Length of Working Life of Males in Pakistan: 1973

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The objective of this paper is to provide some estimates of the length of working life for males in Pakistan, using the more recently available data. The length of working life is defined as the average length of time for which a cohort can expect to remain in the labour force *i.e.* either actively employed or seeking employment. This measure is determined by the levels of age-specific mortality of a hypothetical cohort and its levels of age-specific labour force participation. Therefore an improvement in mortality would tend to increase the length of economically active life and its deterioration would tend to shorten it. Other factors which influence the age-specific labour force participation and age-specific mortality rates are the indirect determinants of this measure. For example, improvements in health and medical facilities may reduce the incidence of premature retirements caused by physical ailments or disorders. Also, migration, nuptiality, fertility and school attendance rates may influence labour force participation rates and thereby affect the length of working life.

The average expected years of active life of males at birth and at the age of entry into the labour force, are seen to vary with the level of development of a society. These measures are seen to be higher for industrialized societies than for predominantly agricultural societies [11]. The difference is largely attributable to better health conditions in the former. However, it has also been noted that labour force participation rates for males are higher in agrarian societies than in industrialized societies for the youngest and eldest age groups. Pakistan is a predominantly agricultural country with most of its population residing in the rural areas and also has high male labour force participation rates in the youngest and oldest age groups. Although health conditions in Pakistan have improved [1], the mortality level in comparison to the levels of industrialized societies is still quite high.

The intent in this paper is to ascertain the relative importance of the level of mortality and labour force participation rates in Pakistan, in determining the length of working life for males in the country. This has been done by preparing tables of economically active life which allow the calculation of net expected years of active life for a hypothetical cohort at the time of birth or at other ages. The methodology used is an extension of the life-table construction procedure which incorporates the simultaneous effect of age specific activity, as well as mortality, to work out the average expected years of working life of males in Pakistan [10]. Tables of economically active life for females were not prepared because of coverage and reporting problems relating to data on female labour force participation. As will be elaborated in later sections, the data are very erratic and provide unexpectedly low rates which could probably be attributed to large response errors particularly in the agricultural sector. The more frequent movement of females in and out of the labour force presents another problem which has only recently been tackled by some countries where data sources are highly developed [10].

The results from tables of economically active life for males have been used to compute some dynamic functions of the labour force such as the annual rates of (a) losses by death (b) retirements (c) entries and (d) replacement rates. For a hypothetical cohort of population, under given conditions of age specific labour force participation and mortality, the replacement rate which is the net balance of the rate of entry (or re-entry) into the labour force and the rate of depletion (due to deaths and retirements) has been worked out. An attempt has also been made in this paper, to compare the results of this paper with earlier studies for Pakistan [4] and with similar estimates for some other countries.

DATA AND THEIR LIMITATIONS

Data on the civilian labour force by five year age groups have been drawn from the Housing, Economic and Demographic Survey of 1973 (HED '73). Another source for labour force statistics is the Labour Force Survey of 1974-1975. Estimates on mortality, in the form of abridged life tables have been taken directly from the "Provisional Abridged Life Tables for Urban and Rural Areas in Pakistan" based on the Population Growth Survey (PGS), of 1968 and 1971 [5].

The HED was a post-censal survey designed to supplement information on socio-economic characteristics of the population which were not covered by the 1972 Census. In this survey the question asked on labour force participation was "did he or she do any work at all *last week* for pay or profit (for a minimum of 15 hours if worked as unpaid family helper)?" Those who answered yes to this and to the question of "was he or she able to work and looking for work" (unemployed) were included in the labour force.

The results obtained in this paper will be sensitive to the quality of the data used. For example shortcomings of the data would have arisen out of the sampling errors; the time reference of the questions asked and other non-sampling errors of the survey. For instance the question about labour force participation were generally asked of the head of the household in the HED survey which might have reduced the accuracy of answers about

other members of the household especially females. Also the definition of unpaid family workers might have lead to the exclusion from the labour force, of a large number of females and younger persons. In Pakistan, in the agricultural sector, farming is generally a family enterprise and therefore the contribution of each individual to the work is not necessarily reported accurately. In the 1961 Census, the definition of labour force included all those who were ten years old and more "working for profit or earning wages or salary, helping any member of their family, or were not working but looking for work during the previous week". This definition is different from that used in the HED survey and would have probably lead to a more liberal inclusion of unpaid family helpers (females and children especially) in the labour force.

The average PGS estimates for 1968 and 1971, showed a non-substantial change in age-specific mortality rates, except for infant mortality which improved substantially, from the PGE 1962-1965 cross-sectional survey based mortality rates. The reduction in the infant mortality rate may be partly due to differential reporting of births and deaths in the two data sources and only partly due to an actual change in the rate. Also the differences in the sampling and non-sampling errors between the PGS and PGE might also have affected the rates [1].

SOME DEMOGRAPHIC DIMENSIONS OF THE LABOUR FORCE

Figure 1 shows the population age pyramid and the relative contributions of each age and sex group to the labour force in Pakistan. The male contribution is obviously much greater than that of females; and amongst males almost all are employed during the middle of their adult lives. Female contribution to labour force activity in Pakistan is indicated to be very low at all ages.

The simplest index of the overall labour force participation is the crude participation rate which is the percentage of the total population classified as economically active. Crude activity rates which have been computed for the mael and female population separately (Appendix Table 1) indicate the extent to which the two sexes participate in the labour force.[1] Since the HED survey question about labour force activity was asked only of those aged ten years and above an activity rate is also calculated by relating the labour force to the totals of population above the specified minimal age. These refined rates, shown in Appendix Table 1, reflect increased differences between urban-rural male and female activity rates.

Next, males and females in the potentially employable ages are measured by the proportion of economically active persons in each specified age category and the age-specific activity or labour force participation rates were derived. Appendix Tables 2 and 3 show the age-specific activity rates for males and females respectively in Pakistan, for urban and rural areas, obtained from the 1973 HED Survey data. These rates are illustrated in Figure 2 which shows that the curve for males in Pakistan, follows, more or less, the expected pattern. Although males enter the labour force at different ages, by the time they are 25 most of them are economically active and they remain active

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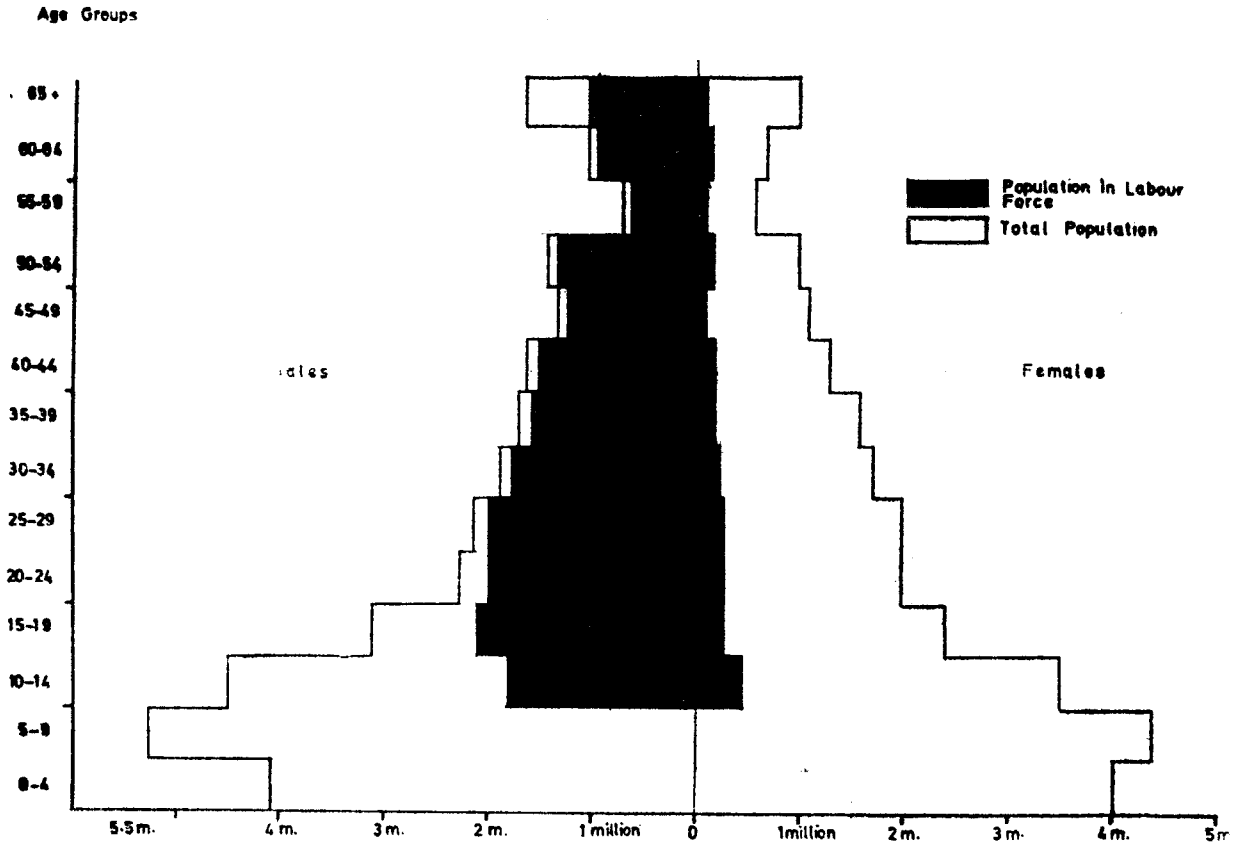female tables of working life were not constructed.

Age Groups

Figure 1

Age Pyramid of Labour Force Participation 1973—HED
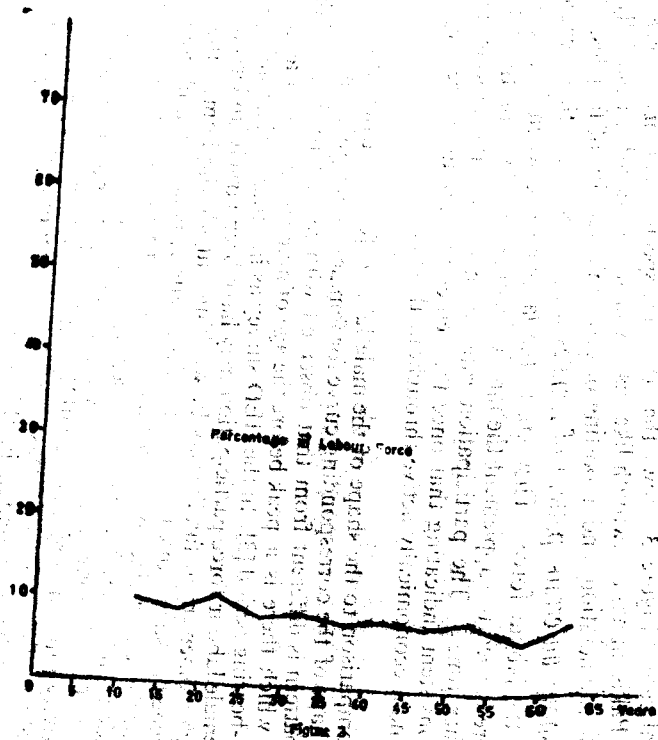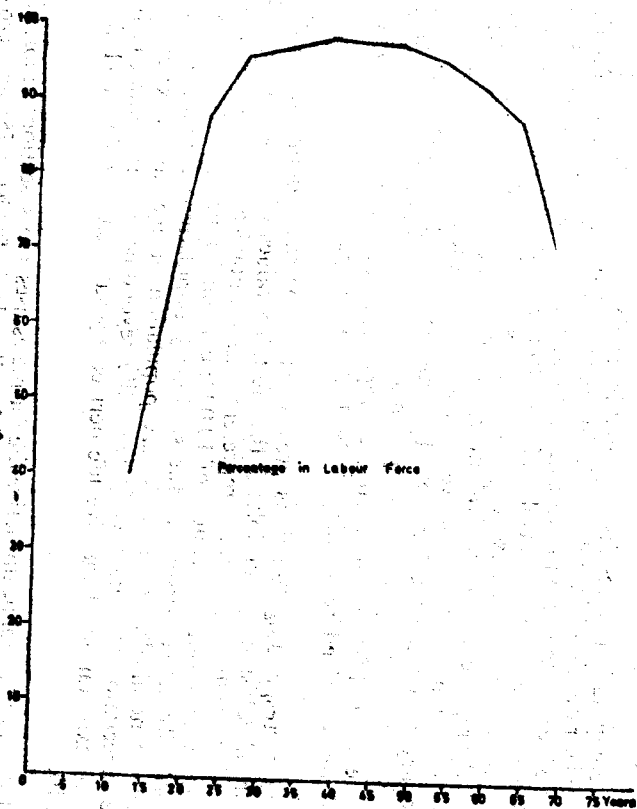
Figure 2
Age Specific Activity Rates for Males in Pakistan—HED 1973

Age Specific Activity Rates for Females in Pakistan—HED 1973

the age of 55 after which they begin leaving the labour force at substantial rate. Figure 3 shows that the age-specific activity curve for males in Pakistan has a sawtooth like shape which reflects atleast partially the problem of enumeration and reporting of economic activity of females. The curve also shows an erratic pattern of females with respect to their entering and leaving the labour force. They are in the labour force when it is feasible or when there is need to supplement the family income and out of the labour force at other times. The participation rates of males in the labour force are more consistent indicating that once they enter the labour force they are likely to remain economically active throughout their adult life.

In comparison to the shape of the male labour force participation rates curve, the shape of the corresponding curve for females is irregular and nearly flat. This pattern is different from that observed with respect to industrialized societies in which there is a peak before the age of marriage and also at the end of the child-bearing period [3]. In the HED survey as in other similar surveys, the extent of female labour force participation may have been largely understated [9]. Even though women in a family may be working outside the home, the social stigma attached to such work may be one of the main reasons for underreporting of the labour force participation of females. As most women in rural areas do work outside their homes, it is hard to accept the rates shown in Appendix Table as accurate. Calculations of length of working life based on these erratic age-specific activity rates in conjunction with life tables for females would provide very unlikely results. For this reason, tables of economically active life for females have not been presented in this paper.

WORKING LIFE OF MALES IN PAKISTAN: 1973

The computation of results presented in Tables 1 to 4 begins with age specific activity rates listed in column 2. In column 3, the specific rates for the beginning of each age group are calculated as an average of two successive years of-age groups. Columns 4, 6, 8 and 10 are drawn directly from the abridged life tables and represent l_x, $_5L_x$, T_x and e^o_x values respectively. Column 4, (l_x) represents the survival function of the life table; column 6 ($_5L_x$) represents the number of person years lived during each 5 year interval of the stationary population; column 8 (T_x) represents total number of years lived after each given age (derived by cumulating $_5L_x$ values from each given age to the end of life); column 10 (e^o_x) represents the expectation of life at each age and is derived by dividing T_x by l_x for each age.

The corresponding functions are calculated for the economically active population of Pakistan by multiplying the life table values with the appropriate specific activity rates. Column 5 represents the economically active survivors (in each age group) out of a cohort of 10,000; column 7 represents the numbers of economically active persons in the stationary population; column 9 is the cumulated economically active stationary population in ages above x; column 11 is the expectation of economically active life beyond each age; column 12 is a measure of expectation of inactive life derived by subtracting column 11 from column 10.

Table 1 of economically active life for males uses cross sectional mortality data from the abridged life table prepared for all males in Pakistan [5] and cross-sectional age specific activity rates for all males in Pakistan [7]. The estimated

Table 1

Abridged Table of Economically Active Life for Males in Pakistan (1973 *HED Survey Data*)

Age interval (exact ages, x to x + n)	Specific activity rates		Survivors at age x of 10,000 born alive		Stationary population in age interval		Cumulated stationary population after age x		Expectation of life at age x		
	In age interval	At beginning age (x)	Total l_x	Economically active at age x (4)x(3)	Total $_5L_x$	Economically active (6)x(2)	Total T_x	Economically active from column (7)	Total years (8)÷(4) $= e_x^o$	Economically active years (9)÷(4)	Inactive years (10—11)
1	2	3	4	5	6	7	8	9	10	11	12
0—4	0	0	10000	0	46144*	0	529043	372555	52.90	37.25	15.65
5—9	0	0	8254	0	40954	0	482899	372555	58.05	45.14	13.32
10—14	.394	0	8127	0	40480	15949	441945	372555	54.38	45.84	8.54
15—19	.677	.535	8064	4314	40154	27184	401465	356606	49.78	44.22	5.56
20—24	.874	.775	7996	6197	39800	34785	361311	329422	45.18	41.19	3.99
25—29	.946	.910	7923	7210	39419	37290	321511	294637	40.58	37.18	3.40
30—34	.963	.954	7844	7483	38988	37545	282092	257347	35.96	32.80	3.16
35—39	.969	.966	7750	7487	38476	37283	243104	219802	31.37	28.36	3.01
40—44	.967	.968	7639	7395	37851	36602	204628	182519	26.79	23.89	2.90
45—49	.963	.965	7500	7238	37042	35671	166777	145917	22.23	19.46	2.77
50—54	.942	.952	7316	6965	35919	33836	129735	110246	17.73	15.07	2.66
55—59	.908	.925	7051	6522	34219	31071	93816	76410	13.30	10.84	2.46
60—64	.855	.881	6686	5846	31376	26826	59597	45339	8.98	6.83	2.15
65+	.656	.755	5914	4465	28221	18513	28211	18513	4.77	3.13	1.64

Source: Columns 2 and 3 [7]; columns 4, 6, 8 and 10 [5].
*Derived by adding $_1L_0 + _4L_1$ from abridged life tables [5].

expectation of economically active life at birth is 37.2 years and at age 10 (which was used as the cutting point for obtaining data on labour force in the HED survey) the expectation of working life is 45.8 years and declines gradually to 41.2 at age 20 and reduces to 3.1 years at age 65. Column 12 of this table provides a measure of expectation of inactive life i.e., the number of years a male in Pakistan is expected to be out of the labour force, at each age. At age 10 he is expected to be out of the labour force for 8.5 years and this value is reduced to 1.6 years at the age of 65.

Table 2 is based on the same set of life tables (obtained from the PGS data of 1968 and 1971) and the labour force participation rates were obtained from the Labour Force Survey of 1974-1975 [8]. The comparison of Tables 1 and 2 shows the difference in the expected lengths of working life in 1973 and 1974-1975 holding mortality levels constant. In Table 2 the expectation of economically active life at birth, age 10, age 20 and age 65 are 37.1, 45.7, 41.5 and 2.8 respectively compared to the corresponding estimates of 37.2, 45.8, 41.2 and 3.1 in Table 1 which were derived from the HED data. As can be seen the differences between the levels of working life obtained from the two sets of data are very small. It is possible that the magnitude and the direction of errors in the two surveys were similar which might have contributed to the convergence of these values. However, one could not expect a notable change in such a short period, and the two sets of data can be said to support each other.

In Table 3, levels of expectation of economically active life at different ages are calculated for urban males in Pakistan. The values of expectation of economically active life at birth, age 10, age 20 and age 65 are estimated at 36.3, 43.7, 40 and 2.6 years respectively. These figures are lower than those for all males in Pakistan. This table is constructed using the life table values of males in urban areas of Pakistan [5].

Table 4 is constructed by using life tables prepared specifically for rural males in Pakistan representing their mortality experience [5]. These are used in conjunction with age specific activity rates for the rural labour force from the 1973 HED data. The results show a higher level of economically active life for rural males than for urban males. This may be because of more formal restrictions on the age of entry and retirement in the labour force in the formal sector found mostly in urban areas. Thus economically active life in rural areas is estimated to be longer because males enter the labour force much earlier and leave it much later. In the rural areas there is no definite age of entry into the labour force nor an age of retirement as such and people who may not actually be fully employed or who may be working intermittently, are enumerated in the labour force, thereby resulting in higher participation rates.

DYNAMIC FUNCTIONS OF THE LABOUR FORCE

Appendix Table 4 illustrates the components of change in the number of economically active survivors during each age interval. The survival functions and stationary population figures (columns 2, 3, 4 and 5) are taken from Table 1. Column 6 of this table shows the increase or decrease in the number of economically active survivors during the age interval and is derived from the difference between successive figures in column 3. The purpose of this table is to separately estimate the two components of the increase or decrease during each age

Table 2

Abridged Table of Economically Active Life for Males in Pakistan (Labour Force Survey 1974-1975)

Age interval (exact ages, x to x+n)	Specific activity rates		Survivors at age x of 10,000 born alive		Stationary population in age interval		Cumulated stationary population after age x		Expectation of life at age x		
	In age interval	At beginning age (x)	Total l_x	Economically active at age x (4)x(3)	Total $_6L_x$	Economically active (6)x(2)	Total T_x	Economically active from column 7	Total years (8)÷(4) $=e_x^o$	Economically active years (9)÷(4)	Inactive years (10)—(11)
1	2	3	4	5	6	7	8	9	10	11	12
0—4	0	0	10000	0	46144*	0	529048	371048	52.90	37.10	15.79
5—9	0	0	8254	0	40954	0	482904	371048	58.50	44.95	13.55
10—14	.325	0	8127	0	40480	13156	441950	371048	54.38	45.66	8.72
15—19	.647	.486	8064	3919	40154	25980	401469	357892	49.78	44.38	5.40
20—24	.883	.765	7996	6117	39800	35143	361315	331912	45.18	41.51	3.67
25—29	.961	.922	7923	7305	39419	37882	321515	296769	40.58	37.46	3.12
30—34	.978	.970	7844	7609	38988	38130	282095	258887	35.96	33.00	2.96
35—39	.983	.980	7750	7595	38476	37822	243107	220757	31.37	28.48	2.89
40—44	.978	.980	7639	7486	37851	37018	204631	182935	26.79	23.95	2.84
45—49	.977	.978	7500	7335	37042	36190	166780	145917	22.23	19.46	2.77
50—54	.958	.968	7316	7082	35919	34410	129737	109726	17.73	15.00	2.73
55—59	.919	.939	7051	6621	34219	31447	93817	75316	13.30	10.68	2.62
60—64	.863	.891	6636	5913	31376	27077	59597	43869	8.98	6.61	2.37
65+	.595	.729	5914	4311	28221	16792	28221	16792	4.77	2.84	1.93

Source: Columns 2 and 3 [8]; columns 4, 6,8 and 10 [5].
*Derived by adding $_1L_0 + _4L_1$ from abridged life tables [5].

Table 3

Abridged Table of Economically Active Life for Urban Males in Pakistan (1973 *HED Data*)

Age interval (exact ages, x to x+n)	Specific activity rates		Survivors at age x of 10,000 born alive		Stationary population in age interval		Cumulated stationary population after age x		Expectation of life at age x		
	In age interval	At beginning age (x)	Total l_x	Economically active at age x (4)x(3)	Total $_5L_x$	Economically active (6)x(2)	Total T_x	Economically active from column 7	Total years (8)÷(4) =e_x^o	Economically active years (9)÷(4)	Inactive years (10—11)
1	2	3	4	5	6	7	8	9	10	11	12
0—4	0	0	10000	0	43201*	0	545287	362604	54.53	36.26	18.27
5—9	0	0	8386	0	41692	0	502086	362604	59.87	43.24	16.63
10—14	.261	0	8290	0	41405	10807	460393	362604	55.53	43.74	11.79
15—19	.527	.394	8271	3259	41292	21761	418987	351797	50.65	42.53	8.12
20—24	.810	.668	8245	5508	41137	33321	377695	330036	45.81	40.03	5.78
25—29	.921	.865	8209	7101	40922	37689	336558	296715	41.00	36.14	4.86
30—34	.959	.940	8159	7669	40621	38956	295635	259026	36.23	31.75	4.48
35—39	.967	.963	8089	7790	40196	38870	255014	220070	31.53	27.21	4.32
40—44	.959	.963	7989	7693	39590	37967	214818	181200	26.89	22.68	4.21
45—49	.951	.955	7846	7493	38721	36824	175227	143232	22.33	18.26	4.07
50—54	.913	.932	7641	7121	37668	34391	136506	106409	17.86	13.93	3.93
55—59	.854	.883	7345	6486	35662	30455	99037	72018	13.48	9.81	3.67
60—64	.750	.802	6919	5549	33077	24808	63375	41563	9.16	6.01	3.15
65+	.553	.651	6311	4108	30298	16755	30298	16755	4.80	2.65	2.15

Source: Columns 2 and 3 [7]; Columns 4,6,8 and 10 [5].
*Derived by adding $_1L_0 + _4L_1$ from abridged life table [5].

Table 4

Abridged Table of Economically Active Life for Rural Males in Pakistan 1973

Age interval (exact ages, x to x+n)	Specific activity rates		Survivors at age x of 10,000 born alive		Stationary population in age interval		Cumulated stationary population after age x		Expectation of life at age x		
	In age interval	At beginning age (x)	Total l_x	Economically active at age x (3)x(4)	Total $_5L_x$	Economically active (6)x(2)	Total T_x	Economically active from column 7	Total years (8)÷(4) =e_x^o	Economically active years (9)÷(4)	Inactive years (10—11)
1	2	3	4	5	6	7	8	9	10	11	12
0—4	0	0	10000	0	43078*	0	524415	385913	52.44	38.59	13.85
5—9	0	0	8205	0	40689	0	481337	385913	58.66	47.03	11.63
10—14	.447	0	8070	0	40151	17948	440648	385913	54.60	47.82	6.78
15—19	.741	.594	7989	4745	39745	29451	400496	367965	50.13	46.05	4.08
20—24	.903	.822	7908	6500	39335	35519	360751	338514	45.62	42.80	2.82
25—29	.949	.926	7825	7246	38917	36932	321417	302995	41.07	38.72	2.35
30—34	.964	.956	7741	7400	38483	37098	282500	266063	36.49	34.37	2.12
35—39	.971	.967	7652	7399	38021	36918	244017	228965	31.89	29.92	1.97
40—44	.970	.970	7556	7329	37506	36381	205996	192047	27.26	25.41	1.85
45—49	.968	.969	7446	7215	36890	35710	168491	155666	22.63	20 90	1.73
50—54	.952	.960	7309	7017	36069	34338	131601	119956	18.00	16.41	1.59
55—59	.927	.939	7117	6683	34757	32220	95532	85618	13.42	12.03	1.39
60—64	.835	.881	6785	5978	32010	26728	60775	53398	8.96	7.87	1.09
65+	.688	.762	6018	4586	28764	26670	28764	26670	4.78	4.43	0.35

Source: Columns 2 and 3 [7]; columns 4, 6, 8 and 10 [5].
*Derived by adding $_1L_0 + _4L_1$ taken from abridged life tables [5].

interval; (a) the number of deaths of economically active persons and (b) the net balance between entries of inactive persons into economic activity and retirements of active persons into inactive status. Retirements include those persons who voluntarily or involuntarily withdraw from the labour force into inactive status [10].

Appendix Table 5 uses the adjusted estimates of deaths of economically active persons and the net balance between entries and retirements, derived in Appendix Table 4, to calculate the rates of deaths and retirements per 1000 of the economically active population and the entry rate per 1000 of the economically inactive population. The death rates for those in the labour force (for each successive five year age group) grow higher as may be expected; the rate of entries per 1000 of the inactive population are highest in the 10-14 and 20-24 age groups. The reason for the high entry rate in this youngest age group is probably because many young boys who do not attend schools will be entering the labour force at these ages, especially if they have not done so earlier. There might be an overstatement of entrants into the labour force in this group, as those who are not yet 10 but already in the labour force may have been lumped in the 10-14 age group. Entry rates in the 20-24 age group are usually high as most males would have completed their education and joined the labour force by this age. Rates of retirement get higher with successively older age groups, as can be expected.

Table 5 describes the estimation of (a) annual losses from the HED 1973 labour force, by deaths and retirements and (b) gains by entries from the inactive male population of Pakistan, for successive age groups. The totals of the columns provide estimates of total number of deaths, retirements and entries connected with the actual labour force in Pakistan (as shown by HED 1973 data). The estimated annual crude rates per 1000 of the labour force are as follows:—

Entries: 39.8;   Retirements: 9.8;   Deaths: 10.7

From the difference between the rate of entries, and the sum of the rates of retirements plus losses by death, the labour force replacement rate can be obtained. In the case of Pakistan in 1973, with the given assumptions about patterns of mortality and labour force participation used in this study, it is calculated to be 19.3 per 1000 in the labour force.

COMPARATIVE RESULTS

It is difficult to ascertain how accurately the results of this analysis represent the actual situation for males in Pakistan in 1973. Here some comparison will be made with previous estimates of length of working life for Pakistan and some results for other countries. In doing this it may be seen whether the estimates of length of working life in Pakistan are plausible. There are two studies which have attempted to compute the length of working life for Pakistan. Some estimates for the 1960's were computed by Bean [2]; data for this work was drawn from the 1961 Pakistan Census and the 1962-1965 Population Growth Estimation Project. In this study by Bean, the working life expectancy for males in Pakistan in 1962-1963 for ages 10-14 is 53.9 years which is much higher than the corresponding estimates of 45.8 years for 1973. Bean claims

Table 5

Calculation of Annual Losses from the Labour Force by Death and Retirement; And Gains by Entries from the Inactive Male Population Pakistan (1973 HED)

Age Interval	Population in 1000's	Labour Force in 1000's	Inactive Population in 1000's	Annual Losses from Labour force by Death		Annual entries into the Labour Force		Annual retirements from Labour Force	
				Rate per 1000 Labour Force	Estimated Number of deaths in 1000's (3) x (5)	Rate per 1000 inactive	Estimated numbers in 1000's (4)x(7)	Rate per 1000 Labour Forcé	Estimated number of retirements in 1000's (3) x (9)
1	2	3	4	5	6	7	8	9	10
10—14	4490.4	1773.2	2717.7	1.6	2.8	176.9	480.7	—	—
15—19	3114.7	2108.9	1005.7	1.7	3.6	148.7	149.5	—	—
20—24	2326.9	2034.2	292.8	1.8	3.7	214.8	62.9	—	—
25—29	2193.1	2074.9	118.1	2.0	4.1	163.5	19.3	—	—
30—34	1859.9	1791.3	68.7	2.4	4.3	64.4	0.6	—	—
35—39	1677.2	1626.7	50.5	2.9	4.7	12.6	0.6	0.6	0.9
40—44	1593.5	1541.1	52.3	3.7	5.7	—	—	2.7	3.3
45—49	1282.7	1235.6	47.1	5.0	6.1	—	—	5.7	7.3
50—54	1351.9	1274.8	77.1	7.4	9.4	—	—	9.7	5.7
55—59	645.1	585.8	59.3	12.1	7.0	—	—	28.9	26.5
60—64	1073.2	918.2	154.9	22.6	20.8	—	—	126.2	132.7
65+	1600.6	1051.3	549.3	115.9	120.8	—	—		
Total		18016			193.1	717.4			176.4

Death rate = 10.7 per 1000
Entry rate = 39.8 per 1000
Retirement rate = 9.8 per 1000
Labour force replacement rate = 19.3 per 1000

Sources: Columns 3, 4 from Table 16 HED
Column 2 from Table 1 HED
Columns 5, 7, 9 from Appendix Table 5.

that the results are plausible but views them as an approximation because of limitations and biases of the data used [2]. However, Bean follows a different method from the one adopted in the present study, and therefore the results are not comparable.

The second study on the length of working life was done by Farooq [4] who also used 1961 Census labour force participation rates and life tables based on the PGE. Farooq followed the same method as that of this paper in his construction of tables of economically active life and therefore the results are comparable. Thus a comparison between the work of Farooq and the results attained here, is relied upon to evaluate the validity of the results of this study.

The comparison between the two studies begins with a look at the age-specific activity rates for 1961 and 1973. However the comparison cannot be made straight away because of different levels of enumeration in the two sources of labour force information, either because of differences in quality of reporting or because of changes in definition used for those to be included in the labour force. The quantity and quality of data derived on labour force activity from two different data collection sources, spaced 12 years apart, makes it difficult to base strong conclusions about changes in labour force activity. Also the 1960's age specific activity rates were available only by ten year age groups after the age of 25, which made a comparison even harder. Rates adjusted for five year age groups for males in Pakistan have been used by G.M. Farooq [4] and are compared here to the rates from the 1973 HED Survey in Table 6.

A comparison of these rates show them to be very similar. The HED 1973 rates are higher for ages 25-59, 10-14 and 75 + and lower for ages 65-74 and 15-19. These rates from the 1961 Census are then used by G.M. Farooq to construct a table of working life for males in Pakistan. Some of the differences in the sources of labour force and mortality data used for the two different sets of tables of working life have been pointed out earlier in the paper. However, proceeding with caution, estimates of length of working life for 1961 [4] and for 1973 using HED survey data are compared in Table 7.

The figures for expectation of working life for males in the 1960's and 1970's show that there has been a decline in the expectation of working life in the 1970's except at birth where it seems to have risen. The expectation of life at birth also seems to have risen in the 1970's but is otherwise lower than the 1960's levels for all other ages. It is questionable whether there has been a conclusive change in the expectation life over the decade or whether it may merely be reflecting biases of the two mortality data sets (PGE and PGS).

Table 6

Age Specific Activity Rates for Males in Pakistan

Age Group (1)	1961 (2)	1973 (3)
0—4	—	—
5—9	—	—
10—14	38.39	39
15—19	72.33	68
20—24	87.89	87
25—29	93.70	95
30—34	94.08	96
35—39	94.45	97
40—44	94.37	97
45—49	94.28	96
50—54	92.63	94
55—59	90.97	91
60—64	86.00	86
65—69	79.00	78
70—74	70.00	69
75+	52.00	54

Source : For column 2 [4], for column 3 [7].

To try and eliminate the effect of the different mortality schedules for the two sets of working life tables, the earlier table is standardized by using 1968 and 1971 PGS life table values. The results are shown in Table 8 and the expectation of working life at ages 0-4 is computed to be 37.1 years and at ages 10-14 to be 45.6 years. The standardization raises the expectation of working life at ages 0-4 by almost one and a half years and reduces it for all other ages. Standardization for mortality brings the expectation of working life (except at birth) using the 1961 Census labour force participation rates, to levels much lower than those computed by Farooq using PGE life tables and the rates converge more to the levels computed for 1973. For ages 0-49, the expectation of working life for 1973 is higher than that of the standardized levels of the 1960's. For ages 55-65+, the standardized levels of the 1960's are higher than those of the 1973 levels of expectation of working life.

Table 7

Expeotation of Working Life for Males in Pakistan

Age Group x to x+5	Expectation of working life at age x		Expectation of life at age x	
	1961	1973	1962-1963	1968-1971
(1)	(2)	(3)	(4)	(5)
0—4	35.4	37.2	51.5	52.9
5—9	45.6	45.1	60.8	58.5
10—14	46.6	45.8	57.2	54.5
15—19	45.3	44.2	52.8	49.8
20—24	42.5	41.2	48.7	45.2
25—29	38.9	37.2	44.7	40.6
30—34	35.0	32.8	40.6	36.0
35—39	31.0	28.4	36.4	31.4
40—44	27.1	23.9	32.4	26.8
45—49	23.3	19.5	28.5	22.2
50—54	19.4	15.1	24.6	17.7
55—59	15.8	10.8	20.8	13.3
60—64	12.3	6.8	17.2	9.0
65—69	9.2	3.1*	14.1	4.8*
70—74	6.7	—	11.3	—
75+	4.7	—	9.0	—

Source : For column 2 [4]; column 3 [Table 1]; column 4 [4]; column 5 [5].
       * Expeciation of life and expectation of working life represented here for ages 65+

     An attempt is also made to compute just the impact of mortality on the length of working life in Table 9, by trying to separate the number of working years lost due to deaths only. This table which is calculated for males in Pakistan 1973, shows that without decrements due to deaths the "gross years of active life" are 62.8 years, if it is assumed that no one dies till the age of 90. The expectation of life at birth is 37.3 years and so the loss of working years due to mortality is $62.8 - 37.3 = 25.5$ years. This means that a male in

Table 8

Abridged Table of Economically Active Life for Males in Pakistan (1961 Census Participation Rates) with 1968 to 1971 PGS Based Mortality

Age interval (exact ages, x to x+n)	Specific activity rates		Survivors at age x of 10,000 born alive		Stationary population in age interval		Cumulated stationary population after age x		Expectation of life at age x		
	In age interval	At beginning age (x)	Total l_x	Economically active at age x (4)x(3)	Total $_5L_x$	Economically active (6)x(2)	Total T_x	Economically active from column 7	Total years (8)÷(4) =e_x^o	Economically active years (9)÷(4)	Inactive years (10—11)
1	2	3	4	5	6	7	8	9	10	11	12
0—4	0	0	10000	0	46144**	0	529043	370457	52.90	37.05	15.85
5—9	0	0	8254	0	40954	0	492899	370457	58.50	44.88	13.62
10—14	.384	0	8127	0	40480	15544	441945	370457	54.38	45.58	8.80
15—19	.723	.553	8064	4459	40154	29031	401465	354913	49.78	44.01	5.77
20—24	.879	.801	7996	6405	39800	34984	361311	325882	45.18	40.76	4.42
25—29	.937	.908	7923	7194	39419	36936	321511	290898	40.58	36.72	3.86
30—34	.940	.938	7844	7358	38988	36649	282092	263962	35.96	33.65	2.31
35—39	.945	.943	7750	7308	38476	36360	243104	217313	31.37	28.04	3.33
40—44	.944	.945	7639	7219	37851	35731	204628	180953	26.79	23.69	3.10
45—49	.943	.944	7500	7080	37042	34931	166777	145222	22.23	19.36	2.87
50—54	.926	.935	7316	6840	35919	33261	129735	110291	17.73	15.08	2.65
55—59	.910	.918	7051	6473	34219	31139	93816	77030	13.30	10.92	2.38
60—64	.860	.885	6636	5873	31376	26983	59597	45891	8.98	6.92	2.06
65+	.670*	.765	5914	4524	28221	18908	28221	18908	4.77	3.20	1.57

Source: Columns 2 and 3 [4]; columns 4, 6, 8 and 10 [5].
*Taken as an average of 65-70, 70-75, 75+ age specific activity rates
**Derived by adding $_1L_0 + _4L_1$ taken from abridged life tables [5]

Table 9

Calculation of Loss of Years of Economically Active Life Due to Mortality for Males in Pakistan (1973 *HED*)

Age group (exact ages)	Number of years in age interval	Specific Activity Rates	Average number of active years (3) x (2)
1	2	3	4
0—9	10	0	0
10—14	5	.394	1.97
15—19	5	.677	3.39
20—24	5	.874	4.37
25—29	5	.946	4.73
30—34	5	.963	4.82
35—39	5	.969	4.85
40—44	5	.967	4.84
45—49	5	.963	4.82
50—54	5	.942	4.71
55—59	5	.908	4.54
60—64	5	.855	4.28
65—69	5	.782	3.91
70—74	5	.688	3.44
75+	15*	.542	8.13
Total			62.80

Source: Column 3 [Appendix Table 1].

1. Gross years of active life 62.80
    (assuming no one died before 90)

2. Expectation of active life at birth 37.25

3. Loss of active years by
    mortality (1)—(2) 24.55

4. Expectation of active life at age 10 45.84

5. Loss of active years by mortality
    after age 10 (1)—(4) 16.96

* It is assumed that all persons die at
  the age of 90.

Pakistan losses an average of 25.5 years due to mortality and could have expected to spend that many more years working had there been no losses in the labour force due to death. If the loss due to mortality is calculated by subtracting from the gross years of active life, the expectation of life at age 10 (45.8 years), the loss of active years by mortality after age 10 is 17 years. Another comparison can be made, again with caution regarding differences in data, about the difference in the loss of years of working life in the two sets of analyses. Farooq reports that the length of working life of an average male in Pakistan was reduced by 9.8 years due to mortality [4].

The retirement, entry and losses due to death rates per 1000 of the labour force in the 1960's were seen to be 4.6, 41.2, 9.4 respectively [4] whereas in the 1970's the rates are 9.8, 39.8, 10.7 respectively. This comparison may reflect a larger loss from the labour force per annum due to deaths and retirements and a lower entry rate for the 1970's. This consequently leads to much lower labour force replacement rate of 19.3 per 1000 in 1973 as compared to 27.3 per 1000 calculated for the 1960's [4].

Next an attempt will be made to compare the length of working life of males in Pakistan with that of males in other countries. Saw See Hok has computed the length of working life for males in Malaya in 1957 to be 37.3 years at birth and 42.9 in the 10-14 age group [11]. Also in the same source [11] some figures on the length of working life in different areas of the world, show that the average expectation of working life in industrialized countries is 42.2 years at birth while their average expectation of life at birth is 65 years. For semi-industrialized countries, the average expectation of working life is 35.6 years while the e_o^o is 52.8 years. For agricultural societies the expectation of active life at birth is 33.9 years while the e_o^o is 48.4 years [11]. In Pakistan the e_o^o is 52.9 years (which is very close to the level of semi-industrialized societies as shown by the figures quoted above) and the expectation of working life at birth is 37.3 years. On the basis of these comparative figures the estimates of length of working life attained in this analysis seem quite plausible.

Some estimates are also available of annual replacement, entry, retirement and losses by death rates for stable population models with various levels of fertility and mortality [11]. Pakistan has a GRR close to 3.0 and an e_o^o close to 50 years and therefore its rates should be somewhere between the following ranges:

Table 10

Average Rates of Replacement, Entry, Retirement and Death for Stable Population with GRR of 3.0 and e_o^o af 50 Years

	Averages Ranges given by UN		Pakistan
Replacement rate	28.8	26.9	19.3
Rate of entry per 1000 males	41.0	41.0	39.8
Rate of retirement per 1000 males	1.3	3.9	9.8
Rate of losses by death per 1000 males	10.9	10.2	10.7

Source: Determinants and Consequences of Population Trends [11] page 320 Table IX 11.

Although the rate of losses by death falls into this range, the rate of retirement seems too high and the replacement rate is a low as compared to the average figures given by the UN [11]. However, the table from which these figures are taken, is based on the assumption of a stable population model which may differ considerably from the population situation in Pakistan in 1973.

CONCLUSIONS

The uses of these tables of economically active life and the estimates of length of working life are multi-fold, despite their limitations due to data inaccuracies. They can be instructive for planners and administrators who are concerned with demographic dimensions of the labour force. The tables can be utilized, to take into account the expectation of active and inactive life and its variations in urban and rural areas, when employment policies are being designed. The components of the tables of economically active life can be used in connection with data on annual earnings to draw up earnings profiles. Similarly the expectation of life-time consumption can also be compiled if data are available on average consumption by age and sex. The average net economic value of persons can be computed by subtracting the expected consumption from the expected earnings at each age in their life span. The average cost of bringing up and educating fresh labour force entrants, can also be computed with additional information on consumption and earnings [11].

The results attained here which may be considered tentative, primarily provide the most recent estimates of length of working life, using the most recently available life-tables and labour force activity rates for males in Pakistan. In the comparison made earlier, of the results attained in this paper and those computed by Farooq, it was discovered that the length of working life (except at birth) has declined from the 1960's levels. If the length of working life of males in Pakistan (except at birth) has actually declined then this is an indication of significant changes in the ages of entry and retirement in the labour force. As was pointed out earlier, in the comparison with Farooq's work, the annual rate of retirement per 1000 of the labour force seems to have risen almost dualfold, which perhaps reflects retirements at earlier ages than in the 1960's. The same comparison showed the annual rate of entry per 1000 of the labour force to have declined, which may reflect a slightly later age of entry into the labour force than in the 1960's. The labour force replacement rate had dropped considerably from the 1960's level, which is in keeping with the declining length of working life in the 1970's.

The separate computations of length of working life of males in urban and rural areas, provided for the first time, evidence of the differentials which exist between these areas in Pakistan. The length of working life in rural areas is computed to be higher than that in urban areas. As Pakistan undergoes increasing modernization and urbanization, it is possible that the length of working life for all areas in Pakistan will converge more to the present urban levels. The direction of the differential found between the length of working life in urban and rural areas of Pakistan was in accordance with the differential seen in other countries [11].

The attempt to compute the length of working life of females did not portray a realistic picture and it was deduced that the estimates should have been quite high. It is common knowledge that women participate in the labour force to quite a large extent in the rural areas of Pakistan, especially in the seasons of harvest, sowing etc. The data sources used here, were unable to capture fully the extent of female labour force participation and attention should be drawn towards having studies designed especially to improve data in this area. The improved collection of data would enable the computation of more representative estimates of length of working life for females in the future.

These estimates of length of working life can be an aid in the study of the effects of changing activity rates and population structure upon the burden of dependency. If the length of working life is quite long and if males in Pakistan can expect to work for a considerably long part of their lives, then they can support their families for a longer interval. Also since children enter the labour force at an early age (as can be seen by the high participation rates of the 10-14 age group) they too are sharing the burden of supporting their family and thereby reducing the dependency burden. However, in the future likely increases in the enrolment of school, college and higher eduction will lead to a decline in the labour force participation rates in the younger ages. With increasing migration from rural to urban areas and shifts from the agricultural to the non-agricultural sector, labour force participation in the older age groups may decline as well. Currently most of the labour force participants do not survive to complete their productive span of life. Even if mortality levels decline, leading to a longer length of working life, in view of the persistence of high level of fertility, a heavy dependency load may continue for some time. If employment opportunities do not increase substantially, unemployment rates may increase with the increase in the length of working life. Therefore due to the changing nature of the factors which determine the length of working life, one can easily predict that it is likely to change but cannot precisely predict the economic outcome of the change.

Appendix Table 1

Crude Activity Rates and Refined Activity Rates for Pakistan (Rural and Urban Areas)

1	Total Population	Civilian Labour Force	Crude Activity Rates (3)÷(2)	Total Population (10 years and above)	Refined Activity Rates (3)÷(5)
	2	3	4	5	6
PAKISTAN					
Both Sexes	60,509,535	19,761,978	32.66	42,379,279	46.63
Male	32,511,190	18,016,181	55.42	23,209,831	77.62
Female	27,998,345	1,745,797	6.24	19,169,448	9.11
RURAL					
Both Sexes	43,767,001	14,705,290	33.60	30,523,312	48.17
Male	23,493,948	13,424,008	57.14	16,704,008	80.36
Female	20,273,053	1,281,282	6.32	13,819,304	9.27
URBAN					
Both Sexes	16,742,534	5,056,688	30.20	11,855,967	42.65
Male	9,017,242	4,592,173	50.93	6,505,823	70.58
Female	7,725,292	464,515	6.01	5,350,144	8.68

Source: Housing, Economic and Demographic Survey 1973. Tables 1 and 16.

Appendix Table 2

Age-Specific Activity Rates for Males 1973

Age Group	Pakistan			Rural			Urban		
	Total Population	Total Labour Force	Age-Specific Activity Rates as Percentage	Total Population	Total Labour Force	Age-Specific Activity Rates as a Percentage	Total Population	Total Labour Force	Age-Specific Activity Rates as a Percentage
10—14	4,490,914	1,773,226	39	3,215,653	1,440,047	45	1,275,261	333,179	26
15—19	3,114,732	2,108,988	68	2,182,688	1,617,799	74	932,044	491,189	53
20—24	2,326,976	2,034,178	87	1,597,677	1,443,078	90	729,299	591,100	81
25—29	2,193,100	2,074,991	95	1,566,783	1,488,396	95	626,317	586,595	94
30—34	1,859,995	1,791,324	96	1,340,644	1,293,093	96	519,351	498,231	96
35—39	1,677,190	1,626,692	97	1,190,686	1,156,192	97	486,504	470,500	97
40—44	1,593,480	1,541,149	97	1,152,027	1,117,607	97	441,453	423,542	96
45—49	1,282,687	1,235,554	96	905,549	876,730	97	377,138	358,824	95
50—54	1,351,903	1,274,816	94	1,011,143	963,612	95	340,760	311,204	91
55—59	645,054	585,753	91	475,243	440,602	93	169,811	145,151	85
60—64	1,073,180	918,237	86	837,946	741,683	89	235,234	176,554	75
65—69	429,010	335,785	78	322,894	267,459	83	106,116	68,326	64
70—74	543,986	374,746	69	428,192	312,014	73	115,794	62,732	54
75+	627,624	340,742	54	476,883	265,696	56	156,741	75,046	50

Source: Housing, Economic and Demographic Survey 1973. Table 1 and 16.

Appendix Table 3

Age-Specific Activity Rates for Females 1973

Age Group	Pakistan Total Population	Total Labour Force	Age-Specific Activity Rates as a Percentage	Rural Total Population	Total Labour Force	Age-Specific Activity Rates as a Percentage	Urban Total Population	Total Labour Force	Age-Specific Activity Rates as a Percentage
10—14	3,553,880	367,646	10	2,471,257	257,112	10	1,082,623	110,534	10
15—19	2,390,450	206,753	9	1,629,884	146,109	9	760,566	60,644	8
20—24	2,010,665	217,403	11	1,417,943	152,789	11	592,722	64,614	11
25—29	2,043,978	175,729	9	1,479,524	131,203	9	564,454	44,526	8
30—34	1,726,960	151,790	9	1,261,977	116,184	9	464,983	35,606	8
35—39	1,590,017	130,502	8	1,151,093	100,232	9	438,924	30,270	7
40—44	1,347,712	155,747	9	993,130	90,507	9	354,582	25,240	7
45—49	1,148,749	88,267	8	852,175	68,070	8	296,574	20,197	7
50—54	973,865	92,241	9	744,807	69,919	9	229,058	22,322	10
55—59	638,048	46,562	7	490,727	36,237	7	147,321	10,325	7
60—64	697,169	59,729	8	534,114	44,714	8	163,055	15,015	9
65—69	337,054	25,190	7	254,762	18,393	7	82,292	6,797	8
70—74	326,074	27,038	8	249,918	20,388	8	76,156	6,650	9
75+	384,827	41,200	11	287,993	29,425	10	96,834	11,775	12

Source: Housing, Economic and Demographic Survey 1973. Tables 1 and 16.

Appendix Table 4

Calculation of Components of Change in Numbers of Economically Active Survivors 1973

Age interval (exact ages) (x) to (x+n)	Survivors at age x of 10,000 born alive		Stationary Population in age interval		Increase (+) or Decrease (—) of Economically active survivors during age interval (difference between consecutive figures in column 3)	Deaths of Economically active persons during age interval			Net entries into economic activity (+) or Net Retirements (—) during age interval		
	Total L_x	Econo-mically active at age x	Total $_5L_x$	Econo-mically active		Mortality Rate (1000_5m_x)	First estimate of deaths (7) x (5)	Adjusted estimate of deaths	Net entry or retire-ment rate	First estimates of net entries or retire-ments (10) x (4)	Adjusted estimates of net entries or retire-ments
1	2	3	4	5	6	7	8	9	10	11	12
10—14	8127	0	40480	15949	+4314	1.6	26	26	+.535	+4331	+4340
15—19	8064	4314	40154	27184	+1883	1.7	46	46	+.240	+1927	+1928
20—24	7996	6196	39800	34785	+1013	1.8	63	63	+.135	+1075	+1077
25—29	7923	7210	39419	37290	+ 273	2.0	75	75	+.044	+ 347	+ 348
30—34	7844	7483	38988	37545	+ 4	2.4	90	90	+.012	+ 94	+ 93
35—39	7750	7487	38476	37283	— 92	2.9	108	107	+.002	+ 15	+ 15
40—44	7639	7395	37851	36602	— 157	3.7	135	134	—.003	— 23	— 23
45—49	7500	7238	37042	35671	— 273	5.0	178	177	—.013	— 96	— 96
50—54	7316	6965	35919	33836	— 443	7.4	250	249	—.027	— 194	— 194
55—59	7051	6522	34219	31071	— 676	12.1	376	375	—.044	— 732	— 301
60—64	6636	5846	31376	26826	—1381	23.0	617	605	—.126	— 395	— 776
65+	5914	4465	28221	18513	—4465	209.6	3880	2129	—.755	—4261	—2336

Source: Columns 2 & 4 [5]; columns 3 and 5 from Table 1.
Column 7 is derived by $L_x - l_x + 5/_8 L_x$
Column 10 is derived from column 3 in Table 1.

Appendix Table 5

Extension of Tables of Economically Active Life of Males in Pakistan for the Calculation of Death, Retirement and Entry Rates 1973

Age interval	Economically active numbers in population	Economically inactive numbers in population	Net increase (+) Net decrease (—)	Number of Deaths	Rate of deaths per 1000 active population	Number of entries	Rate of entries per 1000 inactive Population	Number of retirements	Rate of retirement per 1000 population
1	2	3	4	5	6 (5÷2)	7	8 (7÷3)	9	10 (9÷2)
10—14	15949	24531	+4314	26	1.6	4340	176.9	—	—
15—19	27184	12970	+1882	46	1.7	1928	148.7	—	—
20—24	34785	5015	+1014	63	1.8	1077	214.8	—	—
25—29	37290	2129	+ 273	75	2.0	348	163.5	—	—
30—34	37545	1443	+ 4	90	2.4	93	64.4	—	—
35—39	37283	1193	— 92	107	2.9	15	12.6	—	—
40—44	36602	1249	— 157	134	3.7	—	—	23	0.6
45—49	35671	1371	— 273	177	5.0	—	—	96	2.7
50—54	33836	2083	— 443	249	7.4	—	—	194	5.7
55—59	31071	3148	— 676	375	12.1	—	—	301	9.7
60—64	26826	4550	—1381	605	22.6	—	—	776	28.9
65+	18513	9708	—4465	2129	115.0	—	—	2336	126.2

Source: Columns 2 and 3 from Table 1; Columns 4, 5, 7 and 9 from Table A. 4.

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