# CURRENT LIFE TABLES FOR IRAQ AND ITS RURAL URBAN AREAS, 1973-1974

*By*

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Life table is a basic and comprehensive means for expressing the mortality experience of a particular population during a given period of time1. Besides this, the uses of life table in demographic analysis are many. It is most widely used for making population projections which show the future size of labour force, the school going population and other characteristics needed for planning purposes. It is an invaluable techniques used in studies of fertility, migration and to the solution of many public health and medicalproblems2. In recent years, the role of life tables has assumed greater significance in view of the rapid decline of mortality in developing areas and its impact on various life table functions that are widely used in demographic and acturial studies3. Iraq does not have reliable and usable vital statistics nor have there been any extensive demographic surveys on a sample basis before 1973. Life tables for Iraq-official or otherwise-have not been published so far. The data produced by the Demographic Surveys and the Sample Registration System have for the first time enabled the construction of a set of life tables for Iraq.

In the present paper, abridged life tables by sex are presented for Iraq and its rural and urban areas separately. They are based on the first year results (1973—1974) of the dual record system developed on sampling basis

* The views expressed in this paper are of the author and not necessarily of the organization in which he is employed.

1. Alpay Aysel, *Abridged Life Tables for Selected Regions and Cities of Turkey,* Proceedings of Turkish Demographic Conference, Hacettepe University, Pub. No. 7 (1968).
2. Kohli, K. L. *Spatial Variations of Mortality in India,* 1951—61 Unpublished Ph. D. Disseratation Submitted in the Univ. of Pennsylavania, Philadelphia (1971).
3. Vaidyanathan, K.E. and Ghanasekaran, K.S. "A Current Life Table for India 1968—69"

for obtaining vital statistics. It is hoped that these life tables will be useulf for planning and policy making.

*Data and their Limitations :*

In the dual record system, information about vital events (births and deaths) was collected through two independent systems of data collection, that is the registration system (RS) and the enumeration system (ES), while the base population statistics was collected only through the ES system4. The registration system was developed by the Ministry of Health while the enumeration system was undertaken by the C.S.O. The two systems were closely co-ordinated and the same sampling units were used in both the systems. Vital events statistics collected through the RS and Es systems were matched so as to get the number of events reported by RS and ES only. These three categories were used to estimate the number of events missed by both the RS and ES systems by using a method suggested by Chandrasekaran and Deming5. No such adjustments were made to the base population data which were provided by ES only.

The life tables presented in this paper are based on the mortality experience of one year instead of two or three years, and therefore, the results should be interpreted with caution. Besides, the data are subject to sampling errors in addition to non-sampling errors, such as coverage response, interviewer and processing errors. Age mis-statement caused error in the distribution of population and deaths by age. Grouping the data in five-year age intervals reduces somewhat the effect of heaping on digits divisible by five but does not avoid other sources of inaccuracy. Nevertheless, it may be pointed out that inspite of the above limitations of the data, the life tables developed in this paper provide important information which hitherto was not available.

## METHODOLOGY

Age specific death rates ($_n^mx$) for all ages above O were computed by using the following formula :

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1. For details of Dual Report System see : Shaikhaly Salah, *Organisation and Methods of the Dual Report System in Iraq.* Paper presented in First Regional Population Confer– Beirut, Lebanon, Feb. March (1974).

2. Chandrasekaran C. and Deming, W.E. *On a Method of Estimating Birth and Death Rates and Extent of Registration* . Journal of the American Statistical Association, 44. 110—115 (1949).

$$n^m x = \frac{n^d x}{n^p x}$$

where $n^d x$ is the estimated numer of deaths of persons in the age group x to x + n, dying during the 1 years of the study and $n^p x$ is the estimated mid-year population during the reference period in the age group x to x + n. The infant mortality rate was computed by dividing the infant deaths during the 1 year period by the sum of live births during that period. The sex-age specific death rates for Iraq and for rural and urban areas are given in a report published by the planning Ministry[6].

The age specific death rates, when plotted for each sex and for rural-urban areas, revealed erratic pattern of the $n^m x$ values beyond age 20. It was felt necessary to graduate the $n^m x$ values beyond age 20 before the construction of life tables. The graduation of the $n^m x$ values given in the quinquenial age 20—24 to 85 + were attempted by means of a Gompertz Curveof the type :

$$n^m x = K\ a^{b^x}$$

where K, a and b were constants and x was the age at death. The constants of Gompertz Curve are presented in Table 1. Further, in case of males, a small amount of additional graphic graduation was found necessary at the age group 5-9.

The graduated $n^m x$ values were converted to the corresponding life table mortality rates ($n^q x$) by means of the formula :

$$n^q x = \frac{2n.\ n^m x}{2+n.\ n^m x}$$

for all ages beyond O. The $q_0$ was assumed to be equivalent to $m_0$[7]. The other columns of the life tables were derived by using the standard acturial formulae. Seven basic values are shown in the life tables. They are shown by column as follows :

1. The age interval from one exact age (x) to another (x+n).

2. The probability of dying ($n^q x$), which shows the proportion of those alive at the beginning of the interval who die during the interval.

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1. Central Statistical Organisation; Ministry of Planning—A *Report on Results of Vita Events Survey* 1973—74 (1975).

2. The separation factros could not be calculated due to the nonavailability of the perti data.

3. The number of survivors ($1_x$), which shows the number of persons out of an initial cohort of 100,000 live births who survive to the beginning of the age interval.

4. The number of deaths ($_nd_x$), which shows the number of deaths in the age interval out of the original population of 100,000 live births.

5. The person-years lived during the interval ($_nL_x$), which shows the average number of persons present at each interval of age under the hypothetical condition of a stationary population.

$$_1L_0 = .3\,(l_0) + .7(l_1)$$

$$_nL_x = n/2\,(l_x + l_{x+n})$$

$$_wL_{85} = l_{85}\,(\log_{10}.\, l_{85})$$

6. The person years lived from age x to the highest attained age ($T_x$), which shows the aggregate remaining lifetime of the life table cohort.

$$T = \sum_{x}^{80} L_x + T_{85}$$

where $T_{85} = L_{85}$

7. The average remaining lifetime ($^0e_x$), which shows the average number of years remaining to be lived by survivors at any given age x.

$$^0e_x = \frac{T_x}{l_x}$$

*Results :*

According to the life tables presented in Tables 2 to 7, the expectation of life at birth for the year 1973-74 was 59.9 years for males and 60.3 years for females. However, children who had survived their first five years of life, had a further average expectation of life of 63.7 years of life for males and 63.2 years for females so as to reach a total of over 68 years. The lowest mortality rates were observed in the age group 15—19. The maximum expectation of life of 65.3 years for males and 65.1 years for females was observed in the age group 1—4.

Regarding the urban-rural mortality differentials, it was observed that in general, rural iraqis were exposed to greater risk of dying than their counterparts in urban areas, exception being the males in the age group 40—65. Because of this phenomenon, life expectancy at birth for both sexes was higher higher in urban Iraq than those for rural Iraq. However, it was noted that rural-urban mortality differences were more pronounced in case of females, particularly those of child bearing age, than for males. The rural-urban differences in the expectation of life at birth were 3.3 years for males and 7.4 years for females.

It was observed that both for rural and urban areas the infant mortality rates for males were higher than the rates for the females. This is in conformity with the pattern observed by the United Nations in many countries of the world[1]. It was further noted that females in rural Iraq at almost all ages had higher risk of dying than males. However, in urban Iraq the situationwas reversed with few exceptions in the early reproductive and at very old age groups. Considering Iraq as a whole, we again find that females had lower expectation of life than males at all ages except at age O. However, the difference in the expectation of life at all ages was rather very small.

Many factors could be contributing to the observed higher female mortality in rural areas. It seems that females in reproductive ages were exposed to greater risk of dying than males. In part, this is due to mortality arising from child birth and its complications. The continuous strain of frequent child bearing with poor or no medical facilities in rural areas to expectant mothers during prenatal and postnatal periods coupled with deficient dietary system might be contributing factors for the heavy toll of females deaths and the consequent imbalances in the sexes.

## SUMMARY

A set of abridged life tables by sex for Iraq and its ruralurban areas separately have been presented. These life tables have been constructed using data obtained from a sample survey and sample registration in which birth and death events were recorded. The present life tables are unique as they have been constructed directly from death and birth statistics for the first time in Iraq.

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1. United Nations Economic Commission for Asia and the Fa East, *Report of the Asl Population Conference and Selected Papers*, United Nations, New York, 1964.

According to the results obtained, the expectation of life at birth in Iraq for the year 1973—74 were 59.9 years for males amd 60.3 years for females. Rural Iraqis in general were exposed to greater risk of mortality than their urban counterparts. The difference was more pronounced in case of females than for males. The high incidence of maternal mortality in rural Iraq was found to be one of the important factors causing sex differentials in mortality.

TABLE 1

THE CONSTANTS OF GOMPERTZ CURVES FITTED TO AGE-SEX SPECIFIC DEATH RATES IN THE AGE RANGE 20 TO 85+ FOR IRAQ AND ITS RURAL—URBAN AREAS.

| Area | Sex | log a | b | log K |
|---|---|---|---|---|
| IRAQ | Males | 1.90687 | 1.05845 | —1.65030 |
| | Females | 0.34773 | 1.16605 | 0.10922 |
| RURAL | Males | 0.40000 | 1.15255 | 0.10535 |
| | Females | 0.30203 | 1.18067 | 0.11786 |
| URBAN | Males | 0.37168 | 1.16271 | —0.01978 |
| | Females | 0.51328 | 1.19098 | —0.40073 |

TABLE 2 : ABRIDGED LIFE TABLE FOR IRAQ, 1973-74. MALES

| Age group | $q_x$ | $l_x$ | $_nd_x$ | $_nL_x$ | $T_x$ | $0e_x$ |
|---|---|---|---|---|---|---|
| 0 | .09643 | 100,000 | 9,643 | 93,250 | 5,991,654 | 59.92 |
| 1 —4 | .03687 | 90,357 | 3,331 | 354,766 | 5,898,404 | 65.28 |
| 5 —9 | .01168 | 87,026 | 1,016 | 432,590 | 5,543,638 | 63.70 |
| 10—14 | .00732 | 86,010 | 630 | 428,475 | 5,111,048 | 59.42 |
| 15—19 | .00514 | 85,380 | 439 | 425,802 | 4,682,573 | 54.88 |
| 20—24 | .00901 | 84,941 | 765 | 422,792 | 4,256,771 | 50.11 |
| 25—29 | .01158 | 84,176 | 975 | 418,442 | 3,833,979 | 45.55 |
| 30—34 | .01518 | 83,201 | 1,263 | 412,847 | 3,415,537 | 41.05 |
| 35—39 | .02019 | 81,938 | 1,654 | 405,555 | 3,002,690 | 36.64 |
| 40—44 | .02727 | 80,284 | 2,189 | 395,947 | 2,597,135 | 32.35 |
| 45—49 | .03748 | 78,095 | 2,927 | 383,157 | 2,201,188 | 28.19 |
| 50—54 | .05229 | 75,168 | 3,930 | 366,015 | 1,818,031 | 24.19 |
| 55—59 | .07419 | 71,238 | 5,285 | 342,977 | 1,452,016 | 20.38 |
| 60—64 | .10687 | 65,953 | 7,048 | 312,145 | 1,109,039 | 16.81 |
| 65—69 | .15592 | 58,905 | 9,184 | 271,565 | 796,894 | 13.53 |
| 70—74 | .22962 | 49,721 | 11,417 | 220,062 | 525,329 | 10.56 |
| 75—79 | .33887 | 38,304 | 12,980 | 159,070 | 305,267 | 7.97 |
| 80—84 | .49382 | 25,324 | 12,505 | 95,358 | 146,197 | 5.77 |
| 85+ | 1.00000 | 12,819 | 12,819 | 52,659 | 52,659 | 4.11 |

TABLE 3

ABRIDGED LIFE TABLE FOR IRAQ, 1973—74. FEMALES

| Age group | qx | lx | ndx | nLx | Tx | 0ex |
|---|---|---|---|---|---|---|
| 0 | .08711 | 100,000 | 8,711 | 93,902 | 5,985,415 | 59.85 |
| 1 —4 | .03223 | 91,289 | 3,663 | 357,830 | 5,891,513 | 64.54 |
| 5 —9 | .01020 | 87,626 | 894 | 435,895 | 5,533,683 | 63.15 |
| 10—14 | .00628 | 86,732 | 545 | 432,297 | 5,097,788 | 58.78 |
| 15—19 | .00534 | 86,187 | 460 | 429,785 | 4,665,491 | 54.13 |
| 20—24 | .01420 | 85,727 | 1,217 | 425,592 | 4,235,706 | 49.41 |
| 25—29 | .01622 | 84,510 | 1,371 | 419,122 | 3,810,114 | 45.08 |
| 30—34 | .01892 | 83,139 | 1,573 | 411,762 | 3,390,992 | 40.79 |
| 35—39 | .02264 | 81,566 | 1,847 | 403,212 | 2,979,230 | 36.52 |
| 40—44 | .02785 | 79,719 | 2,221 | 393,042 | 2,576,018 | 32.31 |
| 45—49 | .03546 | 77,498 | 2,748 | 380,620 | 2,182,976 | 28.17 |
| 50—54 | .04697 | 74,750 | 3,511 | 364,972 | 1,902,356 | 24.11 |
| 55—59 | .06501 | 71,239 | 4,631 | 344,617 | 1,437,384 | 20.18 |
| 60—64 | .09456 | 66,608 | 6,298 | 317,295 | 1,092,767 | 16.41 |
| 65—69 | .14497 | 60,310 | 8,743 | 279,692 | 775,472 | 12.86 |
| 70—74 | .23438 | 51,567 | 12,086 | 227,620 | 495,780 | 9.61 |
| 75—79 | .39518 | 39,481 | 15,602 | 158,400 | 268,160 | 6.79 |
| 80—84 | .67209 | 23,879 | 16,049 | 79,272 | 109,760 | 4.60 |
| 85+ | 1.00000 | 7,830 | 7,830 | 30,488 | 30,488 | 3.89 |

TABLE 4

ABRIDGED LIFE TABLE FOR RURAL IRAQ, 1973—74. MALES

| Age group | nqx | lx | ndx | nLx | Tx | 0ex |
|---|---|---|---|---|---|---|
| 0 | .11480 | 100,000 | 11,480 | 91,964 | 5,825,639 | 58.26 |
| 1 —4 | .04451 | 88,520 | 3,940 | 346,200 | 5,733,675 | 64.77 |
| 5 —9 | .01267 | 84,580 | 1,072 | 420,220 | 5,387,475 | 63.70 |
| 10—14 | .00787 | 83,508 | 657 | 415,897 | 4,967,255 | 59.48 |
| 15—19 | .00494 | 82,851 | 409 | 413,232 | 4,551,358 | 54.93 |
| 20—24 | .01306 | 82,442 | 1,077 | 409,517 | 4,138,126 | 50.19 |
| 25—29 | .01479 | 81,365 | 1,203 | 403,820 | 3,728,609 | 45.83 |
| 30—34 | .01715 | 80,163 | 1,375 | 397,377 | 3,324,789 | 41.47 |
| 35—39 | .02039 | 78,788 | 1.606 | 389,925 | 2,927,412 | 37.15 |
| 40—44 | .02503 | 77,182 | 1,932 | 381,080 | 2,537,487 | 32.88 |
| 45—49 | .03183 | 75,250 | 2,395 | 370,262 | 2,156,407 | 28.66 |
| 50—54 | .04224 | 72,855 | 3,077 | 356,582 | 1,786,145 | 24.52 |
| 55—59 | .05886 | 69,778 | 4,107 | 338,622 | 1,429,563 | 20.49 |
| 60—64 | .08672 | 65,671 | 5,695 | 314,117 | 1,090,941 | 16.61 |
| 65—69 | .13576 | 59,976 | 8,142 | 279,525 | 776,824 | 12.95 |
| 70—74 | .22620 | 51,834 | 11,725 | 229,857 | 497,299 | 9.59 |
| 75—79 | .39621 | 40,109 | 15,892 | 150,815 | 267,442 | 6.67 |
| 80—84 | .70079 | 24,217 | 16,971 | 78,657 | 106,627 | 4.40 |
| 85+ | 1.00000 | 7,246 | 7,246 | 27,970 | 27,970 | 3.86 |

TABLE 5

ABRIDGED LIFE TABLE FOR RUBAL IRAQ, 1973—74. FEMAESL

| Age group | nqx | lx | ndx | nLx | Tx | 0ex |
|---|---|---|---|---|---|---|
| 0 | .10803 | 100,000 | 10,803 | 92,431 | 5,632,748 | 56.83 |
| 1 —4 | .04561 | 89,187 | 4,068 | 348,612 | 5,590,317 | 62.24 |
| 5 —9 | .1385 | 85,119 | 1,179 | 422,647 | 5,241,705 | 61.58 |
| 10—14 | .00663 | 83,940 | 556 | 418,310 | 4,819,058 | 57.41 |
| 15—19 | .00757 | 83,384 | 631 | 415,342 | 4,400,748 | 52.78 |
| 20—24 | .01587 | 82,753 | 1,313 | 410,482 | 3,985,406 | 48.16 |
| 25—29 | .01823 | 81,440 | 1,485 | 403,487 | 3,574,924 | 43.90 |
| 30—34 | .02142 | 79,955 | 1,713 | 395,492 | 3,171,437 | 39.66 |
| 35—39 | .02576 | 78,242 | 2,015 | 386,172 | 2,775,954 | 35.48 |
| 40—44 | .03183 | 76,227 | 2,426 | 375,070 | 2,389,773 | 31.35 |
| 45—49 | .04066 | 73,801 | 3,001 | 361,502 | 2,014,703 | 27.30 |
| 50—54 | .05372 | 70,800 | 3,803 | 344,492 | 1,653,201 | 23.35 |
| 55—59 | .07387 | 66,997 | 4,949 | 322,612 | 1,308,709 | 19.53 |
| 60—64 | .10619 | 62,048 | 6,589 | 293,767 | 986,097 | 15.89 |
| 65—69 | .15982 | 55,459 | 8,863 | 255,137 | 692,330 | 12.48 |
| 70—74 | .25144 | 46,596 | 11,716 | 203,690 | 437,193 | 9.38 |
| 75—79 | .40907 | 34,880 | 14,268 | 138,730 | 233,503 | 6.69 |
| 80—84 | .66877 | 20,612 | 13,785 | 68,597 | 94,773 | 4.60 |
| 85+ | 1.00000 | 6,827 | 6,827 | 26,176 | 26,176 | 3.83 |

TABLE 6

ABRIDGED LIFE TABLE FOR URBAN IRAQ, 1973—74. MALES

| Age group | nqx | lx | ndx | nLx | Tx | 0ex |
|---|---|---|---|---|---|---|
| 0 | .08252 | 100,000 | 8,252 | 94,224 | 6,164,458 | 61.64 |
| 1 —4 | .03072 | 91,748 | 2,818 | 361,356 | 6,070,234 | 66.16 |
| 5 —9 | .00737 | 88,890 | 655 | 443,012 | 5,708,878 | 64.19 |
| 10—14 | .00638 | 88,275 | 563 | 439,967 | 5,265,866 | 59.65 |
| 15—19 | .00484 | 87,712 | 425 | 437,497 | 4,825,899 | 55.02 |
| 20—24 | .00618 | 87,287 | 539 | 435,087 | 4,388,402 | 50.27 |
| 25—29 | .00747 | 86,748 | 648 | 432,120 | 3,953,315 | 45.57 |
| 30—34 | .01183 | 86,100 | 1,018 | 427,955 | 3,521,195 | 40.90 |
| 35—39 | .01843 | 85,082 | 1,568 | 421,490 | 3,093,240 | 36.35 |
| 40—44 | .02805 | 83,514 | 2,343 | 411,712 | 2,671,750 | 31.99 |
| 45—49 | .04181 | 81,171 | 3,394 | 397,370 | 2,260,038 | 27.84 |
| 50—54 | .06108 | 77,777 | 4,751 | 377,007 | 1,862,668 | 23.95 |
| 55—59 | .08731 | 73,026 | 6,376 | 349,190 | 1,485,661 | 20.34 |
| 60—64 | .12229 | 66,650 | 8,151 | 312,872 | 1,136,471 | 17.05 |
| 65—69 | .16753 | 58,499 | 9,800 | 267,995 | 823,599 | 14.08 |
| 70—74 | .22451 | 48,699 | 10,933 | 216,162 | 555,604 | 11.41 |
| 75—79 | .29410 | 37,766 | 11,107 | 161,062 | 339,442 | 8.98 |
| 80—84 | .37639 | 26,659 | 10,034 | 108,210 | 178,380 | 6.69 |
| 85+ | 1.00000 | 16,625 | 16,625 | 70,170 | 70,170 | 4.22 |

TABLE 7

ABRIDGED LIFE TABLE FOR URBAN IRAQ, 1973—74. FEMALES

| Age group | $q_x$ | $l_x$ | $_nd_x$ | $_nL_x$ | $T_x$ | $e_x$ |
|---|---|---|---|---|---|---|
| 0 | .07169 | 100,000 | 7,169 | 94,982 | 6,418,518 | 64.18 |
| 1 —4 | .02027 | 92,831 | 1,882 | 367,560 | 6,323,536 | 63.12 |
| 5 —9 | .00792 | 90,949 | 720 | 452,945 | 5,955,976 | 65.49 |
| 10—14 | .00558 | 90,229 | 503 | 449,887 | 5,503,031 | 60.99 |
| 15—19 | .00339 | 89,726 | 304 | 447,870 | 5,053,144 | 56.72 |
| 20—24 | .01119 | 89,422 | 1,001 | 444,607 | 4,605,274 | 51.50 |
| 25—29 | .01282 | 88,421 | 1,134 | 439,270 | 4,160,667 | 47.05 |
| 30—34 | .01508 | 87,287 | 1,316 | 433,145 | 3,721,397 | 42.63 |
| 35—39 | .01818 | 85,971 | 1,563 | 425,947 | 3,288,252 | 38.25 |
| 40—44 | .02259 | 84,408 | 1,907 | 417,272 | 2,862,305 | 33.91 |
| 45—49 | .02902 | 82,501 | 2,394 | 406,520 | 2,445,033 | 29.64 |
| 50—54 | .03883 | 80,107 | 3,111 | 392,757 | 2,038,513 | 25.45 |
| 55—59 | .05433 | 76,996 | 4,183 | 374,522 | 1,645,756 | 21.37 |
| 60—64 | .07997 | 72,813 | 5,823 | 349,507 | 1,271,234 | 17.46 |
| 65—69 | .12440 | 66,990 | 8,334 | 314,115 | 921,727 | 13.76 |
| 70—74 | .20451 | 58,656 | 11,996 | 263,290 | 607,612 | 10.36 |
| 75—79 | .35201 | 46,660 | 16,425 | 192,237 | 344,322 | 7.38 |
| 80—84 | .61469 | 30,235 | 18,585 | 104,712 | 152,085 | 5.03 |
| 85+ | 1.00000 | 11,650 | 11,650 | 47,373 | 47,373 | 4.07 |