1,000 live births. A reduction in the mortality of the advanced age groups, particularly in the old ages, is more difficult to achieve and would depend on developments, which are enshrouded in the uncertainty of future. As regards the heavy maternal mortality, which is the lot of Indian women, there is a possibility of reduction. To this end, not only the medical and public health activities are likely to contribute effectively but also the increasing realisation by the people and the Government of the fact that excessive maternity should be avoided for their own and Nation's sake. There is a new surge in the country and it is unlikely that it will not have its strong impact on the mortality level. Even granting that a subcontinent like India, situated near the tropics and infested with most of the fatal diseases of the globe, is destined to experience a higher level of mortality than the countries more favourably placed, it appears very likely that further substantial reductions in the Indian mortality may be expected in future as a result of the progressive internal and external currents. The result, to be stable, must be accompanied by a lowering of fertility, whatever the machanism to effect it be. However, it should not be forgotten that Nature in its capriciousness has been known to upset human calculations, but this, of course, is an unaccountable factor in our peep into the future.