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THE VALIDITY, RELIABILITY AND STABILITY OF PAKISTAN'S LIFE TABLES 1950-1972

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1. Significance of the Comparisons

Standard procedure for the production of a life table requires complete age and sex specific registration of deaths for the numerator and complete enumeration of the population "at risk", that is exposed to the mortality recorded for the purpose of the numerator. The enumerated population then enters into the denominator in its appropriate age and sex groups. The more reliable the data, the more detailed the refinements that are justified, down to highly sophisticated actuarial procedures.[1] One obvious precaution taken by compilers of life tables is to avoid years that could have had abnormal mortality and to take instead age and sex specific averages for three years usually centered on a census year.

In Pakistan all of these elements are lacking. For the numerator, neither the completeness is there, nor is the age and sex specificty of the deaths reported with sufficient accuracy. Moreover, such reporting as does take place seems to be heavily selective by age, and particularly by sex. For the denominator, while the completeness is markedly higher than in the case of numerator, there seems to be considerable age and sex selectivity as well as age misstatement. The 1961 Census Commissioner even suggested sex misstatement (53,000 women reporting themselves as men, Census Bulletin No.7, p. 35). The age and sex specific rates required for life table purposes would still be correct if both the numerator and denominator were inaccurate in the same direction and to the same extent. Then, in connection with the last quoted case, it would be necessary to assume that deceased females were reported by their surviving families as males. If the experience of other societies is anything to go by, reports from proxy respondents are usually more given to rounding of ages, and therefore, greater inaccuracy than direct

reports from respondents. Still, the age selectivity of age and sex specific rates might be less than that of the population as a whole or its death reports. Consequently, the need for violence to life tables through pencil smoothing could be less than implied by the age selectivity of age reporting of resident population alone or age reporting done for the descendents by their survivors alone.

It is, therefore, most creditable that in such circumstances, Pakistan demographers attempted repeatedly to build up life tables, a process of making bricks with straw. It is the purpose of this article to summarize a lengthy study of such life tables for Pakistan as have been identified by us in the literature. The purpose of the exercise is three fold: to investigate the validity of these life tables in order to determine how far they represent Pakistan reality, to assess the reliability of the tables through the consistency of their values representing as they do a well-defined population over the period of two decades, and finally to unearth any common and reliable elements in the life tables that would add to our understanding of the dynamics of the Pakistan population and would possibly lessen the degree of uncertainty that surrounds Pakistan parameters to a disconcerntingly increasing extent.[2] In the process, we will inevitably have to take attitudes with regard to the quality of the endeavours undertaken and the success with which demographic techniques, often designed for statistically developed countries, have been applied to the incomplete and inadequate data available to Pakistan analysts.

In the next section, we will sketch briefly the characteristics and origin of the ten life tables we were able to identify. In the third section, we will present the twenty two population projections that somehow must have

engaged some life tables in the process of aging Pakistanis and eventually killing them off, but are not explicit about them. For each of these population projections we try to isolate in the report concerned the statement most closely related to the mortality assumptions. The statement cited is also to explain and excuse us why we were unable to determine what life table has actually been used. In the fourth and fifth sections, we roam over the two decades of the fifties and sixties in order to see whether the ten life tables are enough of a uniform collection to represent plausibly two decades of mortality experience of a developing country. Sex differentials are singled out in section six for a separate discussion relevant to the plausibility of Pakistan data. In the seventh section we will then decide, if possible, whether these mortality suggestions are consistent with other evidence about the population of Pakistan. Such other evidence can be its growth rate, its population size, both reported and estimated, and evidence from specialized survey data in as much as the data can be taken seriously.

Many doubts will be still with us when we completed the overall review and in section eight we will endeavour to lessen our doubts, by studying the details of each life table in comparison with the others. A consistent picture will not, however, necessarily be a convincing presentation close to reality to the extent that, the various pieces of evidence are not independent. In the ninth section, we compare the life tables with some of the existing models of life tables. This will be an interesting part of the exercise, but inconclusive; consistency might mean coincidence for the wrong reasons, inconsistency might mean inapplicability of the model. Of course, should Pakistan insist stubbornly on being the odd country out and refuse to conform to the experiences of other countries, there will be at least the presumption that its data are the outcome of artifacts or the recording process rather than

true demographic phenomena, unless some strong evidence to the contrary can be marshalled.

Finally in the last two sections, we attempt some conclusions with regard to the achievements of Pakistan technical demography living as it must with inadequate data.

2. The Ten Available Life Tables

In this section we give an overview of the ten life tables identified by us. Each title is followed in CAPS by a suggested "nickname" which we propose to us for sake of brevity hereafter. Complete bibliographic details are given in the list of references. The life tables in this section are in the order in which we became aware of their existence. Tables and figures are arranged in a standard chronological order: 1, 4i, 4ii, 5, 7, 6i, 6ii, 2, 8, 3.

1. Khan 1958 Abridged life tables by sex in Punjab, 1950-52 KHAN

The data used were registered vital events for the years 1950-52 and the census population for the year 1951; generally, the technique applied was the Reed-Merrell method of constructing life tables. Through a process of iteration applied to the registered births in ten cities the number of births in the whole of Punjab was estimated to require an increase by 27.17 percent. Subtracting the reported natural increase from the number of estimated births, the deaths taking place in the province during the period 1950-52 were obtained. The ratio of the estimated deaths to the registered deaths became the correction factor for each age-sex group entering into the mortality tables.

The author also noted that the number of married women reported in 1951 census was much less than the number of married men. He calculated a correction factor by equating the number of married women to that of married men, and distributed the additional women proportionately to reported married women in various age groups.

2. Pak. Tech. S.-Com. 1968 Population projections for the fourth five years Plan of Pakistan. PAKTECH

Projections for Pakistan and its provinces for the period 1960-1990 were prepared by using the component method. Average of LR values and the PGE extimates of the Population Growth Estimation study of 1962-65 (PGE)[3] were used as the 1960-65 base for the projection period. The ${}_nq_x$ values for age groups 15-19 through 50-54 for the 1962-65 life tables were smoothed by using three year moving averages. It was assumed that the extent of the inter-province and international migration was negligible and had no significant effect on the total population.

3. Farooqui and Alam 1974 Abridged life tables by sex for urban and rural areas in Pakistan, based on PGS[4], 1968 and 1971 FAROOQUI-ALAM

Age specific death rates (${}_nm_x$), except for age zero, were computed by using the formula:

$$ {}_nm_x = \frac{{}_nd_x}{{}_np_x} $$

where ${}_nd_x$ = estimated number of deaths of persons who died between age x and age x + n

${}_np_x$ = number of persons alive between age x and x + n

The rates were calculated separately for 1968 and 1971 and then averaged to arrive at one estimate for Pakistan. For age 0, infant mortality rates were used which were computed by adding the 1968 and 1971 deaths and dividing them by total births in the two years. The ${}_nm_x$ values thus obtained were then graduated through the use of Gompertz curve to overcome the effect of erratic reporting of ${}_nd_x$:

${}_nm_x = k.ab^x$ where k, a and b are constants and x is the age at death

These data are subject to sampling and nonsampling errors.

4. Aslam et al., 1967 Abridged life tables of Pakistan and provinces by sex, 1962. (i) ASLAM PGE (ii) ASLAM LR

Two series of life tables have been prepared separately for Pakistan and its two provinces for 1962. The difference between the two series lies in the use of adjusted and unadjusted death data. For (i-PGE) series the number of deaths adjusted by the PGE formula has been used whereas for (ii-LR) series unadjusted registered deaths have been used. The base population (1962 mid-year)is the same for both series.

These life tables are based on deaths observed over a period of one year instead of the more usual two or three years. They are also based on data subject to sampling and nonsampling errors.

5. Bean et al., 1968 Abridged life tables for Pakistan and province by sex, 1962-63. BEAN

The PGE data on births, deaths (based on the PGE estimates) and base population were used without correction in the calculation of the infant mortality rate and age specific death rates.

For all ages above 0: ${}_nm_x$ ${}_nd_x$ / ${}_nP_x$

where ${}_nd_x$ = the number of deaths of persons aged x to x + n during 1962 and 1963

${}_nP_x$ = base population as of January 1, 1963 in the age group x + x + n

For all ages above 0, the q values were obtained using the Reed and Merrell tables (1939)

For age 0 the q value was obtained directly: q = B/D

q_o = infant mortality rate

D_o = number of deaths of persons under age 1 during 1962 and 1963

B = number of life births during 1962-1963

The highly irregular values of q so obtained were smoothed through moving averages. Further, conventional values were used with the following specific arrangements: $L_o = .3e_0 + .7e_1$

$$_4L_1 = 1.9\,e_1 + 2.1\,e_5$$

$$_wL_{85} = \frac{L_{85}}{{}_wm_{85}}$$

where w is the highest age attained by a person, and

$_wq_{85}$ is obviously equal to 1.0.

For values of $_nL_x$ where x is other than 0, 1 and 85

$$_5L_x = 2.5\,(\ _x + \ _{x+5})$$

6. Yusuf & Farooqui, 1969 Complete life tables for Pakistan and provinces, 1962-1965 (i) Y&F PGE (ii) Y&F LR

The life tables are based on the demographic data collected by the Population Growth Estimation experiment (PGE) during the four years of its operation: 1962-1965.

(i) PGE estimates of mortality

(ii) LR estimates of mortality

Age specific death rates (m_x) were computed for all ages above 0 by using the formula.

$$m_x = \frac{d_x}{p_x}$$

where d_x = four year total of the estimated number of persons who died between age x and x + 1

p_x = four year total of the estimated number of persons who were of age x

7. Yusuf, 1967 Abridged life tables for Pakistan and its provinces, 1962-1964 SYDNEY

The data were collected by the Population Growth Estimation experiment (PGE).

Age specific death rates ($_nm_x$) for all ages above 0 were computed by using the following formula:

$$ {}_nm_x = \frac{{}_nd_x}{{}_np_x} $$

where ${}_nd_x$ = the sum of the estimated number of deaths of persons in the age group x to x + n, during the three years of study.

${}_np_x$ = the sum of the estimated mid-year population in the age group x to x + n in each of the three years of study.

The infant mortality rate was computed by dividing the sum of infant deaths during the three years by sum of live births during that period.

Since not all the details of the abridged life table were given in the paper under reference, survival ratios were calculated by the present co-authors for the purpose of the projecting the population of Pakistan in the manner required by our analysis.

8. Bose, 1963 Life tables for labor force and employment analysis in Pakistan, 1961-1986 BOSE

Pakistan mortality was assumed by the author to be represented by a U.N. model life table. Survival rates from the U.N. model life tables were used to project population in ages 0-59. A five year age-grouping for these ages was available. The author claims that after testing several U.N. model life tables, the life table with a life expectancy at birth equal to 37.5 years proved to be reasonably appropriate to represent 1961-66 death rates in West Pakistan.

3. Projections Without Life Tables

In this section, we present the twenty two population projections that must have employed some life tables, even if only implied, but which we failed to identify. For each of these projections, we cite, whenever possible, the page (s) where the relevant report comes most closely to describing its mortality assumptions without, however, saying specifically what life table has been used. Should we be wrong in our deductions, or should the life table compilers at this late stage wish to disclose the

life tables they used, we would be most interested to learn the details. In such a case we would move their projection from our section 3 to our section 2 and include the life table, if new to us, in our analysis. They would in this manner, augument the amount of material available to those sharing our interest.

1.	UN Pop. St. No. 41	World population prospects as assessed in 1963 (pp. 66 & 140).
2.	UN Pop. St. No. 53	World population prospects as assumed in 1968 (pp. 27 & 114).
3.	UN Pop. St. No. 60 1977	World population prospects as assumed in 1973 (pp. 58 & 62) Summary available in UN Secretariat 1977 p. 104: in UN Secretariat 1977: life expectancy at birth for both sexes as given for Middle South Asia is 48.0 for 1970-75 and 50.9 for 1975-80.
4.	UN Pop. St. No. 44	Growth of the world's urban and rural population 1920-2000. (pp. 55 & 56).
5.	Zachariah and Cuca 1975 (?)	Population Projections for Bank Member Countries, 1970-2000. (pp. 34)
6.	Frejka 1973b	Reference tables to "The future population growth: alternative paths to equilibrium" (pp. 3, 6, 405, 407, 409)
7.	Keyfitz and Flieger 1971	Population facts and methods of demography. There is no mention of Pakistan in this "world" compendium.
8.	Abbas 1967	Long-term projections of supply and demand for selected agricultural products in Pakistan (p. 95)
9.	UN & GOP 1974	United Nations and Government of Pakistan, 1974. Some projections of the population of Pakistan. Five years interval, base year 1970 (1970-2000), both sexes, life expectancy at birth, age specific fertility rates.
10.	Investment Advisory Centre of Pakistan 1964	Population projections for Pakistan 1961-1986. Appendix A, B, and C, pp. 31-35. Total population Figures for 1961-1986. Base year 1961.
11.	Ahmed 1960	The Second Five Year Plan (1960-65), Government of Pakistan Planning Commission (p.333)
12.	Pak. Techn. Div.	Population estimates for fifth Five Year Plan. Revised population projections for Pakistan by age and sex, 1 July, 1975 to 1, July, 1986. (p. 6)

13. Haq 1964	Population projections for Pakistan. No life table is mentioned in the description of these projections.
14. Aslam 1966	Alternative population projections of Pakistan and provinces by age and sex from mid-1960 to mid-1985. Central Statistical Office, Economic Affairs Division, Government of Pakistan (pp. 49 and 98-99).
15. Faquir 1967	Projections of Population of Pakistan 1961-1981. Census Bulletin 7, Govt. of Pakistan, Islamabad (pp. 4 & 46)
16. Mauldin and Hashmi 1959	Illustrative estimates and projections of the population of Pakistan, 1951 to 1991. Life expectancy and infant mortality in West Pakistan (pp. 61-84 and 70-71)
17. Sheikh 1967	Projections of the population of Pakistan by age and sex 1965-86. This article is essentially a critique of Brackett and Akers 1976. Their life tables, level 25 of the United Nations models (UN Pop. St.No. 25), appears to the author too severe. He is not surprised that Brackett and Akers obtained "one third more deaths than implied by the PGE death rates. How this was reconciled is not stated" (p. 265)
18. Brackett and Akers 1965	Projections of the population of Pakistan by age and sex: 1965-1986 (pp. 4 & 53)
19. UN. Pop. Div. 1970	Total population estimates for world, region and countries each year, 1950-85. Prepared by the Population Division, Department of Economics and Social Affairs.
20. Frejka 1973a	The future of population growth: Alternative paths to equilibrium (p. 117)
21. Keyfitz and Flieger	World population: an analysis of vital data (p. 408 & 662)
22. Preston et al. 1972	Causes of death: life tables for national populations. There is no mention of Pakistan in this "world" compedium.

4. Development of Pakistan Mortality according to the Ten Life Tables

This development is summarized numerically in table 1 and graphically in figures 1 and 2. The first striking feature is the female disadvantage according to eight of the ten tables and we discuss the matter in greater detail in the next section but one. Here we trace the development of Pakistan mortality for each sex separately. The life tables in table 1 have been arranged chronologically, that is to say, tracing a given life table value in its table row from left to right should reflect the history

of Pakistan mortality, presumably improving between 1950 and 1971. The life expectations and numbers surviving should be increasing monotonically and probability of dying and mortality rates should be decreasing monotonically. We can carry out such a comparison in table 1 for 22 lines: 11 for males and 11 for females. One see immediately that the Bose table for 1961-66 breaks the monotonicity consistently. It is obviously too severe in comparison with other tables. In fact, in all (most?) instances, it is nearer to the Khan table of 1950-52, than to the seven PGE tables. The drastic inadequacy and divorce from Pakistani reality of the Bose life table would be slightly lessened if we moved the Bose life table (applying as it does on the average to 1963/4) between the Sydney table of 1963 and the Y and F PGE table that applies to on the average to 1963/64, but that would still leave Bose the odd man out. The immediate and easy conclusion is that economists should not carry out demographic analysis without expert demographic assistance.

Next, it is clear that the seven PGE (and LR) based life tables have much in common with each other and as a first approximation are best viewed as a group. The first comparison that suggests itself is between the Khan table for 1950-52 and the PGE (and LR) tables on the one hand and the PGE (and LR) tables and the Farooqui-Alam table for 1968-71 on the other hand. On all 22 lines, the Khan values reflect mortality more severe than the PGE and (LR) values. However, in the PGE (and LR) comparison with Farooqui-Alam, the latter reflect improved mortality only in eleven out of the 22 cases. In the other eleven cases Farooqui-Alam shows a worsening of mortality conditions. It is noticeable that in five of those eleven cases the Farooqui-Alam life table is worse off only in comparison with the Y & F tables (either PGE or LR or both). We have one witness posed against one

witness. In the remaining six cases, the Farooqui-Alam table seems to be in disagreement with several of the PGE (or LR) tables. With several witnesses posed against one, the presumption of guilt is on the side of Farooqui-Alam table, though the several witnesses must not be taken too seriously because they might have been in colusion. (Less seriously, Farooqui seems to be the common element between the Farooqui-Alam table and the Y&F tables. Could he, another economist, be the villain of the piece, introducing haphazard results into respectable demographic analysis?)

The three q values for males in table 1 are shown again with other q values in figure 1, while those for females are shown together with the remaining q values in figure 2. If our hypothesis about the chronology of life table arrangements were true, the curves should follow each other in the following descending order: 1.Khan, 4.Aslam, 5.Bean, 7.Sydney, 6.Y & F, 2.Paktech, 8.Bose, 3.Farooqui-Alam. We could also bring in the assumption of the United Nations and the Princeton model life tables and say that the curves should not cross each other (because changes in mortality take place in the same direction at all ages). Once more we see the Khan table of 1950-52 in the realm of very high mortality, alone and away from the more recent tables. The Bose table "belongs" more closely to the Khan table although a dozen years more recent. In the course of the a analysis we will grow more and more disillusioned with these two life tables: they seem to ignore Pakistan reality and depend on slavish following model mortality derived elsewhere in the world. The other tables bunch together, except that the two Y&F tables are away in the world of low mortality. The Farooqui-Alam table for 1968-71, which should make up the lowest curve, is hugging the other tables outside and below, as it should. If taken seriously, it shows that by the time of the PGS there were further improvements in mortality since the era of the PGE.[5]

Further, if taken seriously, it shows up on figures 1 and 2 the "badness" of the two Y&F tables: their hurry into the realm of lower mortality proves to be unsubstantiated by later events of the PGS.

In condemning an estimate because it departs from several others, one runs the risk that the several others were not independent. In this case, there is no evidence that the respective authors knew of each other's work. The correct place of the Y&F table would fall somewhere within the other PGE tables or at the most between them and the Farooqui-Alam table, and not so very much out-side and below all the tables including the more recent 1968-71 Farooqui-Alam table. At this stage we do not need to take up the question of the disconcerting age-specific zig-zags in some of the life tables, even though human populations do not behave in this way. These, and the problem of smoothing, are taken up when they become relevant during the discussion of age specificty. Here we are concerned with the general mortality levels, not yet their details.

With evidence that varied and that contradictory, it is with some trepidation that we will attempt to approximate more closely to reality and narrow the uncertainty surrounding the variety of Pakistan life tables. We will first enquire into the level of mortality in the next section. In the following section, we will go into sex differentials, and finally we will touch upon age specificty in Pakistan mortality.

5. Changes in mortality levels, as distinct from patterns

In table 2, life expectations according to various writers have been listed chronologically. The assembled "evidence" covers three decades. Should Pakistan mortality have been improving consistently and should the analysis have made correct estimates, then the life expectations in table 2 should show a monotonic increase. And in fact, there seems to be some such

increase, interrupted here and there by the wilder guesses. Apart from the unreliability of the LR estimates dismissed in footnote 2 of table 2, those that seem to have gone astray are Bean et al. 1968, Yusuf 1967, Bose 1963, Frejka 1973a and 1973b. Farooqui and Alam 1974 should also probably be included in this category, at least with regard to females. (Figure 2 still reports female mortality, during the younger and middle ages, above the male mortality shown in figure 1, but for Farooqui & Alam figure 2 suggests an improvement for women difficult to accept relatively to other life tables). The reason why we cannot accept the five and half writers mentioned is that the mortality improvements suggested by them would require a rate of growth that would have produced by 1972 a population total markedly above the one reported during the 1972 census.[6]

The information from table 2 is repeated on figure 3 with some additional liberties taken with regard to the available data. It is clear that the Mauldin-Hashmi path is now of historical interest, but it is a fascinating record of the early views of analysts in the midst of the so-called population problem: they underestimated mortality improvements and consequently the size of the problem. The later United Nations path hugs closer to reality or to other views, depending on how we chose to describe the analytic and reported results. The Faquir line is still closer to the remaining suggestions. What is called-with tongues in our respective cheeks - the "truth" line (note the quotation marks) turns on the validity of the Khan 1950-52 estimate and on the bunch of PGE estimates in respect of 1962-65. The PGE estimates of life expectations spread well over three years in the case of males and females alike. This is bad enough, but the real uncertainty begins beyond 1965. The three question-marked paths define a

wide range of alternatives. Any number of combinations of fertility, mortality, and rates of growth is possible if we are to entertain doubts with regard to the data reported from the 1972 census count.

Demographic analysis and analysis of field reported fragmentary data from the 1972 census (Krotki 1976 and 1977; Krotki and Parveen 1976) suggest that the crude death rate was somewhere between 16 and 20, the preferred rate being 17. As an exercise in plausibilities the "west" mortality level 12 for females (Coale and Demeny 1966:48) for growth rates ranging as widely as 2 and 3.5 percent places the death rate in the narrow range of 17.43 and 17.63 (fertility varying between a CBR of 53 and 38). We cannot entertain a lower mortality, because level 13 requires a CDR less than 16, while level 11 (higher mortality) demands for consistency with fertility and reported growth a death rate of almost 20 and more severe levels demand still higher CDR. The life expectation at birth of female level 12 "west" (ibid.: 13) is 47.5 years. It would appear then, that of the three question-marked "truth" curves the lowest is most consistent with other evidence, and, incidentally furthest away from Frejka's world projections.

6. Sex Differentials in the Ten Pakistan Life Tables

In the last but one section we gave advance notice that in two of the life tables available for our analysis, females display the usual in the world female advantage in mortality (Khan and Bose). The other eight tables show a male advantage, unusual in comparison with other societies. The two life tables repeating the more traditional male disadvantage are no evidence to that effect. Bose assumes explicitly the applicability of the UN model to Pakistan, while Khan must have assumed so, even if implicitly.

It will be noted that the male advantage disappears in some of our life tables by the age 40 or so. The Bean life table perseveres with higher female mortality at all ages (except haphazardly, at age 0 and age 50), but the hypothetical Keyfitz-Flieger table is consistently showing female mortality advantages from age 40 onwards. For two life tables (Y&F PGE and Y&F LR). The male advantage actually disappears much faster, namely at age 10. The temptation to speculate is great: did the high quality of PGE reflect itself even in this difficult measurement? One could suggest that either there have been improvements in female mortality recently or that we are confronted with a disappearing phenomenon of female underreporting at the denominator more pronounced than at the numerator. The PGE conducted six years later (the Farooqui-Alam life table) did not apparently wake up to this development in Pakistan demography or in Pakistan reporting habits and shows no female advantage until after age 55. We feel that Y&F were too much in a hurry to suggest mortality improvements and to make the population of Pakistan to conform to the rest of the world. One wonders what actual data were Y&F really using.

The question whether there has been a relative improvement in female mortality, that is relative to male mortality, is of critical importance for our last but one section on Pakistan's substantive demography. The Farooqui-Alam life table shows no improvement in female relative mortality. In this section we are interested in the following: the female advantage shown by Khan and Bose is just not acceptable, because the two were blinded by the rest of the world: by the Princeton blinkers and those of the United Nations. The male advantage in Pakistan appears real enough to us. As good PGE people we cannot take PGS seriously and we elect to see in the few

indicators of female improvement an outcome of the general mortality improvement. For those who take PGS more seriously than we do, the continuing male advantage implies no general mortality improvement.

It is tempting to view the two decades as a continuing process of mortality improvements. Apart from the jump between Khan and the others, which common-sensically is probably real, there is, however, little to support this conceptualization. The PGE life expectations hover around 49 and 51; the later PGS does not reach 53, and even then it does not carry through this suggestion of improvement to older ages. In fact, its suggestion at age 40 is decidely grim, next to the lowest Khan a dozen years earlier. It is much a question of temperament whether we look at the sixties as a plateau of survival, with higher life expectations than in the early fifties, but with hardly any urges to improvements by the seventies or whether we do discern a continuing tendency to lower mortality levels throughout this period. We will revert to a discussion of sex differentials in the next but one section on age differentials.

7. External Mortality Evidence Compared with Life Tables

The direct evidence on mortality other than life tables is only slightly less scarce and only slightly less dubious than that on life tables. We assembled 45 reports and estimates of crude death rates for Pakistan covering the period from 1901 to 1972 (not shown here) and it was clear to us that over the long period these rates do create a distinct impression of improvements in mortality. The variations are too great, the sources too uncertain, and the period too short to say with certainty whether the improvement process was also operating over the 1960's.

Indirect evidence on mortality depends on the data we have about population size, population growth, fertility and particularly the degree of dependence with which we are ready to treat this information. If two census totals give us the rate of growth and if the proportion of young children indicates the level and changes in fertility, then we may obtain mortality by subtraction. In Pakistan, there are currently doubts on both these components. There are indications that the 1972 population census had improved areal coverage, experienced traditional age and sex selective underenumeration, and some overenumeration. It is not possible to say with certainty what the contributions of these three elements were to the reported rate of change. Elsewhere (Krotki and Parveen, 1976) illustrative suggestions on magnitude of these three elements have been made. The real possibility, nevertheless, remains that the growth rate varied somewhere within the rather wide span of 2.8 percent and 3.4 percent per annum. The certainty that we are no longer at 1.4 or 1.8 or 2.2 or even 2.6, as was thought in the preanalytic days in Pakistan, is progress, but it remains the duty of field surveyors and analytic demographers to try to narrow this rather wide band.

Mercifully, the band of uncertainty is narrow for fertility. Although, the reports are persistent that Pakistan's crude birth rate declined recently from 50 to 45 per thousand population, there has been no corresponding decline in the proportions at younger ages, and in the absence of firmer evidence we may just as well stick with 50. That leaves by subtraction a crude death rate somewhere between 16 and 22. This gives no insights on the possible mortality improvements and could be consistent with a wide variety of life expectations at birth.

However, it will be recalled that at the end of the last but previous section we have shown that with a growth rate varying widely (between 2 and 3.5 percent), and a crude birth rate varying around 50, the only consistent death rate has to be around 17. And with the high growth rate experienced by Pakistan just before the 1972 census, the birth rate could not have been much less than 50, because that would require a death rate impossibly low.

6. Life Tables Compared with Each Other and their age Specificity

The five year age group q values, with the first five-year age group shown split into the first year and the next four years, are depicted graphically in figure 1 for males and in figure 2 for females. The sexes for each life table can be compared directly on figure 4, where also age and sex differentials with four hypothetical life tables (Keyfitz & Flieger 1968: 1961, Princeton West 10; Princeton West 14, and UN level 50 with e = 45) can be studied. It is easy and instructive to spot the es-ential differences. Firstly, except for Khan and Bose, they all show over the middle ages higher female mortality than that of males. Young females are also disadvantaged, but not so uniformly. Over the older ages, the exact age at which females gain an advantage over males varies among life tables, in some it begins as early as 35 (when the main child bearing is over?), in some it does not take place until age 50.

The second outstanding feature of the ten life tables is that four of them show zig-zags in their age specific mortality, particularly in the case of females, to an extent not observed in any other human society. These life tables are Aslam PGE, Asiam LR, Sydney and to a lesser extent Bean. The zigzags are useful because they underline the extent of the

forceful smoothing to which the other smoother life tables must have subjected. It is important to realize that the smoothness of the other life tables is the function of the whim or skill of the compiler and the steadiness of his hand, not to mention the thickness of his pencil. Thirdly, the lowest values in figures 1 and 2 are those of Y&F PGE and Y&F LR, which cover the years 1962-65. The Farooqui-Alam life table, six year more recent, seems to have a much higher mortality and closer to remaining life tables. Could it be that the estimation of the PGE denominator was more thorough than that of the PGS denominator, so that even if PGS failed to catch all the deaths in the numerator relatively to the PGE, it failed in the denominator even more.[7] However, it will be recalled from the discussion of figure 3 that the PGS values (life expectations from Farooqui-Alam) were not impossible in comparison with the earlier data, and still consistent with the hypothesis of balancing errors. Such improvements as occurred in mortality in the six years between PGE and PGS took place in the youngest ages and not apparently yet over most of the ages.

Figure 4 avoids the crowding of curves on figures 1 and 2, and makes possible a comparison of age specificity of the various Pakistan life tables. Except for the two heavily smoothed Y&F life tables and the Farooqui-Alam table, they all show swollen maternal mortality during the reproductive ages. In comparison with the four hypothetical life tables appended to our figure 4, the Pakistan life tables are very U-shaped, with a flat middle part, a phenomenon to which we will return in the section on Pakistan's substantive demography. The hypothetical tables, kind of averages from elsewhere in the world, show, at the same life expectations as our Pakistan tables, a tendency to an early increase in mortality, discernible at age 20-24. Khan and Bose show this upsurge at around ages

20-24. Consistent with the implication hinted at earlier, this suggests again, that their life tables are not really based on Pakistan data, but rather formulated under the influence of general world experiences.

9. Life Tables Compared with Models

In figure 5 are shown the difference between the ten Pakistan life tables and the nearest Regional model life table (Coale and Demeny 1966). These differences are shown in the form of departures of the Pakistan life table q-s from the regional model q-s. Thus a plus indicator means that the mortality at the given age and for the given sex is higher according to the Pakistan life table than that in the rest of the world (speaking crudely and assuming that the regional life tables summarize the totality of human mortality experience). On the other hand, a minus indicator means that the Pakistan mortality at the given age and for the given sex is lower than that of the regional model.

Actually, whether we happen to have a plus or a minus is not immediately relevant to our discussion. In the calculations (not shown here) leading to figure 5, we merely searched for the nearest "West" level among the Princeton regional tables and we were not particularly punctillious in insisting that the chosen model life table has a life expectation exactly equal to that of the given Pakistan life table. It is the direction of the cruve connecting the indicators in figure 5 which is of interest. They all, that in all Pakistani life tables, decline to the right, irrespective of sex. That is to say, at a given level of mortality tends to be less and less with age. In other words, once the greatest penalty is imposed at the young ages, the force of mortality tends to be milder at older ages.

Khan and Bose, once more, do not conform to this generalization. Khan's data were not even equal to detecting the high infant mortality, so consistently reported by all the other Pakistan life tables. The Khan data on infant deaths were suggesting infant mortality lower than in the world at large. In other words, one of the two departures from the experience of the world, that Khan permitted himself to make, ventured the wrong way. The other departure: the female advantage suggested by Khan, even more pronounced in the world, is also not yet to be, as we saw during the earlier discussion and as we can see on the right hand side of figure 5.

Bose males are close to horizontal, that is the UN values, used by Bose, are close to the regional values. His females depart somewhat more from the horizontal, a reflection probably of greater sensitivity of the regional models to actual data of the world in comparison with the cruder averaging carried out for the purposes of the UN models.

For oldest women, four of the Pakistani life tables turn up, and four turn down. That is to say, the former four suggest more severe mortality for women aged 60 and over in Pakistan than in the rest of the world (Aslam PGE, Aslam LR, Bean, Sydney): all four had a rather narrow data base, all four are zigzaggers on figure 4; we feel that for our money they zig-zagged once to much and in the wrong direction.

A question that arises at the end of this section and at the end of the previous section can now be jointly put. Are these Pakistani peculiarities real demographic phenomena or artifacts of the reporting and estimation system? First for females: Pakistan society is not the only one where females suffer more severe mortality than males, but what is

unusual is that this continues taking place at such a relatively low level of general mortality as experienced recently in Pakistan. On the other hand, we do know that Pakistani females were traditionally undernumerated at certain ages, and that between 1961 and 1972, there has apparently been an improvement in their completeness (Krotki and Farveen 1976:305), reflected also in lower masculinity ratios (ibid.: 302). On balance, once more it cannot be said: may be it is real, may be it is an artifact.

With regard to mortality becoming relatively more favourable with age, there is no immediate reason to think that it could not be real. It is difficult to say something to the contrary. Nevertheless, the wide-bottomed U-shaped curve of most Pakistan life tables shown in figure 4 remains a notable feature. If true, this particular distribution of death also provides an indication to planners: if the rest of the world is a guide, then the high mortality in Pakistan at young ages is ready for improvement. This would swell the youngest ages, once more obliterating any impact the family planners might have had on the Pakistan society.

10. Conclusions for Pakistan's Substantive Demography

The conclusion with regard to the life tables is quite brief and straightforward. They are all more or less plausible (except the zigzags in figures 1 and 2, and in four of the first five curves in figure 5) and they are at least consistent with some other features, also plausible, of the society. However they resolve none of the doubts we have about demographic parameters in Pakistan: they do not even narrow the band of uncertainty surrounding them.

The 1961 age groups were "survived" until 1971 in figure 7 and table and then compared with the CES reported age groups for "1971"[9] and finally

shown as an index with the "1971" age groups serving as a 100. The numerical outcomes of this exercise are shown in table 3 for all ten life tables under analysis and for four of them the results are shown graphically on figure 6. The "survived" age group 15-19 is in all life tables much higher than the reported age group in "1971". As is well-known in Pakistan literature, age group 5-9 has been in 1961 the source of considerable analytic trouble. It has been subject to some overreporting, not dissimilar to the way age group 10-14 seems to have been overreported in 1951, about which we will have more to say in a little while. The female age group aged 25-29 in 1971 and "survived" from 1961 is less than the reported equivalent apparently an aftermath of the severe hiding of these females when they were aged 15-19 in 1961. Finally, at almost all ages (the "survived" age group 15-19 being the most notable exception) the life tables do seem to be too severe with the population of Pakistan in comparison with the actual experiences of these populations, unless what has been called elsewhere "recoveries" of (Krotki and Farveen 1976:305) of areal omissions and "recoveries" of age-and-sex specific underenumeration in 1961, as well as the new phenomenon of overenumeration in 1972, are the explanations. How important this decline in underreporting and the occurrence of overreporting may have been, has been shown drammatically in figure 7, if we take our life tables seriously. The difference between the "1971" population and the survived population is more marked in the case of females than for males, an observation relevant to the hypothesis that some of the increase may have been due to overenumeration.[11]

The "1971" age distribution is based on the very small, even if representative 1972 CES.[12] To assess the possible importance of choosing the CES age distribution, rather than a census distribution, the "1971"

total has been distributed according to the unadjusted 1961 age distribution and the exercise carried out for the purposes of table 3 and figure 6 has been repeated and summarized in table 4. Four of these life tables have been plotted (not shown in this paper), the same four as shown on figure 6. There are no markedly new findings from these plottings in comparison with figure 6. The curves connecting the "survived" age groups seemed to be volatile, which suggests that the 1961 age reporting was poorer than in the 1972 CES, a conclusion however weakened somewhat by the realisation that figure 6 is in terms of ten year age groups, while the plottings not shown in this paper referred to five year age groups, coming as they did from the 1961 five year age distribution.

Having obtained little additional satisfaction and a rather limited insight into the life tables from surviving the 1961 age groups into 1971, we decided to survive the 1951 age groups into first 1961, and then 1971. The 1961 survivors out of the 1951 cohorts are compared with 1961 actuals (=100) in a table not shown in this paper and the 1971 survivors out of the 1951 cohort are compared with the "1971" actuals in another table, also not shown in this paper. As a curiosity one observes that age group 10-14 in 1951, aged 20-24 in 1961, and 30-34 in "1971", seems to have experienced for the last time in Pakistan an overenumeration in 1951 of the kind traditional in other countries (heaping at the age 10). The index is around 160 for males and around 150 for females in 1961 for the age groups projected from 1951 (the census reported 1961 age groups=100) and around 130 for males and around 120 for females in 1971 projected from 1951 (the reported "1971" age groups =100).

By 1971, the age distribution of the 1951 cohort is limited to those above twenty, that is, persons born before 1951. For those above twenty, we applied the relatively mild life tables of the sixties, while they lived also in the presumably tougher fifties. No wonder then that at least for males we have more survivors, than even the overreported age groups "1971". What is instructive is the differential overreporting. First of all, our life tables were apparently too severe for women (or they lowered by 1971 their earlier underreporting or, less likely, engaged in more overreporting than males). Each life table shows fewer of them than the corresponding age group reported in "1971" (with the unimportant exception of the Y&F LR but we are impatient with Y&F by now), and markedly fewer than the corresponding male index. Those aged 30-39 in 1971 show swelling for both sexes. They were aged 10-19 in 1951 and apparently as already indicated, engaged in age-heaping in 1951 (or less likely were exposed to insufficient mortality in the life tables during the process of arithmetical "surviving" or still less likely there have been undernumerations among those aged 30-39 in "1971").

11. Conclusions for Pakistan's Technical Demography

The fine instrument of the life table is quite helpless when confronted with the crude errors of age reporting. This skillful scalpel of a surgeon-actuary cannot withstand the course shifts of misreported age groups from one age to another, as well as the impact of age and sex specific underenumeration or overenumeration.

To say that the material on which our life tables are allegedly[13] based is imperfect in to use mild language. Such material requires forceful smoothing, where we depend on the thickness of the pencil, etc. While the

compilers who left the zigzags in their curves in figures 1, 2 and 4 are to be commended for their modesty, the use of such life tables for realistic projections is probably limited. So we must smooth.

But it is no use projecting the unusual reported age distributions from Pakistan unless smoothed into something more realistic. So we have a smoothed age distribution projected according to smoothed life tables. The smoothing depends partly on assumptions concerning changes in mortality and fertility, that are compounded by powerful influences of areal recoveries, improvements in age and sex selective underenumeration, and emerging - according to some - overenumeration. This situation calls for large scale suicides among demographic analysts, unless they manage to get so busy with the minutiae of their trade that they do not notice the generally unsatisfactory state of their data.

May be, instead of playing with real data, Pakistan demographers should move over entirely to models. The trouble with models is that one is never absolutely sure when they apply and when not. There is no substitute for real data of high quality. Census statisticians and survey practitioners have shown over the years, that when left to their own devices, the improvements in data quantity and quality can be meagre or even negative. Their client-demographer should speak up with a firmer voice.

ENDNOTES

1 The surgical precision of actuarial computations often ends by butcher-like profit motivated decisions of life insurers. Premiums for life policies are based on life tables twenty years old, while the cost of annuities assume some unheard of medical breaks-through, both to leave a sufficiently wide margin between takings and disbursements.

2. The uncertainty surrounding Pakistani demographic data although still narrow in comparison with most socio-economic series, has been widening recently. While the underenumeration of the population during the 1961 count was pretty generally accepted, the count of 1972 gave rise to conflicting opinions. Some writers saw in the result a politically motivated overcount (Bean 1974; Bean and Bhatti 1974), and others felt there was again the traditional undercount (Afzal 1974; Krotki 1976 and 1977; Krotki and Parveen 1976). Recently, doubt has been thrown even on long established series. The birth rate of Pakistan long and generally accepted as an irrefutable fact, might after all have been lower than believed for a long time (Afzal 1977). Thus uncertainties, instead of narrowing with development in demographic analysis, are actually widening.

3 LR stands for Longitudinal Registration, one of the two procedures used in the Population Growth Estimation experiment; the latter is abbreviated in literature to PGE.

4 PGS stands for Population Growth Survey a mutiround survey conducted in Pakistan by the Central Statistical Office in the years 1968 through 1971. While the frequency of the survey varied during the four-year period, it was essentially a retrospective survey with a long recall period.

5 The two Y&F curves place themselves through figures 1 and 2 outside common sense. They claim mortality in 1962-65 lower than even the under-reported PG did six years later for the period 1968-71.

6 Bean seems to be a particularly easy target for complaint in this regard. First, in 1968 with his associates, he suggests low mortality, but by 1974 he thinks on his own that the population of Pakistan in 1972 has been overenumerated. The two alternatives, happening together are not entirely impossible, but would require a kind of analytic gymnastics that have not yet been undertaken.

7 A field exercise, the 1972 CES not dissimilar in its field procedures from the PG, missed apparently eight million people, as compared to the four million people missed by the census (Krotki 1976: 186).

8 As we explain in the text he took particular to care to make allowances for the underenumeration of women. Conceivably, declicate as these adjustments are, he added too many older women and too few young women and was left with over-favourable female mortality at older ages.

9 The September 1972 population total was cecreased by 6 percent to arrive at the January 1971 estimate exactly ten years after the 1961 census taken in January 1961. As there was no such reported total, it is called in quotation marks "1971".

10 The problem of the age group 5-9 is not limited to Pakistan. World literature on this topic is already considerable.

11. There is no reason to think that the manipulative kind of over-enumeration for political and ethnic reasons suggested by Bean 1974 and Bean & Bhatti 1974 would have selected females as its Modus operandi.

12 At the time of this analysis, the re,orted age distribution for 1972 was not available; hence the assumptions with regard to the probable age distributions once by reference to the reported 1961 age distribution, once to the CES (Census Evaluation Survey) of 1972.

13 We refrained from checking the arithmetics of our life table compilers; many of the basic data are not easily accessible, though there was the not infrequent itch to take a closer look, when confronted with internally inconsistent features; hence the words "allegedly based".

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TABLE 1

Basic Life Table Values by Sex in Ten Pakistan Life Tables 1950-71

a	1. Khan 1956	4. Aslam et al. 1967		5. Bean et al. 1968	7. Yusuf 1967
b	KHAN	ASLAM, PGE	ASLAM, LR	BEAN	SYDNEY
c	1950-52	1962		1962-63	1962-64
d	Reed-Merrell	(i) PGE	(ii) LR	PGE	PGE
	1	MALES			2
q_0	0.21815	0.16000	0.16150	0.15300	0.13314
q_{10}	0.03611	0.00995	0.00995	0.01366	0.01237
q_{40}	0.09150	0.02959	0.02959	0.03098	0.034..
l_0	100,000	100,000	100,000	100,000	100,000
l_{10}	62,401	75,676	76,459	75,247	76,218
l_{40}	44,023	67,781	70,225	66,402	67,409
e_0	33.04	49.43	50.85	51.10	51.49
e_{10}	41.85	54.32	55.58	57.40	57.28
e_{40}	22.33	28.79	29.13	32.86	32.44
m_0	0.25830	0.18018	0.18208	0.17135	0.14264
m_{10}	0.00735	0.00200	0.00200	0.00275	0.00249
m_{40}	0.01391	0.00601	0.00601	0.00630	0.00682
		FEMALES			
q_0	0.19636	0.14300	0.15560	0.13552	0.13122
q_{10}	0.03695	0.00995	0.00439	0.01495	0.01710
q_{40}	0.09398	0.03444	0.03927	0.04021	0.033..
l_0	100,000	100,000	100,000	100,000	100,000
l_{10}	65,854	74,726	75,541	73,909	73,283
l_{40}	44,405	64,306	65,006	62,866	61,671
e_0	34.64	47.43	47.82	48.70	48.58
e_{10}	41.66	52.34	52.29	55.24	55.36
e_{40}	23.61	28.21	27.96	31.94	32.55
m_0	0.22780	0.15891	0.17462	0.14972	0.14043
m_{10}	0.00752	0.00200	0.00100	0.00301	0.00345
m_{40}	0.01944	0.00701	0.00801	0.00821	0.00679

a. Bibliographic reference to source where life table published
b. "Nickname" of life table
c. Period covered by life table
d. Model followed or source used in life table computations

6. Yusuf & Farooqui 1969		2.Pak. Tech. S-Com 1968	8 Bose 1963	3. Farooqui & Alam 1974	a
Y&F PGE 1962-65	Y&F LR	PAKTECH 1962-65	BOSE 1961-66	FAROOQUI & ALAM 1968-71	b
(i) PGE	(ii) LR	PGE	UN e_o=37.5	PGS	c
					d
		MALES 3/			
0.12900	0.13953	0.13808	0.20925	0.12265	q_0
0.00180	0.00182	0.01198	0.02447	0.00772	q_{10}
0.00658	0.00558	0.03415	0.08181	0.0.818	q_{40}
100,000	100,000	100,000	100,000	100,000	l_0
75,552	81,398	77,133	67,288	81,274	l_{10}
66,933	74,050	69,085	50,009	76,397	l_{40}
49.79	57.08	47.79	37.50	52.90	e_0
55.42	59.37	51.48	44.06	54.38	e_{10}
30.35	34.06	25.50	23.48	26.79	e_{40}
0.14193	0.15463	0.15285	0.24820	0.13417	m_0
0.00180	0.00182	0.00241	0.00406	0.00155	m_{10}
0.00660	0.00559	0.00695	0.01706	0.00367	m_{40}
		FEMALES			
0.12690	0.14596	0.14026	0.13925	0.10595	q_0
0.00280	0.00282	0.01331	0.02758	0.01521	q_{10}
0.00747	0.00545	0.03531	0.07398	0.02367	q_{40}
100,000	100,000	100,000	100,000	100,000	l_0
71,319	80,390	73,669	68,819	81,942	l_{10}
60,496	71,277	63,452	49,998	73,768	l_{40}
47.88	56.79	45.06	37.50	51.80	e_0
56.50	60.37	50.53	44.65	52.84	e_{10}
33.65	36.02	26.93	25.21	26.96	e_{40}
0.13927	0.16257	0.15553	0.22056	0.11449	m_0
0.00279	0.00283	0.00268	0.00559	0.00306	m_{10}
0.00750	0.00547	0.00719	0.01536	0.00479	m_{40}

1/ Life table based on the province of Punjab only (Khan 1958)

2/ While the author reports m and e values, he does not give the q and l values (Yusuf 1967); they were calculated by the co-authors.

3/ The values cited in this column come from UN Pop. St. No. 25. The author claims to have used the UN model life tables with e_o=37.5 for the period 1961-66 (Bose 1963: 374 mentions pp. 26-27, 80 and 81 of UN Pop. St. No. 25, for population aged 0-59).

TABLE 2

Life Expectations at Birth in Pakistan According to Various Writers 1950-85

Period[1] (1)	Both Sexes (2)	Males (3)	Females (4)	Source[3] (5)	Life table nickname[5] (6)
1950-52		33.04	34.64	Khan 1958	Khan
1951-56		34.0	33.1	Mauldin & Hashmi 1960	
1956-61p		36.9	35.6	ditto	
1956-61	40.0			UN Pop. St. No. 41	
1961-66p		39.2	38.1	Mauldin & Hashmi 1960	
1961		44.328	42.447	Keyfitz & Flieger 1968	
1962		49.43	47.43	Aslam et al. 1967	Aslam PGE
1962		(50.85)[2]	(47.82)[2]	ditto	Aslam LR
1962-63		51.10	48.70	Bean et al. 1968	Bean
1961-65	42.5			(-)UN Pop. St. No. 41	
1962-64		51.49	48.58	Yusuf 1967	Sydney
1962-65		49.79	47.88	Yusuf & Farooqui 1969	Y&F PGE
1962-65		(57.08)[2]	(56.29)[2]	ditto	Y&F LR
1962-65		47.79	45.06	Pak. Tech. S-Com. 1968	Paktech
1961-66	37.5			(-)Bose 1963	Bose
1961-66		45.35	44.65	Faquir 1967	
1965		49.8	53.6	Brackett-Akers 1965[4]	
1965-70	47.4			UN Pop. St. No. 53	
1965-70			53.0	(-)Frejka 1973a, 1973b	
1966-71p		49.38	48.85	(+)Faquir 1967	
1966-71p		41.7	40.7	Mauldin & Hashmi 1960	
1968-71		52.9	51.8	Farooqui & Alam 1974	Farooqui-Alam
1970-75			55.5	(-)Frejka 1973b	
1970-75	49.8			UN Pop. St. No. 60	
1971-76p		52.65	52.35	Faquir 1967	
1971-76p		44.0	43.4	Mauldin & Hashmi 1960	
1980-85p	56.4			UN Pop. St. No. 53	

1/ The distinction between estimates, reliable estimates and assumptions for the purposes of projections is among writers on Pakistani mortality fine and usually unstated, though Keyfitz and Flieger (1968:662) call their life table for Pakistan "hypothetical", while Frejka makes for his assumed life table of 1970 a strong claim to reality (1973b:3). However, those life tables which are definitely "assumed" rather than based on reported data have been marked in col. (1) with p for projected.

2/ The two values in parentheses for 1962 and the two values in parentheses for 1962-65 are based on the LR portion only of the PGE experiment and will, therefore, not be taken seriously by any PGE man. However, the interesting question arises why is the discrepancy between the two rows for 1962 so very much less than between the two rows for 1962-65. Did the quality of the LR management change (read: deleriorate) in the meantime so radically or did Yusuf and Farooqui 1969 play safe in respect of 1962-65 LR and work on the basis of some truly heroic assumptions? To "believe" in greater and greater improvements in mortality was quite fashionable.

3/ we marked in col. (5) with a (-) writers who seem to have been particularly divorced from reality, and gave a (+) to a projection that came apparently close to reality.

4/ Brackett and Akers 1965 do recognize that the female life expectation in Pakistan should be more severe than that of males, and they say what steps they took to come closer to reality than the UN life table they were considering, but they do not report what was the e_o^o eventually used by them.

5/ These are the nicknames of the life tables analysed in this article (see section 2 of the text).

Table 3

The 1961 age groups in Pakistan survived till "1971" according to ten Pakistan life tables and assuming for "1971" the adjusted 1972 CES age distribution (reported "1971" age-groups = 100)

AGE GROUPS IN "1971" (1)	POPULATION SIZE IN "1971" in 000's (2)	1. KHAN (3)	4.i ASLAM PGE (4)	4.ii ASLAM LR (5)
MALES				
10-14	4,328	68	69	70
15-19	2,945	117	124	124
20-29	4,487	90	94	94
30-39	3,716	92	90	91
40-49	2,896	90	88	88
50+	3,434	120	114	115
10+	21,896	106	95	95
FEMALES				
10-14	3,477	84	81	83
15-19	2,455	123	129	130
20-29	4,310	76	80	80
30-39	3,520	80	85	85
40-49	2,553	89	87	85
50+	3,012	121	100	100
10+	19,327	108	91	92

Age Groups in "1971" (6)	5.Bean (7)	7.Sydney (8)	6i Y&F PGE (9)	6ii Y&F LR (10)	2.Pak tech (11)	8.Bose (12)	3.Farooqui-Alam (13)
MALES							
10-14	75	74	76	79	76	72	73
15-19	123	123	124	125	124	120	125
20-29	94	94	94	95	94	89	95
30-39	90	54	90	91	90	84	92
40-49	87	86	86	87	86	79	89
50+	138	135	124	144	95	95	99
10+	99	99	97	102	93	89	94
FEMALES							
10-14	88	86	88	94	88	86	92
15-19	160	128	129	130	129	125	130
20-29	80	80	80	81	81	77	81
30-39	85	85	85	86	85	79	86
40-49	85	86	86	87	86	79	88
50+	121	127	130	139	89	94	92
10+	100	95	97	100	91	88	85

Table 4

The 1961 five year age groups in Pakistan survived till "1971" according to ten Pakistan life tables and assuming for "1971" the unadjusted 1961 age proportions (reported "1971" age-groups » 100) .

AGE GROUPS IN "1971" (1)	POPULATION SIZE IN "1971" IN 000's (2)	1. KHAN (3)	4.i ASLAM PGE (4)	4.ii ASLAM LR (5)
MALES				
10-14	3,251	91	92	93
15-19	2,969	116	123	123
20-24	2,534	81	87	87
25-29	2,455		82	82
30-34	2,057	90	82	84
35-39	1,745		94	95
40-44	1,610	89	85	86
45-49	1,304		89	89
50-54	1,279		82	82
55-59	692	89	127	120
60+	2,418	97	83	85
10+	22,314	92	93	93
FEMALES				
10-14	2,663	109	106	108
15-19	2,516	120	126	127
20-24	2,253	73	79	79
25-29	2,265		74	74
30-34	1,873	83	80	80
35-39	1,494		100	100
40-44	1,353	95	90	90
45-49	1,041		94	93
50-54	992		89	88
55-59	557	100	116	116
60+	1,824	115	82	82
10+	18,831	95	94	94

(6)	5.Bean (7)	7.Sydney (8)	6i Y&F PGE (9)	6ii Y&F LR (10)	2.Pak Tech (11)	8.Bose (12)	3.Farooqui-Alam (13)
MALES							
10-14	100	99	101	105	101	96	97
15-19	122	122	123	124	123	119	124
20-24	87	87	87	88	87	83	88
25-29	81	81	81	82	67	77	83
30-34	82	83	83	83	83	77	84
35-39	94	94	94	95	94	87	96
40-44	84	85	84	85	85	78	87
45-49	88	87	87	88	87	79	90
50-54	81	81	80	81	80	71	84
55-59	117	118	116	122	86	100	122
60+	119	115	100	127	60	69	62
10+	97	96	95	99	91	86	92
FEMALES							
10-14	115	112	115	123	115	112	120
15-19	156	25	126	127	126	122	127
20-24	79	78	79	80	80	76	80
25-29	74	74	74	75	74	70	75
30-34	79	80	79	81	80	74	81
35-39	99	99	100	102	100	93	102
40-44	90	10	90	92	90	84	93
45-49	93	33	93	95	93	86	96
50-54	88	88	87	89	88	79	90
55-59	116	116	117	120	119	104	122
60+	116	120	131	144	63	80	66
10+	102	98	100	103	93	90	88