

# A First Glance at the Pakistan Age Distribution

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What follows is not only a summary of first impressions, but it is also limited to Pakistan as a whole, *i.e.*, inter-regional differentials are not investigated. Furthermore, the following comments are limited to the youngest ages. In particular, no discussion is offered of the age distribution at the oldest ages. In any case the latter is partly a freak of the peculiar assumption on which it is drawn, namely, that nobody in Pakistan lives beyond the age of eighty. These are very severe limitations and in part what follows is more in the nature of advance notice of research to be undertaken than it is a report on substantive findings. Nevertheless, the initial impressions are of a startling enough nature to justify disclosure at this stage, but on the distinct understanding that they may on further inquiry prove illusory.

The observations of this note are based on the simple fact that the population of any area at any time is a function of fertility, mortality and migration prevailing in the past. There are two ways in which these three influences show themselves: on the age distribution and the rate of growth. In a way, it may be more helpful to say that age distribution and growth are the other side of the same thing, namely, the combined product of fertility, mortality and migration. In fact, this is such a wide and all-embracing statement that it may seem almost meaningless. However, relatively recent developments in demographic theory furnish powerful tools for analysis of age distribution and growth. Evidence of growth, such as it is, is not considered in this note. As already indicated, the discussion is limited to age distribution.

The theoretical approach in what follows is further illuminated in two ways. Firstly, it is suggested that the peculiarities of Pakistani age distribution are not real demographic facts, but are most likely, or even almost certainly, the function of enumeration vagaries. These enumeration freaks, when allowed for, indicate higher fertility than currently assumed. As a corollary, having accepted higher fertility even if only for the sake of argument, one or the other or both of two rates must give way. We can keep

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currently accepted growth rates, but must increase mortality to the extent necessary to counter-balance the higher fertility. Or we can keep the currently accepted mortality rates constant, but must increase the growth rate to the extent necessitated by higher fertility. Or finally, both, the currently accepted growth rate and the currently accepted mortality, can be varied to reach levels consistent with the apparently higher fertility. It will be noted that while the following discussion of age distribution arrives at some conclusions about fertility, though with limited confidence, no suggestions, apart from illustrative comments, are advanced about mortality and growth.

The other way in which the theoretical approach is illuminated is a comparison with a number of populations which on very general grounds should have certain similarities with the population of Pakistan. This comparison re-inforces the possibility that the 1951 census age distribution underestimates the real (or at least potential) growth. The main argument is basically very brief and limited at this stage to a consideration of graphs 2 to 5 below. If much of this note is taken up with a more general discussion, it is done in order to suggest, particularly to non-demographers, that unless it is thought that the Pakistani population behaved in the past in some very unorthodox fashion, the tentative conclusions of this note are more reasonable than taking seriously the available census information.

The approach here stems basically from Lotka's formulation of the "stable population" theory, which shows that a population closed to external migratory movements and which had for some time in the past constant fertility and mortality will develop one and one only age distribution no matter what its original age distribution. <sup>2&3</sup> *Vice versa*, the theory can be used to show that by the same token a constant age distribution of a population closed to external migratory movements, is the result of constant fertility and mortality. Specifically this constant age distribution can be calculated as

$$c(a) = be^{-ra} p(a)$$

where:  $c(a)$  = proportion of the population at any given age  $a$ ,  
 $b$  = birth rate, which will be constant under specified conditions,  
 $e$  =  $Lt (1 + \frac{1}{n})^n = 2.71828$ , a constant,  
 $n \rightarrow \infty$   
 $r$  = growth rate, also constant under specified conditions,  
 $p(a)$  = fraction surviving from birth to age  $a$ .

The basis for this equation can be explained in simple terms. The birth rate ( $b$ ) is the proportion of the population at age zero [ $c(a)$  when  $a = 0$ ].

2. L. J. Dublin & A. J. Lotka, "On the True Rate of Natural Increase", *Journal of the American Statistical Association*, September 1925.

3. A. J. Lotka. *Theories Analytique des Associations Biologiques. Deuxieme Partie: Analyse demographique avec application particuliere a lespece humaine* (Paris, 1939).

The population at any age later than zero is related to  $b$  (the population, known in demographic parlance as cohort, born  $a$  years ago to the cohort born currently) by the term  $e^{-ra}$ . The last term of the equation, namely  $p(a)$ , makes an allowance for losses by mortality.

This formula shows more rigorously what has already been said once or twice descriptively, namely, that the age distribution of a closed population is determined solely by fertility and mortality. Strictly speaking, the influence is less direct, but for the purposes of the present exposition this simplification is adequate enough. Alternatively, the age distribution and one of the two other variables (mortality or fertility) determine the other variable (fertility or mortality). The age distribution so determined has inevitably the shape of a cross-section of an onion, somewhat flattened at the base—sometimes more, sometimes less, slim—peeling off exponentially if we deal with a decreasing population, or adding exponentially layers of skin if we have an increasing population. The thinness of the layers lost or added in any unit of time is determined by  $r$  in the above-quoted formula. It is a smooth onion. There are no wiggles on the surface. The onion grows or shrinks, sometimes remains constant, in absolute terms, but the relative age distribution remains the same. Thus, if we have for a given population a series of censuses each yielding very similar, even if not identical, age distributions the stable population theory furnishes very powerful analytical tools. The available age distribution for Pakistan does not lend itself readily to such immediate treatment for a number of reasons. There is only one series (that for 1951) available. The results from the 1961 census will not be available for some time. Those from earlier censuses in the sub-continent need still to be separated out in respect of the present day population of Pakistan (assuming that this task is at all analytically possible). Even the series available (that for 1951) had its edges, as will be explained later, blunted in the process of publication. It must, therefore, be appreciated that we start from a narrow base and proceed on uncertain ground.

It is the confidence that the mortality and fertility conditions of the population of Pakistan were sufficiently stable for a long enough time which lies at the root of this note. Not even the 5 or 6 million refugees exchanged after the Partition need shake this underlying confidence. The millions which crossed the frontiers in each direction were, after all, people of not dissimilar age distribution from each other, with not dissimilar fertility habits and exposed to not dissimilar mortality conditions. The order of magnitude of movements both ways, *i.e.*, from India to Pakistan and from Pakistan to India, was also not very different.

Admittedly, one must not forget the demographic significance of the millions who lost their lives during the Partition and its aftermath. It may

be possible at a later stage to give some numerical assessment of the range of this effect under two sets of extreme assumptions. For the time being the possibility of wiggles in the curve of age distribution on this account must be borne in mind, but any wiggle so arising can not be very considerable because: 1. the millions died so to speak "outside" the present population of Pakistan either because they were literally outside Pakistan; 2. or because they were outside it in a more figurative way belonging to minority communities; 3. furthermore, like ordinary mortality, the numbers who died in the upheavals were by and large spread over all ages and both sexes; the reports from those holocaust days do not suggest that the killings were particularly age or sex selective; 4. in so far as they were selective of men, the children and women who died out of sheer exhaustion and inadequate care went some way towards producing out of the dead a population, well-balanced sex-wise and age-wise; 5. the cases of abducted women, while of course regrettable in each individual case, were again of the "both-ways-traffic" kind and in any case amounting to some 10,000 in each direction<sup>4</sup> their demographic significance could not be anywhere near to their journalistic importance.

However, even though the tendency to minimize the importance of these events in the present approach may be understandable for the sake of this discussion the possibility of sex and/or age selective mortalities during the Partition and its aftermath strong enough to invalidate partly the approach of this paper can not be entirely dismissed. Nevertheless, unless concentrated on a very narrow age and sex group, in comparison with the other inaccuracies of the data and the professed doubts of the interpretation, the importance of these Partition influences can not be very great. As will be shown below, the actual or working requirements of the stable population theory are not so rigid that the approximate numbers of people exchanged and the still more approximate numbers, which died in the process, could vitiate the current approach.

In recent years the "stable population" theory has been simplified into the "quasi-stable population" theory. Several workers in the field have felt their way from stable population theory to its quasi-stable version.<sup>5,6&7</sup> The fullest and most rigorous exposition of the latter has been presented

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4. R. Symonds, *The Making of Pakistan* (London, 1951).

5. F. Lorimer, "Dynamics of Age Structure in a Population with Initially High Fertility and Mortality". *Population Bulletin*, No. 1, December 1951 (United Nations, New York).

6. A. Sauvy, "Le vieillissement des Populations et L'allongement de la vie", *Population*, Oct.-Dec. 1954.

7. United Nations, Department of Social Affairs, (Population Division), "The Cause of the Ageing of Populations: Declining Mortality or Declining Fertility?", *Population Bulletin*, No. 4, December 1954 (United Nations, New York).

by Coale.<sup>8</sup> It relegates mortality to a much inferior position relative to fertility as a factor influencing age distributions. While the rigorous explanation is exceedingly laborious,<sup>9</sup> a simple common sense exposition will suffice for present purposes. Levels of mortality are related to each other at various ages and at any one stage in the demographic history of a population. So are changes in "age-specific" mortality though not to the same extent. That is to say, high mortality at one age is usually associated with high mortality at other ages, and low mortality at some age means low mortality at other ages. Changes of mortality rates at one age are usually accompanied by changes of similar relative magnitude and direction at other ages. In the nature of things, it is not possible to improve the mortality of people aged, say, 25 without improving at the same time the mortality of people aged, say, 30. The effect of this on the age distribution is that whatever the level of mortality or whatever the changes in mortality, each age group is, speaking very roughly, influenced to the same proportionate extent and the relative age distribution remains approximately the same.

Naturally, the growth rate is determined by mortality levels and is affected by changes in mortality. With given fertility, the growth rate is high with low mortality and low with high mortality. But the age distribution is left by and large undisturbed. To use an absurd case, even if mortality was to be abolished altogether, it would not affect appreciably the age distribution in any given conditions of fertility. Not even the proportion of the population of the oldest age groups would be changed substantially.<sup>10</sup> Their increase is more or less counterbalanced by the increased survival in the number of reproductive mothers and fathers and their offspring.

It is thus fertility which is the main determining factor in shaping the age distribution. With high fertility, the proportions at young ages are high; the age distribution is like a squat onion. With low fertility, the proportions at young ages are low; the age distribution is slimming into a pencil. Thus drawing up two proportionate age distributions on the same scale we can immediately say which one has higher fertility and which lower. We can say very little, if anything, about the mortality and consequently about the rate of growth, which is of course a residual phenomenon, but fertility reflects itself in the age distribution directly as in a mirror. The actual analysis

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8. A. J. Coale, "How the Age Distribution of a Human Population is Determined", *Cold Spring Harbor Symposia on Quantitative Biology*, vol. 22, 1957.

9. A. J. Coale, "The Effects of Changes in Mortality and Fertility on Age Composition", *The Milbank Memorial Fund Quarterly*, January 1956; though there is a more popular presentation in, J. Coale "The Effects of Declines in Mortality on Age Distribution" *Trends and Differentials in Mortality* (Proceedings of a Round Table at the 1955 Annual Conference, Milbank Memorial Fund, New York).

10. A. J. Coale, "Increases in Expectation of Life and Population Growth", *International Population Conference* (Vienna, 1959).

is more complicated than this brief summary would suggest. The present writer used over 400 pages to analyse the age distribution in an African country,<sup>11</sup> without arriving at too definite conclusions about mortality and growth, but there was no doubt about fertility. It came out directly from the age distributions. In the process of relaxing the rigid requirements of the stable population theory, we have nearly left it altogether. We arrived at the simple, almost common sense statement, that when a lot of babies are born the population has a lot of babies. (However, common sense in these matters is deceptive, e.g., it is not a difficult exercise to show that contrary to "common sense" expectations, improvements in mortality, which are in all probability taking place in Pakistan now and—it must be hoped—will continue taking place at least for some time in the near future, will produce a younger population, and not an older one, than the present. This will be due to the fact that although the life of some old people will be prolonged, by the same token—mortality, unlike peace, *is* indivisible, we argued earlier—so many parents in the reproductive ages will be saved and, thus, given an extended opportunity to beget children that the resulting offsprings will overshadow on the age distribution curve the increased number of older survivors.)

Consider now the Pakistani age distributions. Those given in the official census reports<sup>12</sup> are less revealing, because the excessive lumping of finer age groups into so-called broad age group conceals or at least dulls many of the really interesting features. However, those available in the restricted publications<sup>13</sup> are good enough for the purpose, though if the first age group 0-4 were split into those aged 0 and those aged 1-4, their usefulness would be even greater. This division, so important for analytical purposes, was apparently undertaken at the sorting stage,<sup>14</sup> but the results have never seen the light of the day and the age distribution at earliest ages was "dulled" even in this series. The age groups available in the restricted publications are presented in graph 1.<sup>15</sup>

It is useful to have a somewhat closer look at this age distribution. The

11. K. J. Krotki, *Estimating Vital Rates From Peculiar and Inadequate Age Distributions (Sudanese experience)*, an unpublished Ph.D. thesis accepted by the Faculty of Princeton University, October 1960.

12. E. H. Slade, *Census of Pakistan, 1951, Volume 1, Pakistan, Report and Tables* (Government of Pakistan), p. 47.

13. Census of Pakistan, 1951, *Census Bulletin No. 5, Parts I and II* (Government of Pakistan).

14. Slade, *op. cit.*, p. 48.

15. To equate this graph and the other graphs in this paper to the earlier used picture of an onion it is necessary to turn the graph sideways so that the Y-axis becomes horizontal and turn the female curve on the now vertical X-axis, like on a hinge, and place it on the right side of the X-axis, more or less symmetrically to the male curve, which remained on the left side.

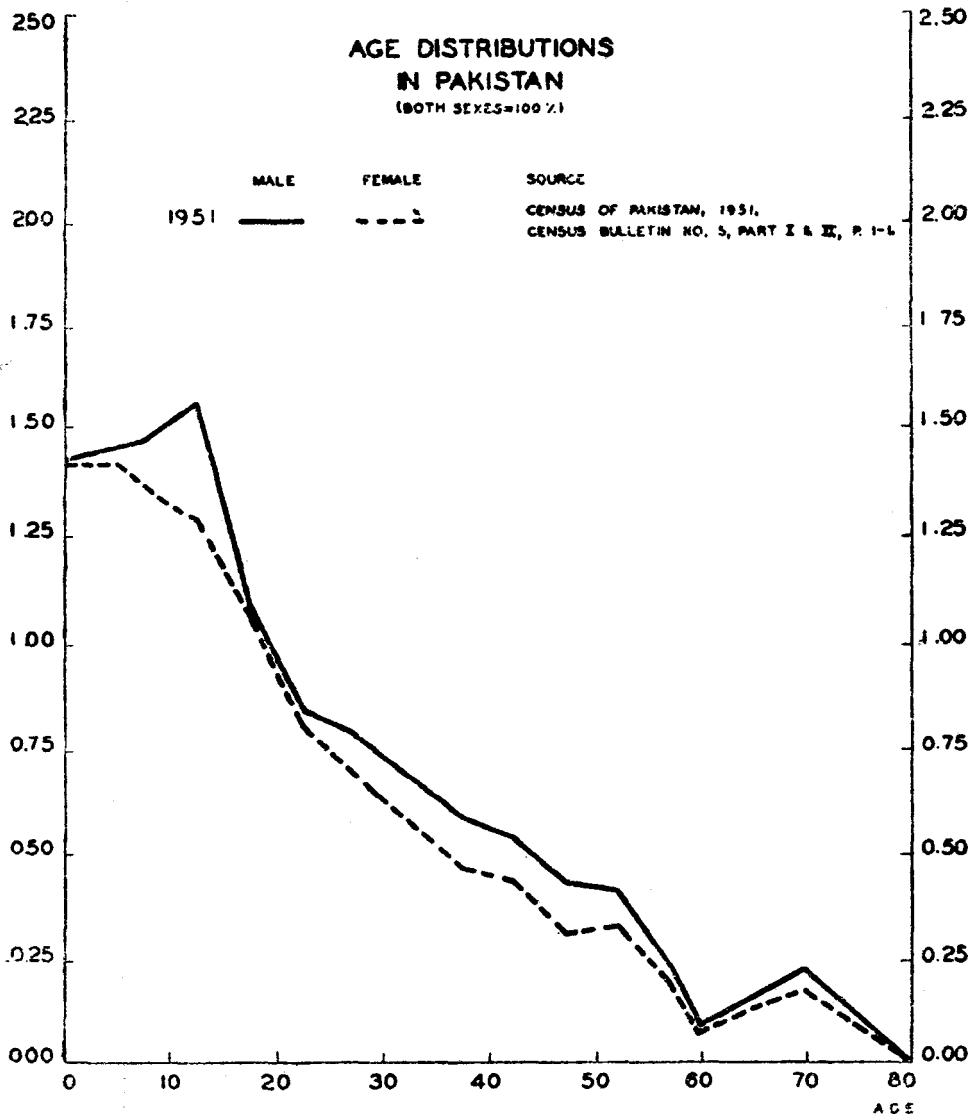
peculiarities at ages above 55 are due probably and partly to the well-known and well-documented phenomenon of overstatement of old ages, and partly to the peculiar way in which this portion of the age distribution curve was influenced by our assumption of bringing everybody above age 80 below 80. This part of the discussion has already been excluded in the opening remarks to this note, but it is useful for the type of reasoning employed later to stop for a while at age 50. It will be noted that both females and males show a wiggle. This is almost certainly of no demographic significance and is merely a reflection of the well-known preference for the figure 50. In conditions of general vagueness about one's birth date, it is only natural for a proportion of those not aged exactly 50, but aged, say, 40 to 49 and 51 to 60 to report themselves as 50. Furthermore, it will be noted that the female wiggle is somewhat more pronounced than the male wiggle. This slightly bigger female tendency to flock around the figure of 50 is in all likelihood merely a reflection of two considerations. Firstly, women are interviewed directly by male enumerators to a smaller extent than are males. They are more often reported by other respondents whose information about female ages is indirect and consequently even less accurate. Secondly, in so far as the information stems directly from the females themselves, the greater grouping around 50 reflects the lesser extent to which educational facilities are being made available to women in a purdah-type society.

If these explanations appear too fanciful, the only alternatives are even more so. It would be necessary to argue that all those aged around 50 in 1951, *i.e.*, born around 1901, were subjected to different, *i.e.*, better, mortality conditions throughout their lives than their co-citizens slightly older or slightly younger. For example, it would be necessary to argue that while they were aged, say, 20 around 1921, they were better off health-wise than their predecessors a few years earlier or their followers a few years later. While one could ignore the demographic significance of war losses suffered by India during World War I one would have to argue, *e.g.*, that somehow the influenza of the late teens of this century, severe with others, spared those born around 1901. More important, in view of the already indicated greater significance of fertility for the shaping of age distribution in comparison with mortality, it would be necessary to argue that, for some reason, significantly more babies were born around 1901 than in the preceding years and in the following years. This is not impossible, but in the virtual absence of effective means of birth control it would be difficult to make out a convincing case. Large numbers of men would have to have been mobilized for wars between, say, 1896 and 1906 with a truce and a large-scale demobilization in between. Short of some such explanation, it is simpler and, therefore, on the principle of Occam's razor, more reasonable to accept the earlier explanation that the wiggles around 50 are due to misreporting. This lengthy discussion of a not very significant point is offered as an introduc-

% OF TOTAL POPULATION  
IN EACH YEAR OF AGE

# GRAPH I

## AGE DISTRIBUTIONS IN PAKISTAN (BOTH SEXES=100%)





tion to, or illustration of, the type of reasoning on which most of this note rests.

There is another point considerably more significant, but also largely outside the scope of this note. It is the very pronounced difference between males and females. In total, it adds up to 4.5 million fewer females than males<sup>16</sup> and gives a masculinity ratio of 113.<sup>17</sup> At first sight, this seems to be a ratio quite without precedence for a large population, and even among smaller populations only Tibet and one or two other territories with small population may possibly have a higher masculinity ratio. Furthermore, it is the shortage of women at *all* ages which is so remarkable. The present writer knows of no other population where this would be the case, though he will be on a look-out from now on for a similar phenomenon. The tendency, well-documented in other populations, above certain minimum health standards and prevailing in most ages, for male mortality to be higher than female mortality, particularly at young ages and old ages, is apparently absent in Pakistan, unless we are prepared to accept the possibility that females were consistently under-enumerated at all ages. Alternatively, or at least additionally, we could also accept the possibility that because of female infanticide, exposure, neglect, greater malnutrition, frequent child bearing, and the stress and strain of household and cultivating duties in the conditions of life in Pakistan, it is a fact, and not an enumeration freak, that there are so few women in Pakistan. There is probably no doubt which explanation appears more reasonable in the circumstances of a purdah-type society with male enumerators, but again we need take no sides here. It is sufficient to say that there are peculiarities in the sex and age distribution reported during the First Pakistan Census of 1951 which cannot be easily accepted without further analysis and explanation.

We come now to the crux of this note—the extraordinary excess of males aged 5 to 14 relative to both the neighbouring male age groups and the equivalent female age groups. If taken at face value, this would suggest one or a combination of the four possibilities described below.

1. For some reason, unparalleled in demographic annals, in the years 1936-1946, *i.e.*, in the period 5 to 14 years prior to the first census many more boys were born than girls.
2. Approximately equal numbers of boys and girls were born in those years, as in all other populations are being born, but somehow in the five years prior to the enumeration in 1951 well over a million more girls died than boys, who were aged 0 to 9 at the beginning

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16. *Ibid.*, Table 1.

17. *Ibid.*, p. 57.

of the five year period and 5 to 14 just before the enumeration five years later. We have shown earlier that under ordinary circumstances demographic theory and experience do not permit allotting such importance to mortality. Only if it could be shown, that e.g., such numbers were killed during the Partition and its aftermath, were abducted into other populations, would we have an explanation consistent with the graph. The trouble with this explanation is that the population, which could have conceivably have benefitted from such abductions, shows very similar peculiarities instead of opposite and counterbalancing surpluses (and shortages).

3. We need make no commitments on the immediately preceding point because there is a still more significant consideration at ages 0 to 4, whatever the reasons for the very peculiar masculinity ratios at ages 5 to 14. There is the very pronounced suggestion that in the last 10 to 15 years Pakistan experienced a large drop in the number of babies born. Judging from the steepness of the distribution of women in the reproductive ages 15 to 44, or even more so from 15 to 29, there had been no drops in the number of women in the main child-bearing ages. On the contrary, there were each year large increases in the number of women of child-bearing ages. Thus, if the figures are taken seriously, there must have been a very definite drop in the fertility of an average Pakistani woman: not only did the numerator decrease in the number of children apparently born, but the denominator increased in the form of the number of women of child-bearing ages. This is not impossible, but is it likely?—In the absence of some positive information, demographic opinion would answer negatively. There were, of course, the upheavels of the Partition in 1947, and of the immediately following years. There was the Bengali famine in 1943.<sup>18</sup> More specific and subsequent analysis is likely to show to what extent such unorthodox explanations can be applied to prove that the extraordinary events described were capable of concentrating their effects with such huge sex differentials in those few ages.
4. There may have been some misquoting of ages on an unprecedented scale. That is to say, the real age distributions are smooth, but large numbers of children aged 0 to 4 and persons aged 15 and over were reported as aged 5 to 14. But making mistakes at those age groups on such a scale is not as easy as at older ages. Or it may be that some millions of schedules with regard to such persons

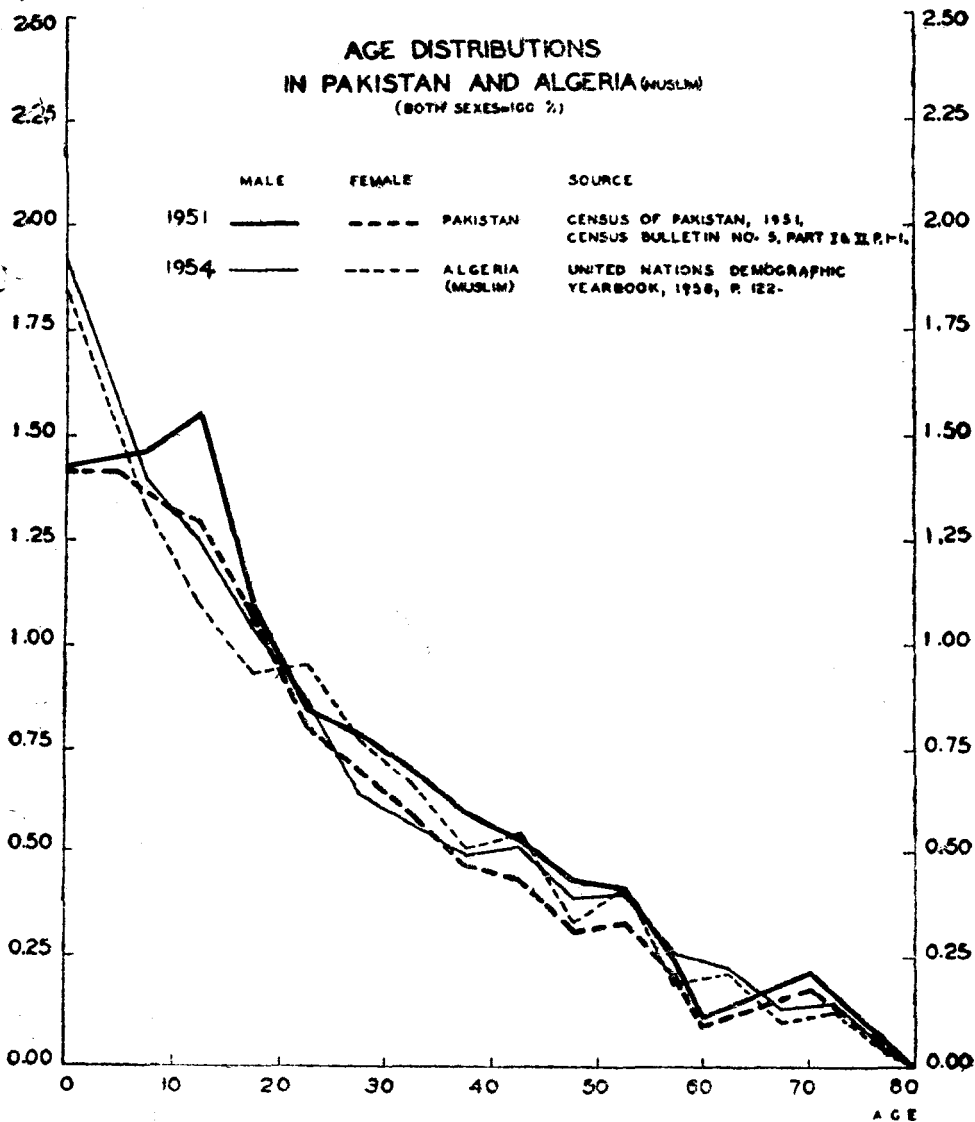
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18. W. P. Mauldin and S. S. Hashmi, "Illustrative Estimates and Projections of the Population of Pakistan, 1951 to 1991" in *Population Growth and Economic Development with Special Reference to Pakistan*, M. L. Qureshi Editor (Summary report of a seminar organised by The Institute of Development Economics, Karachi in cooperation with the Population Council, New York, September 8-13, 1959, Karachi, 1960).

# GRAPH 2

% OF TOTAL POPULATION  
IN EACH YEAR OF AGE

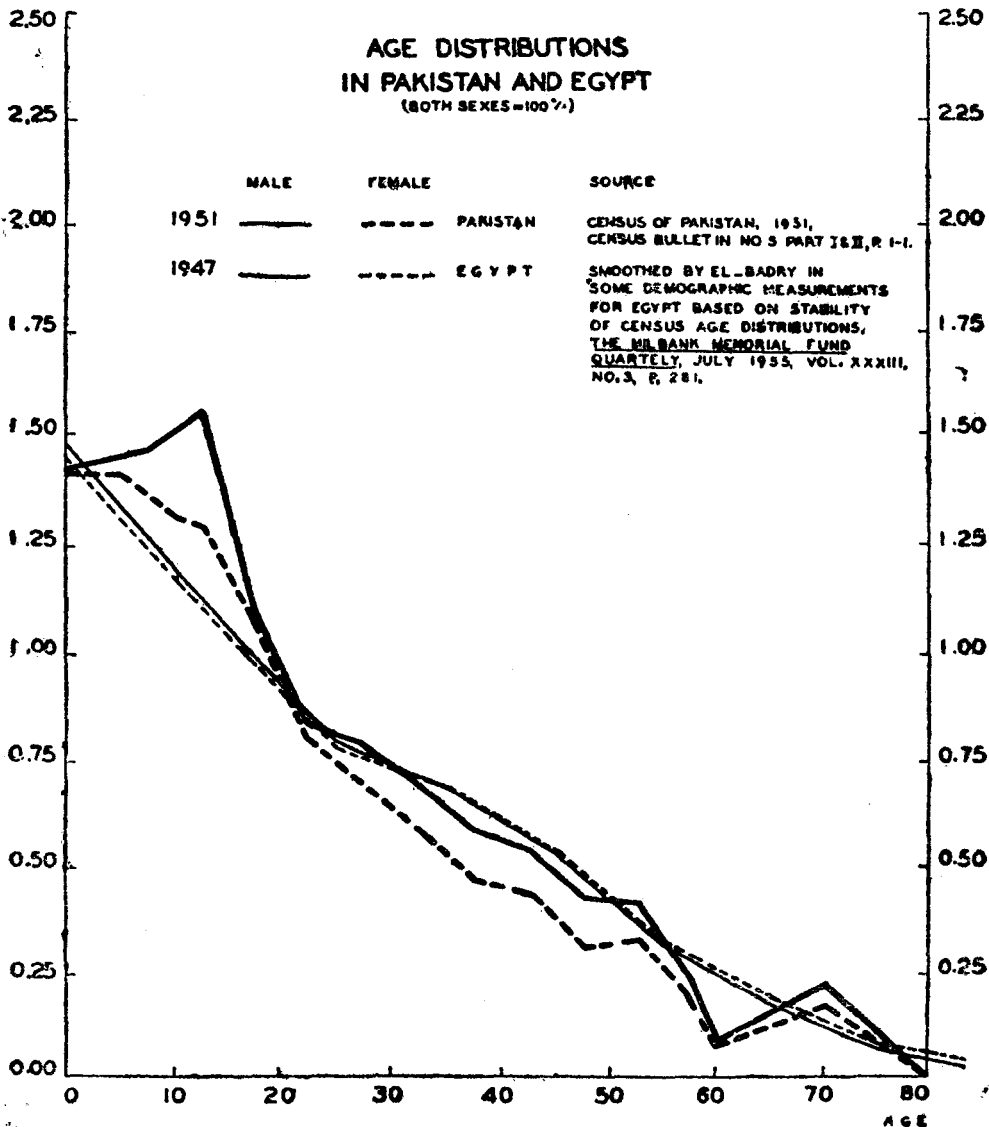
## AGE DISTRIBUTIONS IN PAKISTAN AND ALGERIA (MUSLIM) (BOTH SEXES=100 %)



% OF TOTAL POPULATION  
IN EACH YEAR OF AGE

GRAPH 3

AGE DISTRIBUTIONS  
IN PAKISTAN AND EGYPT  
(BOTH SEXES = 100%)

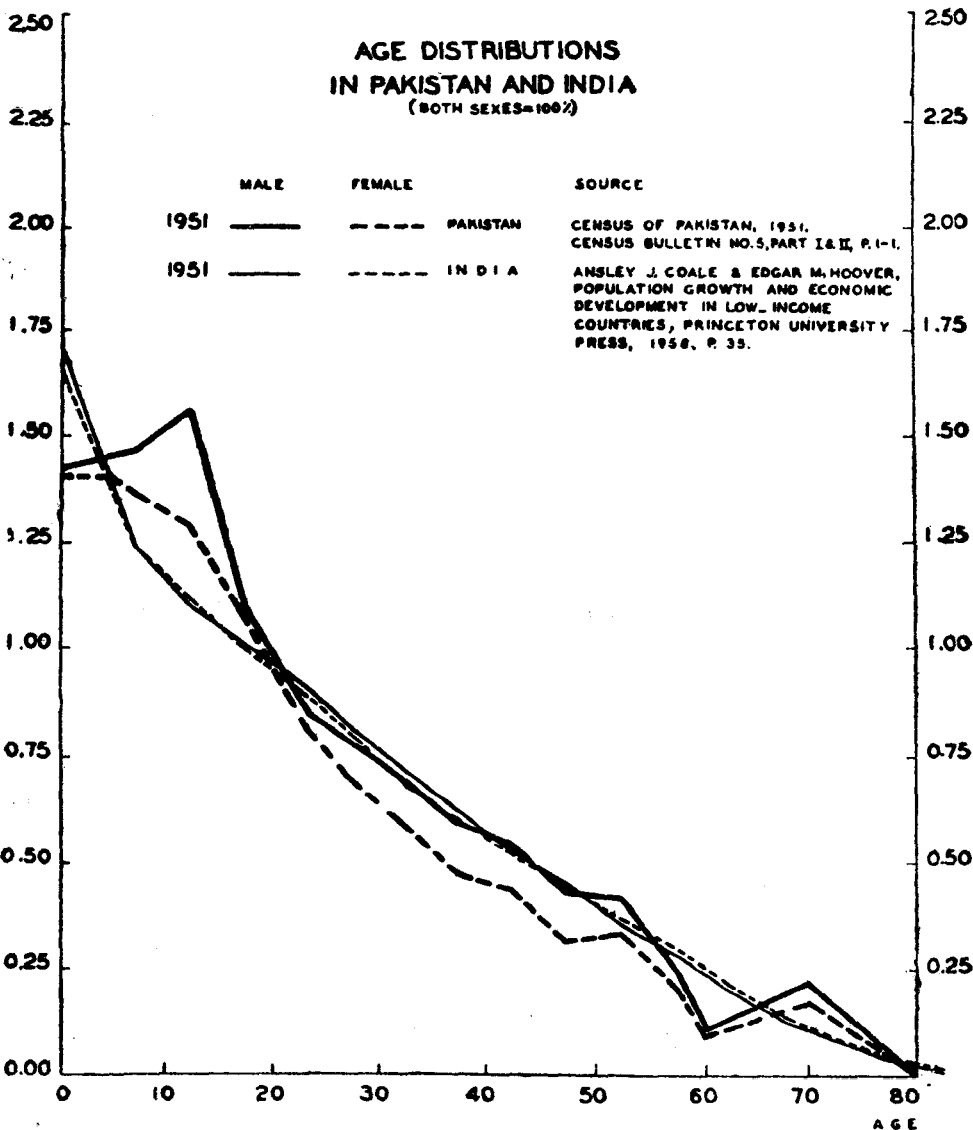


SOURCE  
CENSUS OF PAKISTAN, 1951,  
CENSUS BULLETIN NO 3 PART I & II, P. 1-1.  
SMOOTHED BY EL-BADRY IN  
SOME DEMOGRAPHIC MEASUREMENTS  
FOR EGYPT BASED ON STABILITY  
OF CENSUS AGE DISTRIBUTIONS,  
THE MILBANK MEMORIAL FUND  
QUARTELY, JULY 1955, VOL. XXXIII,  
NO. 3, P. 281.

# GRAPH 4

% OF TOTAL POPULATION  
IN EACH YEAR OF AGE

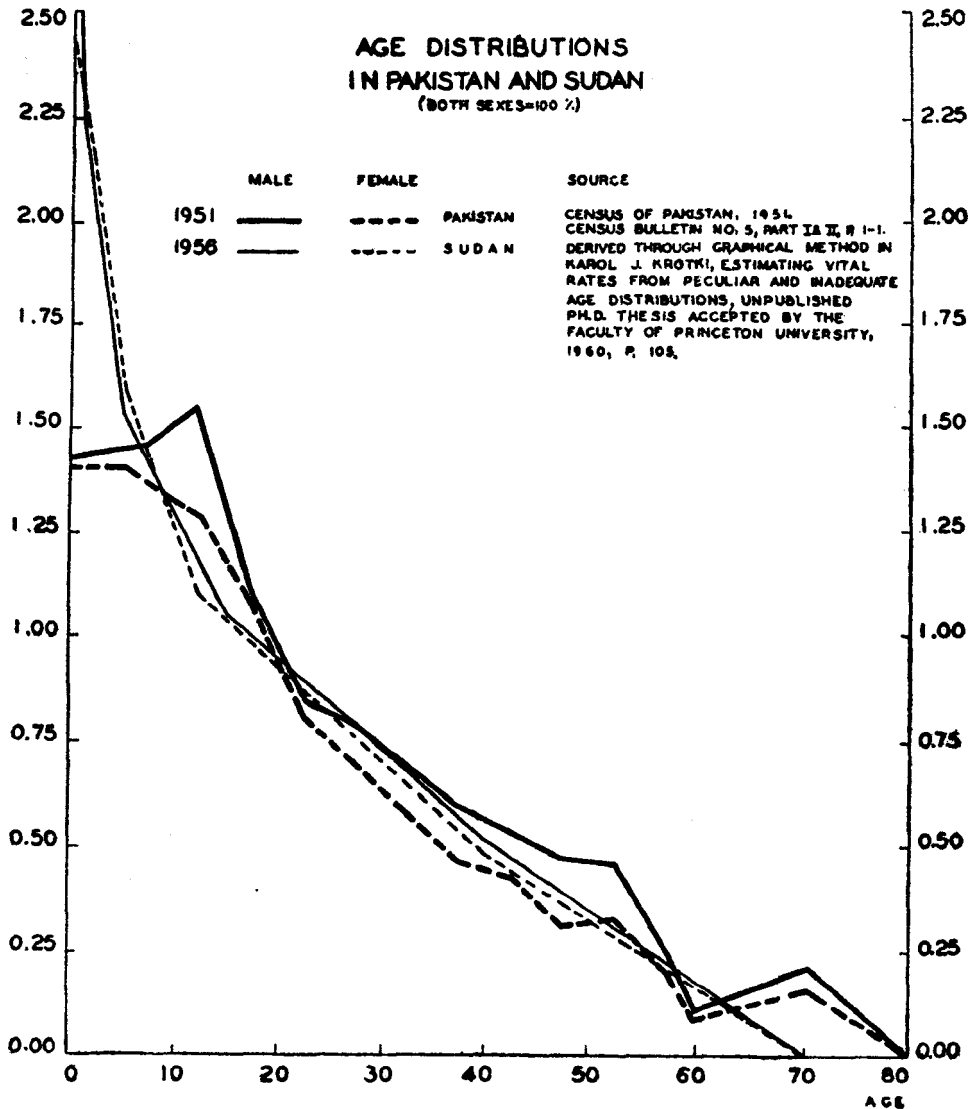
## AGE DISTRIBUTIONS IN PAKISTAN AND INDIA (BOTH SEXES=100%)



# GRAPH 5

% OF TOTAL POPULATION  
IN EACH YEAR OF AGE

## AGE DISTRIBUTIONS IN PAKISTAN AND SUDAN (BOTH SEXES=100 %)



MALE FEMALE SOURCE  
 1951 ——— PAKISTAN CENSUS OF PAKISTAN, 1954.  
 1956 ——— SUDAN DERIVED THROUGH GRAPHICAL METHOD IN  
 KAROL J. KROTKI, ESTIMATING VITAL  
 RATES FROM PECULIAR AND INADEQUATE  
 AGE DISTRIBUTIONS, UNPUBLISHED  
 PH.D. THESIS ACCEPTED BY THE  
 FACULTY OF PRINCETON UNIVERSITY,  
 1960, P. 108.

were switched into the wrong age groups in the sorting and/or tabulating sections of the census organization. Subsequent analysis may be able to pinpoint some such internal inconsistencies.

It is illustrative at this stage to turn to other countries not dissimilar to Pakistan, and to consider briefly their age distributions. These are shown in graphs 2 to 5. The comparisons are made on the assumption that what had been called in the third alternative suggested above the "unorthodox explanations" cannot be seriously considered, though it is the intention to do so on another occasion. Four populations have been selected for comparison: the Muslims of Algeria and the total populations of Egypt, India, and Sudan. On general grounds of the present stage of development, degree of sophistication, cultural background etc., these populations are not radically different from the Pakistani population.

In the present context it is immediately striking that three of the four populations have much higher proportions than the Pakistani population at ages below about 5 or 6 years of age. This excess, while present, is small in the case of Egypt, but then there are reasons to suppose that even the forceful smoothing employed<sup>19</sup> was not capable of dealing with the probable under-enumeration of children.<sup>20</sup> However, even if the population of Egypt comes closer to that of Pakistan, it is obvious that the other populations are out of step with Pakistan. Examples could be multiplied, but for obvious reasons the four populations chosen must suffice.

The shortage of Pakistani children below ages 5 or 6 is even more remarkable when compared with the excess of young Pakistani persons aged between about 5 and 25 relatively to, say, India. The single year age distributions, unsmoothed, for India in 1951 were sketched in roughly onto graph 1 and the comparison with the Pakistan male age distribution shows fewer Indians at ages up to about 25, and more at higher ages.<sup>21</sup> In spite of the shortage below age 5, the Pakistani age distribution seems to be steeper than the Indian one. One could argue that those aged around 5 were misreported around 15 (to suggest that the hill around 15 is simply the product of the dale around 5). While misreporting between, say, 35 and 45 can be easily conceived, it is not very reasonable to suggest misreporting between 5 and 15 on anything like a material scale.

The argument can now be brought swiftly to a close. Unless we are prepared to have greater confidence in one or a combination of the un-

19. M. A. El-Badry, "Some Demographic Measurements for Egypt Based on Stability of Census Age Distributions," *Milbank Memorial Fund Quarterly*, 1955.

20. Krotki, *op. cit.*, pp. 104 and 106.

21. Professor Ansley J. Coale in a personal communication to the writer dated January 23, 1961.

orthodox explanations, it is apparent that the under-enumeration of boys below the age of about 10 and more particularly girls below the age of about 15 took place during the 1951 enumeration on a scale unparalleled elsewhere, except possibly in Egypt. If this is so, then the real age distribution curve at the youngest ages is steeper than the reported one. Particularly the ugly break around age  $12\frac{1}{2}$  must be smoothed by raising the curve below age  $12\frac{1}{2}$  so that it bends gently and upwards. If this is so, then the birth rate necessary to produce such a steep age distribution must be considerably higher than rates consistent with the reported age distribution.

It may be possible in due course to produce more rigorous exercises than the present one. All we can do at the moment, and on the basis of the few calculations already undertaken, is to extend the age distribution curve from the point about age 15 upwards towards the vertical axis. Not forgetting that we have under the curve a relative, and not an absolute, age distribution our pencil may hit the vertical axis at around 2.5 per cent or even 3.0 per cent for each sex. For both sexes together this would give 5.0 to 6.0 per cent (or 50 to 60 per mill) and we must leave to move refined times the difference between the number of babies born per 1000 population and the per mill of persons aged less than one. It is to the great credit of Pakistani demographers that they were not taken in by the flatness of the reported age distributions; but even independently derived fertility rates,<sup>22,23</sup> high though they are, may not be high enough to produce the steep age distributions suggested in this note.

It is too early to express confidence in this reasoning, though it is hoped that more definite results can be reported within a year or two as a result of work undertaken at the Institute of Development Economics in Karachi. Nevertheless, it may be of interest to indicate very briefly the possible implications should the "ifs" listed above prove to be very weak assumptions after all. It may be too fanciful to suggest that the true birth rate in Pakistan is in the sixties. But even if it is only in the fifties, we are confronted with an unfamiliar situation. A birth rate of 50 per 1000 population may still be consistent with the rate of growth less than 20 per mill currently accepted for many purposes, but then the death rate must be well in the thirties, a level not easily acceptable in this age of Ministries of Health and World Health Organisations. It may, in fact, be possible to show through later analysis that the death rate is lower than 30 per 1000 population and that therefore the rate of growth is 30 per mill or more, a figure which would

22. M. K. H. Khan and M. Afzal, "Estimation of the Rate of Growth of Population in West Pakistan", *Proceedings of the Pakistan Statistical Association*, vol. 8, 1959-60 (Punjab University, Lahore).

23. M. K. H. Khan and M. Zia-ud-Din, "Crude Birth and Death Rates in the Province of West Pakistan", *International Population Conference* (Vienna, 1959).



put Pakistan among the fastest growing populations of the world. We see that the steep age distribution, if accepted, leaves us either way with a figure difficult to swallow, be it high mortality or fast growth rate. Now, it does not really matter whether mortality is still very high or whether the growth rate is already high. In the nature of things, it must be accepted that sooner or later the mortality level will be brought down, that is, if it is not already down, to more acceptable levels; and that the high growth rate will soon be with us, if it is not already here.

The results of the 1961 population census and conceivably also the results of the earlier housing census, if published fully and without lumping, are bound to throw light on this crucial questions. That it is a crucial question needs no arguing in this age when everybody is discussing the population explosion. A capital-output ratio of four to one<sup>24</sup> has been used for the purpose of illustrating problems in the economy of Pakistan, that is to say to generate one unit of output four units of capital must be invested. To ensure that the average standard of living will not decline with an annual population increase of 30 per mill (or 3 per cent) requires an investment of 12 per cent of the national income. To double the standards of living in less than a century, *i.e.*, to increase the national income per capita by, say, 1 per cent per annum will need another 4 per cent of the national income, or altogether 16 per cent. There are no under-developed countries which can provide savings of their own on such a scale to achieve the modest objective of doubling the national income in less than a century. And yet three-quarters (12 per cent points out of 16 per cent in our example) of their saving effort goes into keeping the standard of living even with the rising population flood. The populations with such conditions have to run very fast in order to stand still. There must be better ways of spending one's national income.

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<sup>24</sup>. G. Ranis, "Population Growth and Economic Development in Pakistan" in *Population Growth and Economic Development with Special Reference to Pakistan* (Karachi, 1960).