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THE

# REGISTRAR GENERAL'S DECENNIAL SUPPLEMENT

ENGLAND & WALES

1951

# LIFE TABLES

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# THE REGISTRAR GENERAL'S DECENNIAL SUPPLEMENT

## ENGLAND & WALES

## 1951

# LIFE TABLES

*LONDON*

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1957 : REPRINTED 1963

Over the past century the series of life tables known as the English Life Tables have been constructed on the basis of the material provided by the national census and death records. The first pair of tables, for males and females respectively, (together known as English Life Table No. 1 and published in 1843), was constructed by Dr. William Farr, the first statistician of the General Register Office, who also constructed Nos. 2 and 3 which were published between 1853 and 1864. Tables Nos. 4, 5 and 6 were also constructed in the General Register Office, the first by Dr. William Ogle (noted for his work on standardisation of death rates) and the other two by Dr. John Tatham (who introduced some important changes in the method of construction and had previously published a Manchester life table); these appeared in 1885, 1895 and 1907. The preparation of Life Tables Nos. 7 and 8, based on the 1911 Census, was entrusted by the Registrar General to Mr. George King, a former Vice-President of the Institute of Actuaries, who had already prepared a report on the graduation of ages (published in Volume VII of the Report on the 1911 Census) and was responsible for important advances in principles and methods. After the 1921 and 1931 Censuses the Registrar General invited the assistance of Sir Alfred Watson, K.C.B., Government Actuary and sometime President of the Institute of Actuaries, who undertook the preparation of English Life Tables Nos. 9 and 10 which were included in the Registrar General's Decennial Supplements for 1921 and 1931, published in 1927 and 1936 respectively.

The present volume, which forms part of the Decennial Supplement, 1951, is concerned with the production of English Life Table No. 11, which is published —for males and females separately—in Appendix IV. This work was undertaken at the invitation of the Registrar General by Sir George Maddex, K.B.E., Government Actuary and past President of the Institute of Actuaries. The Table is based on the mortality experience in England and Wales as a whole during the three years 1950–52 and is in this respect in line with its three predecessors, English Life Tables Nos. 8–10.

In addition to the main tables for the country as a whole, life tables, on an abridged scale, have been prepared for Wales and for Greater London (the largest of the conurbations). A detailed examination has also been made of mortality variations (*a*) according to marital condition, and (*b*) among the Standard Regions and the Urban and Rural Aggregates.

The Registrar General desires to record his appreciation of the attention which Sir George Maddex has devoted to the task of preparing the new Life Tables and the valuable accompanying commentary which are now made available to the public.



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# REPORT ON LIFE TABLES

# BY THE

# GOVERNMENT ACTUARY

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SIR GEORGE NORTH, C.B., M.C., LL.D.,
REGISTRAR GENERAL,
SOMERSET HOUSE,
W.C.2.

SIR,

In compliance with your request I have undertaken the construction, in connexion with the Census of 1951, of Life Tables representative of the mortality experience of the population of England and Wales, and have prepared such tables for males and for females on the basis of that census and the deaths registered during the three years 1950, 1951 and 1952. The circumstances which have led me to select these years for the preparation of the National Life Tables on this occasion are explained in the opening paragraphs of the following report. I have also examined the extent to which, during this period, mortality varied with marital condition and geographical area.

## The Choice of the Period of Investigation

2. The first point to which consideration was given was the choice of the period to which the tables should relate. The three previous English Life Tables, Nos. 8, 9 and 10, were based on the Censuses of 1911, 1921 and 1931 respectively and on the deaths in the three-year periods 1910 to 1912, 1920 to 1922 and 1930 to 1932 : the reasons for the choice of a three-year period were set out in the reports on those tables. The precedents therefore strongly suggested the use of the deaths in 1950, 1951 and 1952 on this occasion, unless there were special reasons to the contrary.

3. There was one consideration which suggested that a departure from the customary three-year period might be desirable. In the early months of 1951 there was a severe influenza epidemic and in that year mortality at the older ages was appreciably greater than in the immediately preceding and following years. The experience of recent years suggests that epidemic mortality on the 1951 scale has become a relatively infrequent occurrence and it might therefore be thought that the use of the years 1950–52, i.e. the spreading of the excess mortality of 1951 over a period of only three years, would not give a true picture of the level of mortality contemporary with the 1951 Census. Two alternatives were considered, one the use of a longer period, say 1949 to 1953, the other the omission of 1951 and the use of the data for the two years 1950 and 1952. The first of these was open to the objection that it would introduce data somewhat remote in time from the census date ; moreover, there is no particular reason to expect an epidemic on the 1951 scale one year in every five rather than one in



every three. The second alternative, the omission of 1951, would have entailed the virtual exclusion of epidemic mortality and the resulting tables would have tended to underestimate the general level of mortality around the Census date. In the circumstances, the least objectionable course seemed to be to follow previous practice and the investigation has therefore been based on the deaths registered in 1950, 1951 and 1952. It may be of value, however, to give an indication of the differences which would have resulted from the choice of one or other of the alternatives, and in Table A below the average death rates for both sexes in various age groups—as shown in Table 4 of the Registrar General's Annual Statistical Reviews, Part I, Tables, Medical—for the five years 1949 to 1953 and for the two years 1950 and 1952 are expressed as percentages of those for the three years 1950–52.

**Table A**
**Average death rates for 1949–53, and for 1950 and 1952, expressed as a percentage of those for 1950–52**

| Age Group | Men | | Women | |
|---|---|---|---|---|
| | 1949–53 | 1950 and 1952 | 1949–53 | 1950 and 1952 |
| 0–4 | 103 | 100 | 104 | 100 |
| 5–9 | 102 | 100 | 102 | 100 |
| 10–14 | 100 | 98 | 105 | 103 |
| 15–19 | 105 | 103 | 103 | 100 |
| 20–24 | 101 | 100 | 105 | 100 |
| 25–34 | 99 | 99 | 102 | 100 |
| 35–44 | 100 | 99 | 101 | 98 |
| 45–54 | 99 | 98 | 99 | 99 |
| 55–64 | 99 | 97 | 99 | 98 |
| 65–74 | 99 | 97 | 99 | 97 |
| 75–84 | 98 | 96 | 98 | 96 |
| 85 and over | 97 | 94 | 99 | 95 |

4. It will be seen that the use of the five-year period 1949–53 would have resulted in rates of mortality rather heavier than those for 1950–52 at the young ages, but rather lighter at the older ages. The exclusion of 1951 from the period of investigation would have had but a negligible effect on the rates up to age 35 ; at later ages, however, the rates for 1950 and 1952 alone are lighter than those for the whole three-year period, the difference becoming 5 per cent or more in the final age group.

## The Construction of English Life Tables No. 11

5. **Calculation of crude death rates.** The 1951 Census was taken on the night of 8th April, 1951, i.e. nearly three months before the mid-point of the three calendar years to which the investigation relates. The ideal procedure for calculating rates of mortality is to divide the deaths by the number of years of exposure to risk during the period in which the deaths occurred ; the use of the Census method involves the assumption that for practical purposes the denominator can be represented with sufficient accuracy by the population at the exact mid-point of the period. It was therefore necessary to consider whether the population enumerated at each age should be adjusted to produce figures which could be regarded as representing the population at 30th June, 1951.



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Examination of the available statistics led to the conclusion that, at ages up to 45, the adjustments necessary would be so small as to have no appreciable effect on the rates of mortality, but that at older ages the population at 30th June is likely to have exceeded that at 8th April to an extent which warranted some adjustment. At ages over 45 the enumerated populations were therefore adjusted, with the help of the statistics of deaths in the second quarter of 1951, to bring them forward to 30th June, 1951. The effect of the adjustment was to increase the enumerated populations between ages 45 and 75 by fractions of 1 per cent : thereafter the percentage additions were rather greater, reaching some 3 per cent at the most advanced ages.

6. Crude central death rates were then computed for each sex at each age by dividing the annual average of the deaths registered in 1950, 1951 and 1952 by the Census population (at ages up to 44) or by the estimated mid-1951 population (at ages 45 and over). These deaths, populations and rates of mortality are set out in full in Appendix I. The irregular progression of the rates from age to age is due to a number of causes, such as the use of the mid-1951 populations instead of a true " exposed to risk ", the partiality shown, more particularly in the Census enumerations but to a lesser extent in the registrations of deaths, for ages ending in certain digits (notably 0) at the expense of others, and the inevitable random fluctuations, particularly at ages where the deaths are relatively few. The purpose of the graduation process, which will next be referred to, is to substitute for these irregularities a smooth and orderly progression.

7. **The Calculation of Graduated Rates of Mortality.** It has become customary to graduate mortality rates required for the construction of national life tables by the method of pivotal values and osculatory interpolation which was developed by Mr. George King at the beginning of the century. This method automatically produces, over each five-year age group, a very close agreement between actual and " expected " deaths. Such an agreement can only be obtained, however, by retaining features which a more powerful method of graduation would obliterate as of no real significance. Moreover, since pivotal values at the most advanced ages are likely to be unreliable, the table of graduated values has to be carried to the end of life by an ad hoc process which has no relation to the main method. On the present occasion it was decided to investigate the possibility of using a method which, although lacking the simplicity of King's process, would be more closely akin to those which have latterly been employed in the graduation of mortality experiences of assured lives and annuitants. After much experiment it was found that from age 21 in the case of men, and from age 27 for women, the national mortality rates of 1950–52 could be represented very closely by a mathematical formula of similar form for each sex ; this of necessity produces a smooth progression of values without, it is thought, removing any of the essential features of the experience. A full description of the method is given in Appendix II.

8. In view of the departure from previous practice it was thought desirable to test how far the mortality rates derived by the mathematical formula differed from those that would have been obtained by the traditional method. The data were therefore graduated by King's method, the quinary age groups chosen being those with last digits 0–4 and 5–9, as in the construction of the 1930–32 Life Tables, pivotal values being calculated at ages 22, 27, 32 . . . . 87. A detailed comparison of the two graduations was made and the results are described in Appendix II ; as a summary indication of the magnitude of the differences between the two methods Table B opposite compares the rates of mortality obtained by each process at every third age from 30 to 87.



**Table B**

**Graduated rates of mortality per 100,000 ($10^5 q_x$)**

| Age $x$ | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | Graduation formula | King's method | (1)—(2) | Graduation formula | King's method | (4)—(5) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 30 | 157 | 158 | — 1 | 127 | 130 | — 3 |
| 33 | 177 | 180 | — 3 | 145 | 148 | — 3 |
| 36 | 210 | 209 | 1 | 172 | 171 | 1 |
| 39 | 265 | 260 | 5 | 211 | 206 | 5 |
| 42 | 352 | 343 | 9 | 266 | 259 | 7 |
| 45 | 486 | 484 | 2 | 341 | 345 | — 4 |
| 48 | 680 | 685 | — 5 | 441 | 450 | — 9 |
| 51 | 949 | 951 | — 2 | 571 | 568 | 3 |
| 54 | 1,311 | 1,306 | 5 | 741 | 735 | 6 |
| 57 | 1,779 | 1,770 | 9 | 966 | 962 | 4 |
| 60 | 2,369 | 2,382 | — 13 | 1,271 | 1,266 | 5 |
| 63 | 3,101 | 3,140 | — 39 | 1,696 | 1,705 | — 9 |
| 66 | 4,019 | 4,042 | — 23 | 2,300 | 2,305 | — 5 |
| 69 | 5,188 | 5,183 | 5 | 3,167 | 3,169 | — 2 |
| 72 | 6,714 | 6,664 | 50 | 4,406 | 4,387 | 19 |
| 75 | 8,738 | 8,688 | 50 | 6,143 | 6,152 | — 9 |
| 78 | 11,416 | 11,394 | 22 | 8,503 | 8,518 | — 15 |
| 81 | 14,871 | 14,870 | 1 | 11,567 | 11,529 | 38 |
| 84 | 19,124 | 19,159 | — 35 | 15,323 | 15,210 | 113 |
| 87 | 24,027 | 24,182 | —155 | 19,614 | 19,523 | 91 |

It will be seen that the differences between the rates obtained by the two methods are small throughout and that their sign changes frequently; the graduation formulae cut through the minor waves retained by King's method, whilst preserving the general shape of the curve of mortality rates. It is evident that the differences resulting from the change of method are too small to vitiate comparison with earlier national life tables.

9. The graduated rates at ages 21 and over (men) and 27 and over (women) having been fixed, it was necessary to obtain rates for the younger ages. From age 6 to age 20 (men) and 26 (women) the rates of mortality are small, never being much in excess of 1 per 1,000 ; it was found that, over these ranges, the series of values of $q_x$ obtained by averaging the crude values at ages $x - 1$, $x$ and $x + 1$ formed a reasonably smooth progression for both sexes and these averages were adopted. A note on the rates for ages 0 to 5 will be found in Appendix III.

10. **English Life Tables No. 11.** The rates of mortality derived as explained in the foregoing paragraphs form the basis of the new tables, which in accordance with the established numbering system fall to be designated English Life Tables No. 11. These life tables, for males and females respectively, are given in full in Appendix IV ; each has been based on a radix of 100,000 births and on rates of mortality which at every age proceed to five places of decimals. This degree of refinement is in accordance with precedent ; it is convenient, too, as a means of exhibiting the smooth progression of the graduated rates, but it endows those rates with an appearance of precision not justifiable on statistical grounds. Any rate of mortality is subject to a margin of error which depends on the size of the population and the number of deaths from which it is computed. It would



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hardly be practicable to give recognition to this by tabulating all the functions in the table with, alongside each, a measure of the margin of error, but it might be thought desirable to vary the number of decimal places shown in the rates according to the volume of data at each age. This, however, would give the table a complicated and untidy appearance and might lead to some confusion when the table is compared with others constructed on traditional lines. The customary method of presentation has therefore again been adopted.

11. It is important to show that the rates of mortality used in these life tables do indeed represent closely the mortality prevailing in the years 1950, 1951 and 1952. In Table C the " expected " deaths obtained by applying the graduated rates of mortality to the populations set out in Appendix I are compared with the deaths actually recorded in the age group 6–9 and quinary groups thereafter. More detailed figures are given in Appendix II.

**Table C**
**Comparison of actual and expected deaths**

| Age Group | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | Actual deaths (annual average 1950–52) | Expected deaths | Deviation: Actual *less* expected deaths | Deviation: Accumulated deviation | Actual deaths (annual average 1950–52) | Expected deaths | Deviation: Actual *less* expected deaths | Deviation: Accumulated deviation |
| 6–9 | 782 | 814 | — 32 | — 32 | 523 | 541 | — 18 | — 18 |
| 10–14 | 778 | 789 | — 11 | — 43 | 520 | 532 | — 12 | — 30 |
| 15–19 | 1,248 | 1,250 | — 2 | — 45 | 893 | 878 | + 15 | — 15 |
| 20–24 | 1,947 | 1,931 | + 16 | — 29 | 1,365 | 1,375 | — 10 | — 25 |
| 25–29 | 2,370 | 2,379 | — 9 | — 38 | 1,919 | 1,903 | + 16 | — 9 |
| 30–34 | 2,619 | 2,558 | + 61 | + 23 | 2,213 | 2,158 | + 55 | + 46 |
| 35–39 | 3,708 | 3,737 | — 29 | — 6 | 3,104 | 3,129 | — 25 | + 21 |
| 40–44 | 5,782 | 5,920 | —138 | —144 | 4,482 | 4,576 | — 94 | — 73 |
| 45–49 | 9,615 | 9,583 | + 32 | —112 | 6,732 | 6,598 | +134 | + 61 |
| 50–54 | 14,199 | 14,108 | + 91 | — 21 | 9,429 | 9,457 | — 28 | + 33 |
| 55–59 | 19,537 | 19,695 | —158 | —179 | 13,009 | 13,077 | — 68 | — 35 |
| 60–64 | 27,412 | 27,130 | +282 | +103 | 18,865 | 18,838 | + 27 | — 8 |
| 65–69 | 35,100 | 34,920 | +180 | +283 | 27,452 | 27,347 | +105 | + 97 |
| 70–74 | 40,674 | 41,020 | —346 | — 63 | 37,635 | 37,833 | —198 | —101 |
| 75–79 | 40,863 | 40,907 | — 44 | —107 | 43,667 | 43,412 | +255 | +154 |
| 80–84 | 28,632 | 28,570 | + 62 | — 45 | 37,487 | 37,657 | —170 | — 16 |
| 85–89 | 13,594 | 13,516 | + 78 | + 33 | 22,776 | 22,846 | — 70 | — 86 |
| 90–94 | 3,581 | 3,520 | + 61 | + 94 | 8,085 | 7,911 | +174 | + 88 |
| 95 and over | 502 | 559 | — 57 | + 37 | 1,718 | 1,686 | + 32 | +120 |
| Total | 252,943 | 252,906 | + 37 | | 241,874 | 241,754 | +120 | |

This table in general calls for little comment ; having regard to the magnitude of the actual deaths, the differences between actual and expected deaths are small in each age group and change sign frequently so that the accumulated deviations are always small. The only point that needs special mention is the excess—more than 10 per cent—of expected over actual deaths in the " 95 and over " group for men : at these ages the crude rates obtained from the data appear to be small in comparison with those in the 90–94 group—a feature that was also apparent in 1930–32—and it appears likely that at these ages there is a distortion in the ungraduated rates arising primarily from mis-statements of age.



## Comparison with earlier National Life Tables

12. In the Report on the 1930–32 Life Tables a comparison was made of the mortality experience shown by the English Life Tables Nos. 8, 9 and 10, related to the Censuses of 1911, 1921 and 1931 respectively. These comparisons have now been extended to include the results of the present investigation, so as to present a picture of the secular changes in mortality over a period of forty years. Table D below shows the rates of mortality ($q_x$) for selected ages for men and women as given in the four English Life Tables, and in Table E the changes that have occurred in these rates since 1911 are indicated by expressing the rates from the three later tables as percentages of those from English Life Tables No. 8.

**Table D**
**Rates of mortality ($q_x$)**

| Age $x$ | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | E.L.T.8 (1910–12) | E.L.T.9 (1920–22) | E.L.T.10 (1930–32) | E.L.T.11 (1950–52) | E.L.T.8 (1910–12) | E.L.T.9 (1920–22) | E.L.T.10 (1930–32) | E.L.T.11 (1950–52) |
| 0 | ·12044 | ·08996 | ·07186 | ·03266 | ·09767 | ·06942 | ·05455 | ·02510 |
| 10 | ·00193 | ·00181 | ·00146 | ·00052 | ·00196 | ·00180 | ·00134 | ·00035 |
| 20 | ·00348 | ·00349 | ·00316 | ·00129 | ·00295 | ·00306 | ·00268 | ·00083 |
| 30 | ·00478 | ·00434 | ·00340 | ·00157 | ·00411 | ·00392 | ·00319 | ·00127 |
| 40 | ·00811 | ·00688 | ·00562 | ·00290 | ·00660 | ·00532 | ·00440 | ·00227 |
| 50 | ·01482 | ·01179 | ·01128 | ·00850 | ·01140 | ·00915 | ·00816 | ·00524 |
| 60 | ·03042 | ·02561 | ·02415 | ·02369 | ·02310 | ·01897 | ·01770 | ·01271 |
| 70 | ·06470 | ·05997 | ·06035 | ·05651 | ·05259 | ·04646 | ·04451 | ·03532 |
| 80 | ·14299 | ·14002 | ·14500 | ·13629 | ·12419 | ·11766 | ·11858 | ·10466 |
| 90 | ·27395 | ·26752 | ·28614 | ·29255 | ·23826 | ·23852 | ·25061 | ·24146 |

**Table E**
**Rates of mortality for males and females expressed as percentages of English Life Table No. 8 rates**

| Age | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | E.L.T.8 (1910–12) | E.L.T.9 (1920–22) | E.L.T.10 (1930–32) | E.L.T.11 (1950–52) | E.L.T.8 (1910–12) | E.L.T.9 (1920–22) | E.L.T.10 (1930–32) | E.L.T.11 (1950–52) |
| 0 | 100 | 75 | 60 | 27 | 100 | 71 | 56 | 26 |
| 10 | 100 | 94 | 76 | 27 | 100 | 92 | 68 | 18 |
| 20 | 100 | 100 | 91 | 37 | 100 | 104 | 91 | 28 |
| 30 | 100 | 91 | 71 | 33 | 100 | 95 | 78 | 31 |
| 40 | 100 | 85 | 69 | 36 | 100 | 81 | 67 | 34 |
| 50 | 100 | 80 | 76 | 57 | 100 | 80 | 72 | 46 |
| 60 | 100 | 84 | 79 | 78 | 100 | 82 | 77 | 55 |
| 70 | 100 | 93 | 93 | 87 | 100 | 88 | 85 | 67 |
| 80 | 100 | 98 | 101 | 95 | 100 | 95 | 95 | 84 |
| 90 | 100 | 98 | 104 | 107 | 100 | 100 | 105 | 101 |



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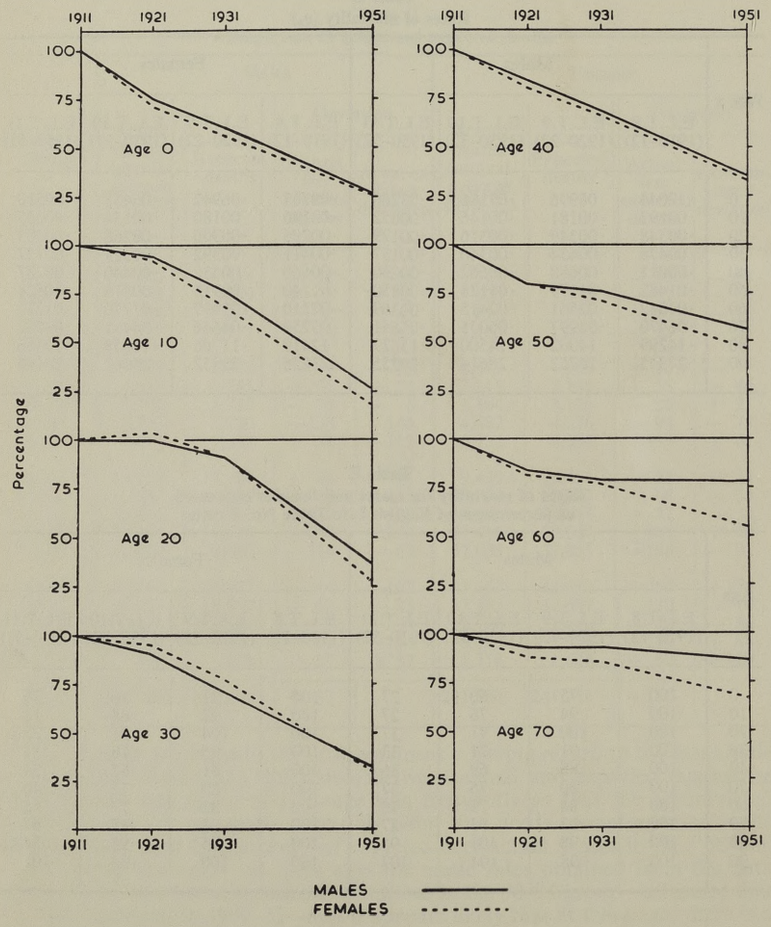
13. To enable the implications of these figures to be more easily seen the accompanying diagrams have been prepared for each of the ages given in the tables other than 80 and 90. At these advanced ages the rates of mortality are subject to wide fluctuations from year to year, to a much greater extent than at younger ages, owing to the incidence of epidemics or severe winters ; even the average for a period of three years might depart considerably from the general secular trend. Moreover, at the oldest ages the effect of age mis-statements may be considerable. For ages up to 70 it is thought that the tables and diagrams give a broad picture of the secular trend which would not have been materially different had the comparison been based on the experience of periods other than the triennia centred on the Census years.

**RATES OF MORTALITY EXPRESSED AS PERCENTAGES OF 1911 RATES**






14. From the tables and diagrams it will be seen that over the twenty-year period 1911–1931 the downward trend of mortality followed much the same course for both sexes. The improvement was greatest at age 0 and at ages around 40 : infant mortality was reduced by 40 per cent or more, and the 1931 death rates at age 40 were less than 70 per cent of those for 1911. Between ages 0 and 40 the improvement was less, being only about 10 per cent at age 20, while after age 40 the degree of improvement steadily declined with advancing age.

15. In the period between the 1931 and 1951 Censuses the improvement at the younger ages was maintained or even accelerated. Infant mortality has been reduced to one-quarter of what it was forty years earlier, and the rates of mortality for young adults are only about one-third of the 1911 rates. At ages over 40, however, the experience of the two sexes has diverged. For women, there has been a continued substantial lightening of mortality, extending to age 80 and beyond. For men, on the other hand, the improvement has been much less ; at age 60 the 1951 rate is almost the same as that of twenty years earlier. At that age the women's rate of mortality in 1950–52 was about 45 per cent less than that forty years before, while the men's rate was only 22 per cent less. A more detailed indication of the changes in mortality over the last twenty years is provided by the following figures :

**Table F**

**1950–52 rates of mortality as percentage of 1930–32 rates and men's mortality rates as percentage of women's**

| Age | 1950–52 as percentage of 1930–32 | | Men's mortality rates as percentage of women's | |
|---|---|---|---|---|
| | Males | Females | 1930–32 | 1950–52 |
| 0 | 45 | 46 | 132 | 130 |
| 5 | 24 | 19 | 115 | 140 |
| 10 | 36 | 26 | 109 | 149 |
| 15 | 37 | 26 | 103 | 146 |
| 20 | 41 | 31 | 118 | 155 |
| 25 | 43 | 36 | 111 | 133 |
| 30 | 46 | 40 | 107 | 124 |
| 35 | 47 | 45 | 116 | 122 |
| 40 | 52 | 52 | 128 | 128 |
| 45 | 61 | 58 | 137 | 143 |
| 50 | 75 | 64 | 138 | 162 |
| 55 | 90 | 69 | 137 | 180 |
| 60 | 98 | 72 | 136 | 186 |
| 65 | 97 | 75 | 138 | 178 |
| 70 | 94 | 79 | 136 | 160 |
| 75 | 92 | 83 | 128 | 142 |
| 80 | 94 | 88 | 122 | 130 |
| 85 | 98 | 93 | 117 | 124 |
| 90 | 102 | 96 | 114 | 121 |

16. This table brings out very clearly several of the features already mentioned—the dramatic fall in death rates at the younger ages, the considerable improvement for women in middle and old age, and the very much smaller improvement for men. The last two columns of the table show that between 1930–32 and 1950–52 there was, in the age range 5 to 30, a considerable increase in the ratios of the men's mortality rates to those of women. Between ages 35 and 45 the ratios are much the same for both periods, but a very substantial

increase is shown between ages 50 and 75. Further light on this divergence of experience could no doubt be given by an analysis according to cause of death, but such an analysis is outside the scope of this report.

17. At the early ages both sexes have shared in the improvement of the last twenty years ; but although infant mortality rates have been halved the probability of surviving for one year is still no greater at birth than at age 65 or thereabouts. In subsequent childhood the decline in mortality has been very rapid—in 1950–52 children of school age experienced death rates of less than one per thousand—and, as far as age 35, the 1950–52 rates are less than one-half of those twenty years earlier.

18. The overall effect of these changes can perhaps be shown most succinctly by a comparison of the expectations of life computed from English Life Tables Nos. 8, 10 and 11.

**Table G**

**Expectations of life ($\mathring{e}_x$)**

| Age $x$ | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | 1910–12 | 1930–32 | 1950–52 | 1910–12 | 1930–32 | 1950–52 |
| 0 | 51·50 | 58·74 | 66·42 | 55·35 | 62·88 | 71·54 |
| 10 | 53·08 | 55·79 | 59·24 | 55·91 | 58·87 | 63·87 |
| 20 | 44·21 | 46·81 | 49·64 | 47·10 | 49·88 | 54·17 |
| 30 | 35·81 | 38·21 | 40·27 | 38·54 | 41·22 | 44·68 |
| 40 | 27·74 | 29·62 | 30·98 | 30·30 | 32·55 | 35·32 |
| 50 | 20·29 | 21·60 | 22·23 | 22·51 | 24·18 | 26·34 |
| 60 | 13·78 | 14·43 | 14·79 | 15·48 | 16·50 | 18·07 |
| 70 | 8·53 | 8·62 | 9·00 | 9·58 | 10·02 | 10·97 |

During the forty years covered by the table the expectation of life at birth has increased by nearly 15 years for males and more than 16 years for females ; in 1950–52 it reached about 66½ years for a boy and 71½ years for a girl. These increases (of almost 30 per cent in each case) are largely the result of the immense improvement in infant mortality. Forty years ago, of every 1,000 boys born 120 died before reaching their first birthday, and so did 98 of every 1,000 girls ; the corresponding figures for 1950–52 were 33 boys and 25 girls. At every age in the table the expectation has increased. It is noticeable, however, that the increases are greater for women than for men, particularly at the older ages ; thus at ages 50, 60 and 70 the expectations for men have increased by 2 years, 1 year and ½ year respectively, while for women the corresponding increases were 4 years, 2½ years and 1½ years. This is a natural corollary of the divergent experience of the two sexes which was described earlier.

19. Although a table of expectations of life computed from a table of contemporary mortality is a useful means of comparing the experience of two epochs or the mortality of men with that of women, it does not provide a measure of the probable future lifetime of the existing population save on the assumption that there will be no further secular changes in mortality. In the light of past events such an assumption would be quite unrealistic. It has to be admitted, indeed, that in an era of persistently declining death rates the whole concept of the life table as normally computed is somewhat artificial. To produce a life table which had any real meaning it would be necessary to attempt an estimate of the mortality likely to be experienced by the existing population during their future lifetime—a course which would involve the forecasting of mortality rates for at least a century ahead. Thus, although a life table reflecting current mortality may be a convenient summary for comparative purposes, it cannot be regarded as a suitable basis for predicting the size and age structure of the future population.



## Mortality Rates according to Marital Condition*

20. The classification of the Census population and the deaths recorded in 1950–52 according to marital condition enabled death rates at quinary age-points to be calculated for single, married and widowed (including divorced) women. These are given in Table H below, together with the corresponding (ungraduated) rates for all women. At the younger ages the numbers of widows, and of deaths amongst them, are small, and the rates in this section of the table should be regarded with some reserve on this account.

**Table H**

**Rates of mortality per thousand ($10^3 q_x$) for women according to marital status**

| Age $x$ | Single | Married | Widowed | All women |
|---|---|---|---|---|
| 22 | 1·1 | ·7 | | ·9 |
| 27 | 1·7 | 1·0 | | 1·2 |
| 32 | 2·2 | 1·2 | 1·8 | 1·4 |
| 37 | 2·8 | 1·6 | 2·2 | 1·8 |
| 42 | 3·6 | 2·4 | 3·2 | 2·6 |
| 47 | 5·2 | 3·9 | 4·6 | 4·1 |
| 52 | 7·2 | 5·9 | 7·0 | 6·2 |
| 57 | 10 | 9·2 | 10 | 9·6 |
| 62 | 15 | 15 | 17 | 15 |
| 67 | 25 | 25 | 27 | 26 |
| 72 | 41 | 42 | 46 | 44 |
| 77 | 72 | 72 | 80 | 77 |
| 82 | 122 | 113 | 131 | 127 |
| 87 | 189 | 156 | 201 | 195 |

21. In the upper half of the table the rates for married women and for widows are lighter than those of single women ; in the case of married women the difference is very considerable. At the older ages (except the most advanced) there is little or no difference between the single and the married ; the rates for widows, however, tend to be higher than either. These differences need to be considered in relation to the decline in mortality between 1930–32 and 1950–52. The following table shows the 1950–52 mortality rates of each of the three classes in relation to those of 1930–32 :

**Table J**

**Rates of mortality in 1950–52 as percentages of corresponding rates in 1930–32**

| Age | Single women | Married women | Widows |
|---|---|---|---|
| 22 | 39 | 24 | |
| 27 | 55 | 33 | |
| 32 | 62 | 39 | 39 |
| 37 | 69 | 43 | 48 |
| 42 | 66 | 51 | 60 |
| 47 | 69 | 62 | 58 |
| 52 | 73 | 65 | 65 |
| 57 | 74 | 69 | 70 |
| 62 | 74 | 73 | 73 |
| 67 | 81 | 77 | 77 |
| 72 | 83 | 81 | 80 |
| 77 | 85 | 86 | 85 |
| 82 | 89 | 86 | 92 |

* The validity of this analysis depends, of course, on the reliability of the statements of marital status in the Census schedules and the death registers ; but there is no reason to suppose that mis-statements are sufficiently numerous to affect the general tenor of the conclusions.

22. It is apparent from Table J that, while the fall in the rates for widows was much the same as that in the married women's rates, the rates for single women declined to a smaller extent, particularly at the younger ages. There has, in fact, been a marked change at these ages in the ratios of single women's to married women's mortality. These ratios are as follows :

**Table K**

**Mortality rates of single women expressed as percentages of those of married women**

| Age | 1950–52 | 1930–32 |
|---|---|---|
| 22 | 150 | 93 |
| 27 | 176 | 107 |
| 32 | 180 | 113 |
| 37 | 173 | 107 |
| 42 | 153 | 118 |
| 47 | 133 | 119 |
| 52 | 122 | 108 |
| 57 | 113 | 106 |
| 62 | 100 | 98 |
| 67 | 99 | 95 |
| 72 | 98 | 96 |
| 77 | 100 | 101 |
| 82 | 108 | 104 |

Thus in 1950–52 the single women's rates at ages under 45 or thereabouts were, on average, some 60 or 70 per cent greater than those of married women ; twenty years earlier they were only about 10 per cent greater.

23. No doubt the enormous progress made in the last twenty years towards the elimination of the risks of child-bearing has made some contribution to the rapid fall in the mortality of married women at the younger ages, but this factor cannot account for the fact that the mortality of these women is now considerably less than that of spinsters of the same age. There can be little doubt that this feature of the experience is associated with the fact that, at the ages in question, there was a marked increase between 1931 and 1951 in the proportion of women who are married. The change is clearly brought out in the table below :

**Table L**

**Percentages of women who were single, married and widowed (including divorced)**

| Age Group | 1951 Census | | | 1931 Census | | |
|---|---|---|---|---|---|---|
| | Single | Married | Widowed | Single | Married | Widowed |
| 20–24 | 52 | 48 | — | 74 | 26 | — |
| 25–29 | 22 | 77 | 1 | 40 | 59 | 1 |
| 30–34 | 14 | 83 | 3 | 25 | 73 | 2 |
| 35–39 | 13 | 83 | 4 | 21 | 75 | 4 |
| 40–44 | 14 | 81 | 5 | 18 | 75 | 7 |
| 45–49 | 15 | 78 | 7 | 17 | 73 | 10 |

24. This rise in the proportions married is the result of the high marriage rates which have been maintained ever since 1939. It is to be supposed that those persons who marry are likely, on average, to be in better health than the unmarried ; it was, therefore, to be anticipated that, as the number of spinsters



became progressively smaller, a higher proportion of them would be of inferior vitality and that their mortality, relative to that of married women, would become heavier. This expectation is borne out in a striking manner by the comparative mortality rates discussed in these paragraphs.

25. The foregoing paragraphs relate to women. Only since the passing of the Population (Statistics) Act, 1938, has it been possible in England and Wales to obtain information regarding the marital status of men at death. Unfortunately it is found that in a considerable number of cases this information is still not supplied to the registrar. In the years 1950–52 there were more than 36,000 such cases ; these represent 4½ per cent of all male deaths registered, the proportion of " marital condition not stated " cases decreasing, as the age at death advances, from almost one-third in the age group 20–24 to some 3 per cent at ages over 70. This contrasts strongly with the position regarding women, for whom the marital status at death is recorded in all but one of a thousand cases.

26. It follows that the results of an analysis for men on similar lines to that already described for women must be regarded with considerable reserve, at any rate at the younger ages. The figures (which are necessarily confined to the 1950–52 period) obtained by allotting the " unstated " cases rateably to the single, married and widowed categories are as follows :

**Table M**

**Rates of mortality per thousand ($10^3 q_x$) for men according to marital status**

| Age $x$ | Single | Married | Widowed | All men |
|---|---|---|---|---|
| 22 | 1·5 | ·8 | | 1·4 |
| 27 | 2·2 | 1·0 | | 1·4 |
| 32 | 3·0 | 1·4 | 2·2 | 1·7 |
| 37 | 4·1 | 1·9 | 2·9 | 2·2 |
| 42 | 5·7 | 3·1 | 4·7 | 3·4 |
| 47 | 8·8 | 5·7 | 8·4 | 6·1 |
| 52 | 14 | 10 | 15 | 11 |
| 57 | 23 | 17 | 24 | 18 |
| 62 | 34 | 27 | 37 | 29 |
| 67 | 50 | 42 | 52 | 44 |
| 72 | 72 | 63 | 76 | 67 |
| 77 | 108 | 96 | 116 | 104 |
| 82 | 162 | 147 | 175 | 162 |

**Table N**

**Mortality rates (1950–52) of single men expressed as percentages of those of married men**

| Age | Percentage | Age | Percentage |
|---|---|---|---|
| 22 | 184 | 57 | 135 |
| 27 | 216 | 62 | 124 |
| 32 | 213 | 67 | 119 |
| 37 | 210 | 72 | 115 |
| 42 | 183 | 77 | 113 |
| 47 | 153 | 82 | 110 |
| 52 | 138 | | |

It will be seen that at all ages the ratios of the mortality rates of the single to those of the married are rather higher in the case of men than in the case of women ; the extent of the decline as the age advances is much the same for both sexes.

### Mortality in different Geographical Areas

27. In the report on the 1931 Life Tables an analysis was made of the differences between rates of mortality in 34 geographical areas. On this occasion it has been decided to adopt a less elaborate subdivision and, in conformity with the recent practice of the Registrar General, to base the main analysis on the ten " standard regions " ; certain of these regions have been divided to show separate figures for six " conurbations "—the Tyneside, West Yorkshire, South East Lancashire, Merseyside and West Midlands conurbations and Greater London—whilst Wales, which forms one of the regions, is divided into Wales I (South East) and Wales II (Remainder). Details of the constitution of these regions and conurbations are given each year in the Registrar General's Statistical Review. The table below shows the proportional distribution of the 1951 Census population over the 17 divisions described above.

**Table O**

**1951 Census population of each region as a percentage of that of England and Wales**

| Region | Population as a percentage of the whole of England and Wales | | | |
|---|---|---|---|---|
| | Males | | Females | |
| NORTHERN | | | | |
| Tyneside Conurbation | 1·9 | | 1·9 | |
| Remainder | 5·4 | | 5·1 | |
| Total | | 7·3 | | 7·0 |
| EAST AND WEST RIDINGS | | | | |
| West Yorkshire Conurbation | 3·8 | | 4·0 | |
| Remainder | 5·6 | | 5·4 | |
| Total | | 9·4 | | 9·4 |
| NORTH WESTERN | | | | |
| South East Lancashire Conurbation | 5·4 | | 5·6 | |
| Merseyside Conurbation | 3·1 | | 3·2 | |
| Remainder | 6·0 | | 6·1 | |
| Total | | 14·5 | | 14·9 |
| NORTH MIDLAND | | 7·9 | | 7·6 |
| MIDLAND | | | | |
| West Midlands Conurbation | 5·1 | | 5·1 | |
| Remainder | 5·2 | | 4·8 | |
| Total | | 10·3 | | 9·9 |
| EASTERN | | 7·2 | | 7·0 |
| LONDON AND SOUTH EASTERN | | | | |
| Greater London | 18·7 | | 19·5 | |
| Remainder | 5·6 | | 6·0 | |
| Total | | 24·3 | | 25·5 |
| SOUTHERN | | 6·2 | | 6·0 |
| SOUTH WESTERN | | 6·9 | | 6·9 |
| WALES (including Monmouthshire) | | | | |
| Wales I (South East) | 4·3 | | 4·1 | |
| Wales II (Remainder) | 1·7 | | 1·7 | |
| Total | | 6·0 | | 5·8 |



28. It has frequently been shown in the past that the mortality experience of various districts is greatly influenced by the density of population. A further analysis of mortality has therefore been made in which the country has been divided into the five aggregates adopted by the Registrar General :

| Urban/Rural Aggregates | Population (1951 Census) as a percentage of the whole of England and Wales | |
|---|---|---|
| | *Males* | *Females* |
| Conurbations | 38·0 | 39·3 |
| Urban Areas (other than Conurbations) | | |
| (i) with populations of 100,000 and over | 13·2 | 13·3 |
| (ii) with populations of 50,000 and under 100,000 | 7·5 | 7·7 |
| (iii) with populations under 50,000 | 21·2 | 21·4 |
| Rural Districts | 20·1 | 18·3 |

29. For each of the areas and aggregates described in the previous paragraphs the data available consisted of the enumerated Census population and the deaths registered in 1950, 1951 and 1952, both tabulated in five-year age groups. The deaths were classified according to the place of usual residence of the deceased ; it would therefore have been desirable in theory to adjust the Census populations to allow for the fact that many persons were enumerated at a place other than their usual residence. It would not, however, have been possible to do this without a disproportionate amount of labour, and investigation showed that the errors introduced by ignoring the need for adjustment were unlikely to be significant ; the Census populations were therefore used without adjustment.

30. From these statistics of population and deaths mortality rates were calculated for each sex at ages 0, 2, 7 and at quinary ages thereafter ; the resulting rates are given in Appendix V, Table 1, together with the corresponding rates for the whole country for comparison. [These latter rates, being ungraduated, differ very slightly from those given by the English Life Tables No. 11.] This table of mortality rates hardly forms a ready means of comparing the mortality experienced in different areas ; for comparative purposes, therefore, an alternative basis was adopted. Death rates for quinary age groups, 0–4, 5–9, .... were computed for the whole of England and Wales and these were multiplied by the areal populations in the corresponding age groups to obtain the number of deaths which would have occurred had the experience of each area been identical with the national average. The ratio of the actual deaths to these " expected " deaths was then computed and the results are set out in Appendix V, Table 2, together with the ratios obtained when the actual and expected deaths were combined in four broad age groups, 0–19, 20–49, 50–69, and 70 and over.

31. A summary of the results taking all ages together is given in the table below ; the ratios here shown give, of course, greater weight to the older ages, at which the majority of deaths occur, than to the younger ages, but they give as good an indication as can be shown by a single index of the relative level of mortality in the various areas.

**Table P**

**Actual deaths (1950–52) in certain areas and deaths expected on the basis of the national experience**

| Region | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | Actual deaths | Expected deaths | Ratio of actual to expected deaths | Actual deaths | Expected deaths | Ratio of actual to expected deaths |
| NORTHERN .. .. | 60,967 | 55,772 | 1·093 | 52,884 | 46,023 | 1·149 |
| Tyneside Conurbation .. | *16,660* | *14,264* | *1·168* | *14,469* | *12,230* | *1·183* |
| Remainder .. .. | *44,307* | *41,508* | *1·067* | *38,415* | *33,793* | *1·137* |
| EAST AND WEST RIDINGS | 78,502 | 72,803 | 1·078 | 72,726 | 65,756 | 1·106 |
| West Yorkshire Conurbation .. .. .. | *34,323* | *30,079* | *1·141* | *34,262* | *29,613* | *1·157* |
| Remainder .. .. | *44,179* | *42,724* | *1·034* | *38,464* | *36,143* | *1·064* |
| NORTH WESTERN .. | 128,120 | 111,947 | 1·144 | 123,775 | 106,010 | 1·168 |
| South East Lancashire Conurbation .. .. .. | *48,491* | *41,121* | *1·179* | *47,676* | *39,602* | *1·204* |
| Merseyside Conurbation .. | *25,739* | *21,199* | *1·214* | *24,139* | *20,919* | *1·154* |
| Remainder .. .. | *53,890* | *49,627* | *1·086* | *51,960* | *45,489* | *1·142* |
| NORTH MIDLAND .. | 59,036 | 62,635 | ·943 | 54,001 | 54,120 | ·998 |
| MIDLAND .. .. .. | 76,403 | 74,000 | 1·032 | 68,783 | 66,481 | 1·035 |
| West Midlands Conurbation | *38,394* | *35,364* | *1·086* | *34,313* | *32,563* | *1·054* |
| Remainder .. .. | *38,009* | *38,636* | *·984* | *34,470* | *33,918* | *1·016* |
| EASTERN .. .. .. | 53,640 | 62,481 | ·859 | 51,517 | 57,809 | ·891 |
| LONDON AND SOUTH EASTERN.. .. .. | 187,128 | 197,463 | ·948 | 184,896 | 206,304 | ·896 |
| Greater London .. .. | *139,606* | *142,738* | *·978* | *134,362* | *147,003* | *·914* |
| Remainder .. .. | *47,522* | *54,725* | *·868* | *50,534* | *59,301* | *·852* |
| SOUTHERN.. .. .. | 46,170 | 52,093 | ·886 | 44,992 | 51,136 | ·880 |
| SOUTH WESTERN .. | 56,353 | 61,365 | ·918 | 56,967 | 61,284 | ·930 |
| WALES (including Monmouthshire.. .. .. | 54,317 | 50,077 | 1·085 | 45,988 | 41,606 | 1·105 |
| Wales I (South East) .. | *38,667* | *34,536* | *1·120* | *31,084* | *27,462* | *1·132* |
| Wales II (Remainder) .. | *15,650* | *15,541* | *1·007* | *14,904* | *14,144* | *1·054* |
| *Aggregates* | | | | | | |
| CONURBATIONS .. .. | 303,213 | 284,765 | 1·065 | 289,221 | 281,930 | 1·026 |
| URBAN AREAS | | | | | | |
| With populations of 100,000 and over.. .. .. | 109,329 | 102,656 | 1·065 | 102,006 | 98,330 | 1·037 |
| With populations of 50,000 and under 100,000 .. | 61,506 | 62,202 | ·989 | 60,418 | 62,553 | ·966 |
| With populations under 50,000 .. .. .. | 178,456 | 181,846 | ·981 | 170,273 | 170,648 | ·998 |
| RURAL DISTRICTS .. | 148,132 | 169,167 | ·876 | 134,611 | 143,068 | ·941 |



32. A number of points of interest are apparent in Table P opposite. Dealing first with the differences between the regions, it is clear that in the years 1950–52 mortality was heaviest in the north and west of the country and lightest in the south and east. Thus, for both men and women, the area with the heaviest mortality was the North Western region—with an excess of actual over expected deaths of 14½ per cent for men and nearly 17 per cent for women—followed by the Northern region. Within these regions particularly heavy mortality was experienced in the three areas where the population is most dense—the Tyneside, South East Lancashire and Merseyside conurbations. An adverse experience was also shown by the West Yorkshire and West Midlands conurbations, but not by Greater London. For men, the lightest mortality was in the Eastern region, where the actual deaths were 14 per cent less than the expected, followed by the Southern region ; for women the positions were reversed, the Southern region being the most favoured with deaths 12 per cent below those expected. The general regional pattern is much the same for both sexes, although it is noteworthy that in Greater London, where the female mortality was 8½ per cent less than the national average, the male mortality was only 2 per cent less. Not all the differences indicated by the table can be due to the greater density of population in the north and west, since the mortality in the North Western region, for example, is heavier than in the conurbations and large urban areas taken as a whole, while that in the Eastern region is lighter than in all rural districts.

33. The lower part of Table P does show, however, the effects of environment. The rural districts show a mortality lighter by 12½ per cent for men and 6 per cent for women than the national average, and the mortality is much heavier, particularly for men, in the urban areas. The ratios shown for the aggregate of conurbations are somewhat misleading as they combine the adverse experience of the great industrial centres of the north and midlands with the relatively favourable experience of Greater London. For the conurbations excluding Greater London the ratios of actual to expected deaths are 1·152 for men and 1·148 for women. Mortality rates in these conurbations are thus greater, on average, by 32 per cent for men and 22 per cent for women than they are in rural districts; and—to take an extreme case—men in the Merseyside conurbation experienced death rates about 40 per cent greater than those in the Eastern region.

34. The preceding paragraphs have dealt with the relative mortality of the various areas taking all ages together. If the tables in Appendix V are studied it will be found that in general, when allowance is made for the random fluctuations that arise, particularly at the younger ages, through the small number of deaths in some of the subdivisions, the general pattern is much the same in each adult age group, although there is a tendency for the percentage deviation from the national average to decrease as the age advances. The death rates in the first year of life in the different regions vary from more than 20 per cent above the national average to 20 per cent below. It is very noticeable that, contrary to the experience at the older ages, there is very little difference in the rates according to density of population ; the rural districts as a whole experience infant death rates little, if any, more favourable than urban areas. The regional variations, on the other hand, are very marked. The Northern region and Wales experience the highest rates, the North Western region the next highest and these rates are about one-half greater than those of the London and South Eastern region. It is noteworthy that infant mortality in the conurbations seems to have been very little different from that of the regions in which those conurbations are situated. Finally, attention must be drawn to the very favourable experience of Greater London, where the rates are lower

than in any other of the areas examined. For England and Wales as a whole the number of deaths under age 1 in 1950–52 per 1,000 live births was 32·7 for boys and 25·1 for girls ; in Greater London the corresponding numbers were but 25·6 for boys and 19·8 for girls, more than 20 per cent less in each case.

35. The data for the English and the Welsh regions have been separately aggregated to provide mortality rates for each country. National life tables based on the 1951 Census and the deaths of 1950–52 have recently been prepared for Scotland and published as a Supplement to the Ninety-ninth Annual Report of the Registrar General for that country. In the following table the mortality rates of Scotland and Wales have been expressed as percentages of the English rates.

**Table Q**

**Rates of mortality (1950–52) for Scotland and Wales expressed as percentages of those for England**

| Age | Males | | Females | |
|---|---|---|---|---|
| | Scotland | Wales | Scotland | Wales |
| 0 | 129 | 120 | 132 | 126 |
| 2 | 123 | 112 | 125 | 125 |
| 7 | 121 | 115 | 117 | 121 |
| 12 | 100 | 145 | 122 | 106 |
| 17 | 125 | 112 | 153 | 127 |
| 22 | 112 | 109 | 173 | 133 |
| 27 | 126 | 125 | 160 | 132 |
| 32 | 126 | 134 | 143 | 118 |
| 37 | 123 | 124 | 138 | 122 |
| 42 | 125 | 120 | 133 | 116 |
| 47 | 124 | 115 | 122 | 120 |
| 52 | 125 | 110 | 123 | 108 |
| 57 | 117 | 111 | 126 | 112 |
| 62 | 112 | 112 | 123 | 110 |
| 67 | 104 | 109 | 124 | 112 |
| 72 | 103 | 108 | 121 | 110 |
| 77 | 106 | 102 | 115 | 107 |
| 82 | 108 | 104 | 113 | 111 |

36. At practically all ages, and for both sexes, the mortality of both Scotland and Wales is considerably higher than the English experience. Looking at the table as a whole, there would appear to be little difference between the mortality of the two smaller countries so far as men are concerned ; the rates for women are, generally speaking, higher in Scotland, particularly at the adolescent and young adult ages. The extent of the differences in experience can perhaps best be seen in the following table of expectations of life. The abridged life tables for Wales from which the expectations for that country have been calculated are given in Appendix V, Table 3 ; a note on the method employed in their construction will be found in Appendix III. The expectations for England were derived from abridged life tables constructed by the same process.



**Table R**

**Expectations of life ($\mathring{e}_x$), England, Scotland and Wales, 1950–52**

| Age $x$ | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | England | Scotland | Wales | England | Scotland | Wales |
| 0 | 66·7 | 64·4 | 64·9 | 71·8 | 68·7 | 69·9 |
| 10 | 59·3 | 57·9 | 58·1 | 64·0 | 61·5 | 62·7 |
| 20 | 49·7 | 48·3 | 48·6 | 54·3 | 51·9 | 53·1 |
| 30 | 40·4 | 39·1 | 39·3 | 44·8 | 42·7 | 43·7 |
| 40 | 31·0 | 29·9 | 30·1 | 35·4 | 33·6 | 34·4 |
| 50 | 22·3 | 21·4 | 21·5 | 26·4 | 24·8 | 25·6 |
| 60 | 14·8 | 14·3 | 14·2 | 18·1 | 16·8 | 17·4 |
| 70 | 9·0 | 8·8 | 8·7 | 11·0 | 10·1 | 10·5 |
| 80 | 4·9 | 4·6 | 4·7 | 5·9 | 5·4 | 5·5 |

37. Abridged life tables (see Appendix V, Table 4) have also been prepared for Greater London. The expectations of life derived from these tables compare with those on the basis of the mortality of the whole of England and Wales as follows :

**Table S**

**Expectations of life ($\mathring{e}_x$), England and Wales and Greater London**

| Age $x$ | Males | | Females | |
|---|---|---|---|---|
| | England and Wales 1950–52 | Greater London 1950–52 | England and Wales 1950–52 | Greater London 1950–52 |
| 0 | 66·4 | 67·3 | 71·5 | 73·0 |
| 10 | 59·2 | 59·6 | 63·9 | 64·9 |
| 20 | 49·6 | 49·9 | 54·2 | 55·2 |
| 30 | 40·3 | 40·4 | 44·7 | 45·6 |
| 40 | 31·0 | 31·0 | 35·3 | 36·2 |
| 50 | 22·2 | 22·2 | 26·3 | 27·1 |
| 60 | 14·8 | 14·7 | 18·1 | 18·8 |
| 70 | 9·0 | 9·0 | 11·0 | 11·5 |
| 80 | 4·9 | 4·9 | 5·8 | 6·1 |

In the case of men, from age 30 onwards the two columns are virtually identical ; below that age the expectations for Greater London are slightly higher. For women the Greater London figures are a little higher than those for England and Wales at all ages.

I am, Sir,
Your obedient Servant,
GEORGE H. MADDEX

Government Actuary's Department,
London, S.W.1.
13th September, 1956.

## APPENDIX I

### ENGLAND AND WALES—Crude central rates of mortality ($m_x$) 1950–52

### MALES

| Age $x$ | 1951 Census population | Deaths 1950–52 | $m_x = \frac{(2)}{3 \times (1)}$ | Age $x$ | 1951 Census population adjusted to 30th June, 1951 | Deaths 1950–52 | $m_x = \frac{(2)}{3 \times (1)}$ |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | | (1) | (2) | (3) |
| 0 | 338,009 | 34,494 | ·03402 | 50 | 305,135 | 7,620 | ·00832 |
| 1 | 352,598 | 2,573 | ·00243 | 51 | 282,612 | 8,009 | ·00945 |
| 2 | 373,179 | 1,592 | ·00142 | 52 | 258,905 | 8,516 | ·01096 |
| 3 | 410,799 | 1,232 | ·00100 | 53 | 245,375 | 8,990 | ·01221 |
| 4 | 428,971 | 997 | ·00077 | 54 | 237,601 | 9,463 | ·01328 |
| 5 | 329,728 | 915 | ·00093 | 55 | 225,259 | 9,531 | ·01410 |
| 6 | 350,206 | 710 | ·00068 | 56 | 220,453 | 10,780 | ·01630 |
| 7 | 334,734 | 640 | ·00064 | 57 | 217,744 | 11,604 | ·01776 |
| 8 | 318,901 | 551 | ·00058 | 58 | 218,122 | 12,984 | ·01984 |
| 9 | 282,824 | 446 | ·00053 | 59 | 210,148 | 13,711 | ·02175 |
| 10 | 273,080 | 433 | ·00053 | 60 | 201,764 | 14,022 | ·02317 |
| 11 | 289,434 | 439 | ·00051 | 61 | 189,129 | 14,850 | ·02617 |
| 12 | 291,190 | 447 | ·00051 | 62 | 188,092 | 16,654 | ·02951 |
| 13 | 290,346 | 472 | ·00054 | 63 | 184,126 | 17,719 | ·03208 |
| 14 | 284,551 | 544 | ·00064 | 64 | 177,343 | 18,990 | ·03569 |
| 15 | 279,427 | 615 | ·00073 | 65 | 172,141 | 19,948 | ·03863 |
| 16 | 277,078 | 675 | ·00081 | 66 | 162,739 | 19,376 | ·03969 |
| 17 | 268,728 | 730 | ·00091 | 67 | 153,645 | 20,935 | ·04542 |
| 18 | 270,600 | 826 | ·00102 | 68 | 148,466 | 21,831 | ·04901 |
| 19 | 239,466 | 899 | ·00125 | 69 | 143,803 | 23,209 | ·05380 |
| 20 | 270,347 | 1,078 | ·00133 | 70 | 135,730 | 22,848 | ·05611 |
| 21 | 279,620 | 1,087 | ·00130 | 71 | 124,003 | 22,852 | ·06143 |
| 22 | 284,654 | 1,203 | ·00141 | 72 | 117,981 | 25,146 | ·07105 |
| 23 | 289,899 | 1,179 | ·00136 | 73 | 110,746 | 25,215 | ·07589 |
| 24 | 302,708 | 1,293 | ·00142 | 74 | 103,612 | 25,962 | ·08352 |
| 25 | 314,448 | 1,292 | ·00137 | 75 | 95,457 | 25,625 | ·08948 |
| 26 | 314,087 | 1,410 | ·00150 | 76 | 86,110 | 25,985 | ·10059 |
| 27 | 319,979 | 1,401 | ·00146 | 77 | 74,084 | 24,503 | ·11025 |
| 28 | 326,300 | 1,414 | ·00144 | 78 | 65,420 | 23,814 | ·12134 |
| 29 | 350,985 | 1,594 | ·00151 | 79 | 56,098 | 22,663 | ·13466 |
| 30 | 375,737 | 1,754 | ·00156 | 80 | 47,836 | 20,623 | ·14371 |
| 31 | 345,035 | 1,569 | ·00152 | 81 | 38,874 | 18,352 | ·15736 |
| 32 | 256,273 | 1,482 | ·00193 | 82 | 32,267 | 17,510 | ·18089 |
| 33 | 246,854 | 1,475 | ·00199 | 83 | 26,505 | 15,457 | ·19439 |
| 34 | 290,023 | 1,578 | ·00181 | 84 | 21,356 | 13,955 | ·21782 |
| 35 | 304,592 | 1,906 | ·00209 | 85 | 16,605 | 11,489 | ·23063 |
| 36 | 334,342 | 1,983 | ·00198 | 86 | 12,830 | 10,036 | ·26074 |
| 37 | 329,659 | 2,204 | ·00223 | 87 | 9,697 | 8,044 | ·27651 |
| 38 | 331,081 | 2,454 | ·00247 | 88 | 7,336 | 6,203 | ·28185 |
| 39 | 332,871 | 2,576 | ·00258 | 89 | 5,144 | 5,009 | ·32459 |
| 40 | 340,603 | 2,821 | ·00276 | 90 | 3,709 | 3,800 | ·34151 |
| 41 | 327,261 | 3,139 | ·00320 | 91 | 2,452 | 2,678 | ·36406 |
| 42 | 341,855 | 3,623 | ·00353 | 92 | 1,636 | 1,967 | ·40077 |
| 43 | 328,244 | 3,727 | ·00378 | 93 | 1,056 | 1,377 | ·43466 |
| 44 | 319,903 | 4,035 | ·00420 | 94 | 619 | 922 | ·49650 |
| | 1951 Census population adjusted to 30th June, 1951 | | | 95 | 414 | 604 | ·48631 |
| | | | | 96 | 276 | 365 | ·44082 |
| | | | | 97 | 167 | 229 | ·45709 |
| | | | | 98 | 124 | 140 | ·37634 |
| 45 | 322,935 | 4,706 | ·00486 | 99 | 87 | 89 | ·34100 |
| 46 | 317,290 | 5,080 | ·00534 | | | | |
| 47 | 309,321 | 5,677 | ·00612 | 100 and | | | |
| 48 | 307,767 | 6,242 | ·00676 | over | 61 | 79 | ·43169 |
| 49 | 301,606 | 7,141 | ·00789 | | | | |



### FEMALES

| Age $x$ | 1951 Census population | Deaths 1950–52 | $m_x = \frac{(2)}{3 \times (1)}$ | Age $x$ | 1951 Census population adjusted to 30th June, 1951 | Deaths 1950–52 | $m_x = \frac{(2)}{3 \times (1)}$ |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | | (1) | (2) | (3) |
| 0 | 320,996 | 25,101 | ·02607 | 50 | 328,742 | 5,034 | ·00510 |
| 1 | 336,511 | 2,165 | ·00214 | 51 | 309,226 | 5,170 | ·00557 |
| 2 | 354,480 | 1,268 | ·00119 | 52 | 295,174 | 5,753 | ·00650 |
| 3 | 392,673 | 992 | ·00084 | 53 | 290,596 | 5,897 | ·00676 |
| 4 | 409,427 | 757 | ·00062 | 54 | 286,615 | 6,434 | ·00748 |
| 5 | 314,799 | 626 | ·00066 | 55 | 274,475 | 6,465 | ·00785 |
| 6 | 333,869 | 488 | ·00049 | 56 | 269,798 | 7,380 | ·00912 |
| 7 | 319,444 | 428 | ·00045 | 57 | 265,860 | 7,752 | ·00972 |
| 8 | 305,504 | 352 | ·00038 | 58 | 267,858 | 8,416 | ·01047 |
| 9 | 271,926 | 301 | ·00037 | 59 | 259,564 | 9,015 | ·01158 |
| 10 | 263,398 | 296 | ·00037 | 60 | 256,146 | 9,510 | ·01238 |
| 11 | 279,733 | 256 | ·00031 | 61 | 239,523 | 10,056 | ·01399 |
| 12 | 283,116 | 323 | ·00038 | 62 | 241,055 | 11,404 | ·01577 |
| 13 | 281,343 | 354 | ·00042 | 63 | 239,602 | 12,397 | ·01725 |
| 14 | 275,743 | 330 | ·00040 | 64 | 230,352 | 13,229 | ·01914 |
| 15 | 271,574 | 420 | ·00052 | 65 | 227,109 | 14,151 | ·02077 |
| 16 | 269,445 | 465 | ·00058 | 66 | 217,721 | 14,600 | ·02235 |
| 17 | 265,567 | 513 | ·00064 | 67 | 206,172 | 16,338 | ·02641 |
| 18 | 276,110 | 584 | ·00071 | 68 | 203,547 | 17,460 | ·02859 |
| 19 | 286,479 | 696 | ·00081 | 69 | 196,234 | 19,806 | ·03364 |
| 20 | 298,764 | 689 | ·00077 | 70 | 190,877 | 20,003 | ·03493 |
| 21 | 297,379 | 821 | ·00092 | 71 | 173,938 | 20,332 | ·03896 |
| 22 | 298,331 | 821 | ·00092 | 72 | 167,388 | 22,764 | ·04533 |
| 23 | 297,924 | 854 | ·00096 | 73 | 158,750 | 24,188 | ·05079 |
| 24 | 307,833 | 909 | ·00098 | 74 | 148,816 | 25,619 | ·05738 |
| 25 | 316,271 | 996 | ·00105 | 75 | 138,011 | 26,308 | ·06354 |
| 26 | 317,690 | 1,093 | ·00115 | 76 | 125,569 | 26,857 | ·07129 |
| 27 | 326,356 | 1,076 | ·00110 | 77 | 109,156 | 25,731 | ·07858 |
| 28 | 334,904 | 1,274 | ·00127 | 78 | 98,026 | 26,286 | ·08938 |
| 29 | 358,863 | 1,317 | ·00122 | 79 | 84,481 | 25,818 | ·10187 |
| 30 | 385,580 | 1,414 | ·00122 | 80 | 76,562 | 24,639 | ·10727 |
| 31 | 352,875 | 1,384 | ·00131 | 81 | 63,690 | 23,110 | ·12095 |
| 32 | 268,089 | 1,333 | ·00166 | 82 | 54,656 | 22,741 | ·13869 |
| 33 | 257,558 | 1,186 | ·00153 | 83 | 47,882 | 21,727 | ·15125 |
| 34 | 300,481 | 1,321 | ·00147 | 84 | 40,576 | 20,244 | ·16631 |
| 35 | 315,465 | 1,581 | ·00167 | 85 | 32,553 | 17,704 | ·18128 |
| 36 | 347,830 | 1,736 | ·00166 | 86 | 26,422 | 16,045 | ·20242 |
| 37 | 342,339 | 1,872 | ·00182 | 87 | 21,056 | 13,548 | ·21448 |
| 38 | 344,766 | 2,028 | ·00196 | 88 | 16,521 | 11,417 | ·23035 |
| 39 | 340,273 | 2,096 | ·00205 | 89 | 12,390 | 9,613 | ·25862 |
| 40 | 350,038 | 2,280 | ·00217 | 90 | 9,424 | 7,648 | ·27051 |
| 41 | 333,428 | 2,479 | ·00248 | 91 | 6,664 | 5,986 | ·29942 |
| 42 | 352,353 | 2,705 | ·00256 | 92 | 4,657 | 4,621 | ·33076 |
| 43 | 341,091 | 2,907 | ·00284 | 93 | 3,334 | 3,388 | ·33873 |
| 44 | 330,430 | 3,075 | ·00310 | 94 | 2,244 | 2,613 | ·38815 |
| | 1951 Census population adjusted to 30th June, 1951 | | | 95 | 1,538 | 1,772 | ·38405 |
| | | | | 96 | 1,047 | 1,272 | ·40497 |
| | | | | 97 | 630 | 853 | ·45132 |
| | | | | 98 | 443 | 491 | ·36945 |
| 45 | 332,849 | 3,406 | ·00341 | 99 | 324 | 346 | ·35597 |
| 46 | 329,680 | 3,676 | ·00372 | | | | |
| 47 | 322,722 | 4,011 | ·00414 | 100 and | | | |
| 48 | 321,436 | 4,404 | ·00457 | over | 266 | 420 | ·52632 |
| 49 | 312,363 | 4,699 | ·00501 | | | | |

## APPENDIX II

### The graduation of the mortality rates at adult ages

1. The main object of graduating mortality rates is to remove irregularities in the progression of the rates from age to age which may arise from random fluctuations in the experience or from inaccuracies in the data. In a large experience comprising many millions of lives random fluctuations may be expected to be of minor importance, and the graduation process can be regarded as primarily directed to removing the effects of mis-statements of age.

2. In the method developed by Mr. George King it is not, strictly speaking, the mortality rates themselves that are smoothed in this way, since ungraduated rates are not calculated at any stage. Numerators and denominators are dealt with separately ; the populations, and the deaths, at individual ages are summed in quinary groups and a " pivotal " value is obtained for the mid-point of each group by means of a formula which is based on the assumption that any run of values at fifteen consecutive ages can be represented by a low-order polynomial. The quinary values of the mortality rate obtained by dividing each pivotal numerator by the corresponding pivotal denominator are then treated as fixed points on the graduated curve, the points at intervening individual ages being determined by another formula based on the assumption that the curve as a whole can be represented by a succession of linked parabolas.

3. The essence of the method lies in the choice of the quinary age groups. The avowed object of the choice is to obtain a system which shall minimise the distorting effect of age mis-statements ; this means that the data must be inspected with a view to detecting whether their irregularities appear to be associated with any particular final digits of age.

4. Even in periods of relatively stable fertility there are appreciable fluctuations from year to year in the number of births, and these are clearly an additional possible source of roughness in the age-distribution of the lives and deaths on which the mortality investigation is based although, of course, their effects may be to some extent masked by the age-incidence of migration. A method of graduation which operated on mortality rates would obviously not need to take these birth fluctuations into account, since they would have the same proportionate effect on the numerator and the denominator ; but in a method which treats numerators and denominators separately it would seem necessary to give some recognition to the fact that irregularities may be caused not only by the age mis-statements whose effect it is sought to remove, but also by other features of the data which do not affect the mortality rate. To attempt to correct for variations in numbers of annual births would, however, be laborious, if not impracticable. It has only recently been possible to relate survivors (or deaths) to births over the whole span of ages, and in the later period of life, where age mis-statements are likely to be more numerous than elsewhere, the records of related births may be incomplete.

5. So far as is known, it has never been claimed for King's method that a system of groups can be found which will remove the effects of age mis-statements entirely. This being so, it hardly seems justifiable to regard the pivotal values, once obtained, as requiring no adjustment. But in practice, as has already been indicated, the pivotal values—one for every five years of age—are regarded as the final determinants of the graduated curve in the same way as constants in a mathematical formula. In such circumstances the graduation cannot fail to exhibit a high degree of adherence to the data ; it seems legitimate, however, to question whether this does not entail the retention of some features which the method purports to remove, viz., irregularities due to age mis-statements.

6. Once the grouping system has been determined, the method is undoubtedly simple to apply, and on this account there has perhaps been a tendency to prefer it to a curve-fitting process in the usual sense of that term. In fact, however, despite the simplicity of the actual arithmetic, the method represents a series of separate curve-fitting operations, each being applied to a limited section of the data. By contrast, the normal method of curve fitting proceeds on the assupmtion that the shape of the mortality curve over the whole range of the data can be represented by one mathematical



formula, the constants or parameters in this formula being determined by reference to the data as a whole. The formula need not (and in most cases does not) purport to give mathematical expression to any preconceived ideas of the nature of the relationship between mortality and age; its choice rests rather on a study of the pattern of the ungraduated rates in relation to the known shapes of various types of curve.

7. For the purposes of this study, an inspection of the sequence of the rates themselves is much less revealing than an examination of the ratios which rates at successive ages bear to one another. In the table below, these ratios are shown for the pivotal ages used in the construction of the English Life Tables from No. 7 onwards, the rates employed being the central death rates obtained by dividing the pivotal deaths by the pivotal populations, so that the function tabulated is $m_{x+5}/m_x$.

**Table II.1**

| E.L.T. 7 (1901–10) | | E.L.T. 8 (1910–12) | | E.L.T. 9 (1920–22) | | E.L.T. 10 (1930–32) | | (1950–52) | |
|---|---|---|---|---|---|---|---|---|---|
| Age $x$ | $\frac{m_{x+5}}{m_x}$ | Age $x$ | $\frac{m_{x+5}}{m_x}$ | Age $x$ | $\frac{m_{x+5}}{m_x}$ | Age $x$ | $\frac{m_{x+5}}{m_x}$ | Age $x$ | $\frac{m_{x+5}}{m_x}$ |
| **Males** | | | | | | | | | |
| 27 | 1·31 | 26 | 1·22 | 29 | 1·26 | 27 | 1·10 | 27 | 1·19 |
| 32 | 1·28 | 31 | 1·31 | 34 | 1·24 | 32 | 1·31 | 32 | 1·30 |
| 37 | 1·28 | 36 | 1·30 | 39 | 1·28 | 37 | 1·35 | 37 | 1·53 |
| 42 | 1·34 | 41 | 1·35 | 44 | 1·30 | 42 | 1·45 | 42 | 1·79 |
| 47 | 1·37 | 46 | 1·37 | 49 | 1·50 | 47 | 1·40 | 47 | 1·74 |
| 52 | 1·41 | 51 | 1·44 | 54 | 1·44 | 52 | 1·46 | 52 | 1·68 |
| 57 | 1·42 | 56 | 1·45 | 59 | 1·57 | 57 | 1·53 | 57 | 1·63 |
| 62 | 1·41 | 61 | 1·45 | 64 | 1·51 | 62 | 1·60 | 62 | 1·54 |
| 67 | 1·52 | 66 | 1·50 | 69 | 1·60 | 67 | 1·61 | 67 | 1·53 |
| 72 | 1·51 | 71 | 1·53 | 74 | 1·54 | 72 | 1·60 | 72 | 1·59 |
| 77 | 1·42 | 76 | 1·49 | 79 | 1·50 | 77 | 1·54 | 77 | 1·61 |
| 82 | 1·52 | 81 | 1·43 | 84 | 1·39 | 82 | 1·48 | 82 | 1·56 |
| 87 | 1·50 | 86 | 1·41 | 89 | 1·39 | 87 | 1·39 | 87 | 1·48 |
| **Females** | | | | | | | | | |
| 27 | 1·28 | 26 | 1·22 | 29 | 1·15 | 27 | 1·09 | 27 | 1·22 |
| 32 | 1·26 | 31 | 1·28 | 34 | 1·17 | 32 | 1·18 | 32 | 1·29 |
| 37 | 1·24 | 36 | 1·26 | 39 | 1·24 | 37 | 1·24 | 37 | 1·42 |
| 42 | 1·29 | 41 | 1·30 | 44 | 1·35 | 42 | 1·38 | 42 | 1·60 |
| 47 | 1·33 | 46 | 1·35 | 49 | 1·45 | 47 | 1·41 | 47 | 1·50 |
| 52 | 1·46 | 51 | 1·43 | 54 | 1·41 | 52 | 1·47 | 52 | 1·56 |
| 57 | 1·40 | 56 | 1·44 | 59 | 1·59 | 57 | 1·54 | 57 | 1·61 |
| 62 | 1·44 | 61 | 1·47 | 64 | 1·54 | 62 | 1·58 | 62 | 1·67 |
| 67 | 1·67 | 66 | 1·60 | 69 | 1·67 | 67 | 1·65 | 67 | 1·72 |
| 72 | 1·49 | 71 | 1·55 | 74 | 1·59 | 72 | 1·69 | 72 | 1·77 |
| 77 | 1·47 | 76 | 1·56 | 79 | 1·57 | 77 | 1·60 | 77 | 1·70 |
| 82 | 1·52 | 81 | 1·41 | 84 | 1·42 | 82 | 1·54 | 82 | 1·60 |
| 87 | 1·43 | 86 | 1·42 | 89 | 1·41 | 87 | 1·41 | 87 | 1·50 |

8. If attention is confined in the first instance to the first four of the five sets of ratios, it will be seen that in each set the ratios rise to a maximum in the neighbourhood of age 70 and fall away thereafter. [The earliest experience (E.L.T. 7) can perhaps hardly be said to possess this latter feature ; it is not apparent in the ratios for men, and would not be apparent in the ratios for women but for the very high figure at age 67.] The degree of regularity, however, with which the ratios follow this general trend varies very considerably between one experience and another. In E.L.T. 8 (men) and to a smaller extent in E.L.T. 8 (women) the progression is reasonably smooth. It is very smooth in E.L.T. 10 (women) and from age 47 onwards in E.L.T. 10 (men) (at the younger ages this experience has a special feature which will be referred to later).

The other experiences (E.L.T. 7 and E.L.T. 9) possess marked irregularities ; over considerable spans of age the ratios move alternately upwards and downwards, producing when plotted on a diagram a very noticeable saw-tooth effect.

9. The feature referred to at the beginning of the previous paragraph is a well-known characteristic exhibited equally by mortality experiences of assured lives. It cannot be said, however, that anything has emerged from mortality studies generally which is analogous to the undulating effect described at the end of the paragraph. A national experience, it is true, consists of a blend of various classes of lives whose mortality characteristics, if analysed separately, would be likely to vary considerably between one class and another ; but the possibility that the explanation may lie in considerations of this nature is ruled out by the fact that while some of the sets of ratios in the table exhibit the feature, others do not. For the same reason, and also because of the great size of the experiences, it is unlikely that the feature is attributable to purely random fluctuations in the age-incidence of mortality in the years to which the data relate.

10. If the undulations are neither accepted as genuine features of the experience nor considered to be of a random nature, it seems to follow that they must be a reflection of age mis-statements. In some cases, it would appear, the process of inspecting the data with a view to selecting groupings which would minimise the effect of these mis-statements has been much more successful than in others, so that in the unsuccessful cases, at any rate, the principle of adhering closely to the data has been carried to excess. It is, however, not possible to deduce from the table in paragraph 7 (which covers three of the five possible sets of quinary groups) that any one system has a marked advantage over any other in this respect. The natural conclusion seems to be that while the establishment of a series of pivotal values is an obviously convenient labour-saving device as a first stage in graduation, subsequent work should not proceed on the supposition that these values can be regarded as immune from any further treatment. On this basis, the choice of groups from which to derive the pivotal values becomes a matter of convenience rather than a vital part of the process.

11. It is reasonable to suppose that the extent of age mis-statement in census enumerations and registrations of death has diminished, and will continue to diminish, with the passage of time. If so, the results obtained by the use of King's method in the future will be less dependent on the choice of groups. This, however, is not necessarily an argument for the retention of a method which, it may be recalled, was developed half a century ago. In the interval the technique of graduation has developed considerably, and it seems not inappropriate to accompany the foregoing investigation into the characteristics of the traditional process with an attempt to graduate the experience of 1950–52 by an alternative method.

12. The series of ratios for 1950–52 in the last column of Table II.1 has in common with the ratios for the earlier experiences a peak value in the region of age 70, with values falling away from it on either side. A new feature, however, is the very rapid rise of the ratios at the younger ages to a peak at age 42. [In the light of the 1950–52 figures it is possible to discern a much smaller peak at this age in the E.L.T. 10 ratios for men, which might otherwise have been regarded merely as one of the " saw-teeth " referred to in paragraph 8.] The second peak is particularly marked in the case of men : this is, of course, a reflection of the fact that in recent years the mortality rates of young men have declined much more rapidly than those of men in middle life. There can be no doubt that it is a genuine feature of the experience and not an irregularity of the type described earlier. Such irregularities are, indeed, noticeably lacking throughout the series of 1950–52 ratios ; this seems more likely to be due to greater accuracy in the age statements than to good fortune in the choice of groups.

13. The second peak has converted the bell-shaped curve suggested by the run of the ratios for earlier experiences into a two-humped curve, with the implication that any mathematical expression which represents at all closely the shape of the mortality curve itself must be of a somewhat complicated character. But for the emergence of a second peak, the formula which would suggest itself for graduation purposes is

$$m_x = a + \frac{b}{1 + e^{-\alpha(x - x_1)}},$$

which has in the past been found suitable for application to experiences of assured lives and annuitants. It was at first thought that the complication of the new peak could



be dealt with by adding to this formula a third term similar to the second but with different values for the constants $b$, $\alpha$ and $x_1$, and a close fit to the women's rates was in fact obtained in this way. In the case of men, however, it proved impossible to find an additional term of this nature which would not only provide a sufficiently steep rise in the mortality rates in the age range 40–50 but also give good results over the remainder of the span of ages. Ultimately it was found that these requirements could be met, in the case of both sexes, by using a subsidiary curve of a different character, the complete expression being as follows :

$$m_x = a + \frac{b}{1 + e^{-\alpha(x - x_1)}} + c\, e^{-\beta(x - x_2)^2}$$

In this combination of a logistic curve with the symmetrical " normal curve " the parameters adopted for the 1950–52 experience were as follows, two of these ($\alpha$ and $\beta$) being common to men and women :

| | *Men* | *Women* |
|---|---|---|
| $a$ .. .. | ·00129 | ·00099 |
| $b$ .. .. | ·734 | ·578 |
| $\alpha$ .. .. | ·136 | ·136 |
| $x_1$ .. .. | 91·3 | 90·8 |
| $c$ .. .. | ·0186 | ·00323 |
| $\beta$ .. .. | ·003 | ·003 |
| $x_2$ .. .. | 71·6 | 62·5 |

14. In the following table the values of $100{,}000m_x$ calculated from the formula are compared with the pivotal values of this function at ages 27, 32 . . . . 87. The calculated values are subdivided to show the portions derived from the main curve (the first two terms in the formula) and the subsidiary curve (the third term).

**Table II.2**

| Age | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|
| | Calculated | | | Pivotal | Calculated | | | Pivotal |
| | Main Curve | Subsidiary Curve | Total | | Main Curve | Subsidiary Curve | Total | |
| 27 | 141 | 5 | 146 | 145 | 109 | 7 | 116 | 116 |
| 32 | 152 | 17 | 169 | 172 | 118 | 20 | 138 | 141 |
| 37 | 175 | 51 | 226 | 224 | 137 | 46 | 183 | 182 |
| 42 | 219 | 134 | 353 | 343 | 175 | 91 | 266 | 259 |
| 47 | 306 | 303 | 609 | 613 | 248 | 157 | 405 | 415 |
| 52 | 478 | 587 | 1,065 | 1,065 | 393 | 232 | 625 | 621 |
| 57 | 814 | 981 | 1,795 | 1,786 | 676 | 295 | 971 | 967 |
| 62 | 1,469 | 1,411 | 2,880 | 2,914 | 1,227 | 323 | 1,550 | 1,553 |
| 67 | 2,728 | 1,745 | 4,473 | 4,500 | 2,284 | 304 | 2,588 | 2,601 |
| 72 | 5,088 | 1,859 | 6,947 | 6,894 | 4,259 | 246 | 4,505 | 4,485 |
| 77 | 9,313 | 1,704 | 11,017 | 10,971 | 7,772 | 172 | 7,944 | 7,960 |
| 82 | 16,288 | 1,345 | 17,633 | 17,631 | 13,511 | 103 | 13,614 | 13,536 |
| 87 | 26,394 | 913 | 27,307 | 27,507 | 21,693 | 54 | 21,747 | 21,635 |

The agreement between the calculated values and the pivotal values is close at all ages. Apart from this, the main feature of the table is the fact that while the ordinates of the main curve for men are at nearly all ages some 20 to 25 per cent greater than those of the main curve for women, the contribution made by the subsidiary curve is much greater for men than for women. The large " bulge " between ages 45 and 75 in the ratios of men's to women's rates in Table F of the Report is a reflection of this.

15. In Table II.3 the comparison between the graduation and the data is extended to individual ages. The table gives the actual deaths at each age in the three years 1950–52 and the differences between them and the expected deaths calculated from the formula. The corresponding differences are also shown for a graduation by King's method based on the pivotal values given in Table II.2. The usual statistical tests cannot readily be applied to a table of mortality rates compiled by the census method ; the ratio of the difference (regardless of sign) between actual and expected deaths to the square root of the actual deaths has been included in the table merely as a device for reducing the deviations at all ages to a common standard.

16. At no point in the age range do the two sets of results differ sufficiently to require comment. In the formula graduation the difference between actual and expected deaths changes sign 31 times in the case of men and 32 times in the case of women ; the corresponding figures for the King graduation are 30 and 32 respectively. For a span of 61 ages all these figures are equally satisfactory. In the case of each sex the patterns of the sign-changes given by the two graduations are virtually identical. The sum, over the whole age range, of the differences between the actual and expected deaths regardless of sign, is slightly greater for the formula graduation than for the King graduation ; in view of the cardinal difference in principle between the two methods, this was only to be expected, and the difference is remarkably small. For all practical purposes either graduation can be considered as good as the other.

17. It is of some interest to consider whether Table II.3 provides any clue to the location of age mis-statements. If the values of $|A-E| \div \sqrt{A}$ are aggregated according to the second digit of age, the results are as follows :

| Final Digit | Men | | Women | |
|---|---|---|---|---|
| | Formula | King | Formula | King |
| 0 | 17·5 | 15·6 | 17·6 | 16·3 |
| 1 | 12·2 | 14·5 | 15·2 | 12·8 |
| 2 | 17·3 | 18·3 | 16·5 | 16·1 |
| 3 | 12·6 | 9·4 | 6·0 | 4·5 |
| 4 | 12·6 | 12·2 | 6·8 | 8·1 |
| 5 | 13·7 | 11·1 | 6·4 | 5·8 |
| 6 | 13·2 | 15·3 | 11·1 | 13·7 |
| 7* | 5·5 | 3·7 | 9·5 | 7·5 |
| 8 | 3·6 | 4·7 | 7·9 | 6·8 |
| 9 | 8·0 | 7·3 | 15·1 | 13·5 |
| | 116·2 | 112·1 | 112·1 | 105·1 |

* It should be noted that there are seven ages ending in 7 in Table II.3, but only six ages ending with each other digit.

In considering this table it must be borne in mind that any one mis-statement of age will affect two of the figures in the table, and that, while one person of true age $x$ may state his age as $y$, another of the same true age may state it as $z$. Moreover, the figure shown in the table against a particular digit may be affected by some circumstance unconnected with age mis-statement ; the figure shown against digit 2, for example, is undoubtedly affected by the rapid changes in the birth rate in the post-war years 1919 and 1920, by reason of which the population enumerated at age 32 at a particular date in 1951 is a very imperfect denominator for the average central death rate at that age over the years 1950–52. These circumstances inevitably limit the significance of the figures in the table, and while it is noticeable that in the case of men the figures for digits 7, 8 and 9, and in the case of women the figures for 3, 4, 5, 7 and 8 are considerably below the average, it is not possible to assess the extent to which the higher figures for the remaining digits are affected by age errors.



**Table II.3**

| Age | MEN | | | | | | | WOMEN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Actual Deaths 1950–52 | Actual Deaths (A) less Expected Deaths (E) | | | | $\frac{\lvert A-E \rvert}{\sqrt{A}}$ | | Actual Deaths 1950–52 | Actual Deaths (A) less Expected Deaths (E) | | | | $\frac{\lvert A-E \rvert}{\sqrt{A}}$ | |
| | | Formula | | King | | For-mula | King | | Formula | | King | | For-mula | King |
| | | + | − | + | − | | | | + | − | + | − | | |
| 27 | 1,401 | | 1 | 9 | | — | ·2 | 1,076 | | 60 | | 60 | 1·8 | 1·8 |
| 28 | 1,414 | | 45 | | 45 | 1·2 | 1·2 | 1,274 | 78 | | 58 | | 2·2 | 1·6 |
| 29 | 1,594 | | 6 | | 17 | ·2 | ·4 | 1,317 | | 7 | | 29 | ·2 | ·8 |
| 30 | 1,754 | | 16 | | 27 | ·4 | ·6 | 1,414 | | 55 | | 90 | 1·4 | 2·4 |
| 31 | 1,569 | | 108 | | 139 | 2·7 | 3·5 | 1,384 | | 13 | | 45 | ·4 | 1·2 |
| 32 | 1,482 | 183 | | 160 | | 4·7 | 4·1 | 1,333 | 223 | | 199 | | 6·0 | 5·4 |
| 33 | 1,475 | 164 | | 142 | | 4·3 | 3·7 | 1,186 | 66 | | 42 | | 1·9 | 1·2 |
| 34 | 1,578 | | 40 | | 58 | 1·0 | 1·4 | 1,321 | | 58 | | 76 | 1·6 | 2·1 |
| 35 | 1,906 | 106 | | 106 | | 2·4 | 2·4 | 1,581 | 48 | | 48 | | 1·2 | 1·2 |
| 36 | 1,983 | | 123 | | 113 | 2·7 | 2·5 | 1,736 | | 59 | | 48 | 1·4 | 1·1 |
| 37 | 2,204 | | 31 | | 11 | ·7 | ·2 | 1,872 | | 7 | 3 | | ·2 | ·1 |
| 38 | 2,454 | 30 | | 60 | | ·6 | 1·2 | 2,028 | 1 | | 21 | | — | ·5 |
| 39 | 2,576 | | 70 | | 20 | 1·4 | ·4 | 2,096 | | 58 | | 7 | 1·3 | ·2 |
| 40 | 2,821 | | 142 | | 50 | 2·7 | ·9 | 2,280 | | 104 | | 41 | 2·2 | ·9 |
| 41 | 3,139 | 7 | | 115 | | ·1 | 2·1 | 2,479 | 18 | | 98 | | ·4 | 2·0 |
| 42 | 3,623 | 3 | | 105 | | — | 1·8 | 2,705 | | 107 | | 33 | 2·1 | ·6 |
| 43 | 3,727 | | 133 | | 54 | 2·2 | ·9 | 2,907 | | 50 | 1 | | ·9 | — |
| 44 | 4,035 | | 149 | | 101 | 2·3 | 1·6 | 3,075 | | 38 | | 28 | ·7 | ·5 |
| 45 | 4,706 | | 12 | 7 | | ·2 | ·1 | 3,406 | | 9 | | 49 | ·2 | ·8 |
| 46 | 5,080 | | 98 | | 108 | 1·4 | 1·5 | 3,676 | | 3 | | 82 | — | 1·3 |
| 47 | 5,677 | 26 | | | 11 | ·3 | ·1 | 4,011 | 90 | | | 7 | 1·4 | ·1 |
| 48 | 6,242 | | 55 | | 101 | ·7 | 1·3 | 4,404 | 142 | | 55 | | 2·2 | ·8 |
| 49 | 7,141 | 237 | | 192 | | 2·8 | 2·3 | 4,699 | 182 | | 135 | | 2·6 | 2·0 |
| 50 | 7,620 | | 198 | | 216 | 2·3 | 2·5 | 5,034 | | 144 | | 154 | 2·0 | 2·2 |
| 51 | 8,009 | | 79 | | 79 | ·9 | ·9 | 5,170 | | 146 | | 118 | 2·0 | 1·6 |
| 52 | 8,516 | 244 | | 244 | | 2·7 | 2·7 | 5,753 | 218 | | 254 | | 2·9 | 3·3 |
| 53 | 8,990 | 252 | | 267 | | 2·7 | 2·8 | 5,897 | | 49 | | 5 | ·6 | ·1 |
| 54 | 9,463 | 54 | | 97 | | ·6 | 1·0 | 6,434 | 37 | | 88 | | ·5 | 1·1 |
| 55 | 9,531 | | 376 | | 302 | 3·8 | 3·1 | 6,465 | | 221 | | 155 | 2·8 | 1·9 |
| 56 | 10,780 | 40 | | 126 | | ·4 | 1·2 | 7,380 | 193 | | 257 | | 2·2 | 3·0 |
| 57 | 11,604 | | 122 | | 63 | 1·1 | ·6 | 7,752 | 7 | | 39 | | ·1 | ·4 |
| 58 | 12,984 | 21 | | 41 | | ·2 | ·4 | 8,416 | | 126 | | 118 | 1·4 | 1·3 |
| 59 | 13,711 | | 39 | | 71 | ·3 | ·6 | 9,015 | | 57 | | 33 | ·6 | ·3 |
| 60 | 14,022 | | 487 | | 566 | 4·1 | 4·8 | 9,510 | | 318 | | 280 | 3·2 | 2·9 |
| 61 | 14,850 | | 67 | | 197 | ·5 | 1·6 | 10,056 | | 54 | | 26 | 5·4 | 2·6 |
| 62 | 16,654 | 403 | | 211 | | 3·1 | 1·6 | 11,404 | 195 | | 173 | | 1·8 | 1·6 |
| 63 | 17,719 | 319 | | 104 | | 2·4 | ·8 | 12,397 | 98 | | 34 | | ·9 | ·3 |
| 64 | 18,990 | 678 | | 491 | | 4·9 | 3·6 | 13,229 | 161 | | 99 | | 1·4 | ·9 |
| 65 | 19,948 | 541 | | 401 | | 3·8 | 2·8 | 14,151 | | 130 | | 164 | 1·1 | 1·4 |
| 66 | 19,376 | | 646 | | 758 | 4·6 | 5·5 | 14,600 | | 599 | | 632 | 5·0 | 5·2 |
| 67 | 20,935 | 317 | | 193 | | 2·2 | 1·3 | 16,338 | 331 | | 250 | | 2·6 | 2·0 |
| 68 | 21,831 | 96 | | 6 | | ·6 | — | 17,460 | | 151 | | 242 | 1·1 | 1·8 |
| 69 | 23,209 | 232 | | 262 | | 1·5 | 1·7 | 19,806 | 862 | | 850 | | 6·1 | 6·0 |
| 70 | 22,848 | | 830 | | 671 | 5·5 | 4·4 | 20,003 | | 589 | | 497 | 4·2 | 3·5 |
| 71 | 22,852 | | 782 | | 562 | 5·2 | 3·7 | 20,332 | | 666 | | 520 | 4·7 | 3·6 |
| 72 | 25,146 | 558 | | 745 | | 3·5 | 4·7 | 22,764 | 142 | | 242 | | ·9 | 1·6 |
| 73 | 25,215 | | 48 | 98 | | ·3 | ·6 | 24,188 | 152 | | 166 | | 1·0 | 1·1 |
| 74 | 25,962 | 66 | | 228 | | ·4 | 1·4 | 25,619 | 368 | | 341 | | 2·3 | 2·1 |
| 75 | 25,625 | | 541 | | 357 | 3·4 | 2·2 | 26,308 | 67 | | 29 | | ·4 | ·2 |
| 76 | 25,985 | 75 | | 248 | | ·5 | 1·5 | 26,857 | 115 | | 73 | | ·7 | ·4 |
| 77 | 24,503 | 17 | | 120 | | ·1 | ·8 | 25,731 | | 283 | | 335 | 1·8 | 2·1 |
| 78 | 23,814 | 53 | | 94 | | ·3 | ·6 | 26,286 | 169 | | 122 | | 1·0 | ·8 |
| 79 | 22,663 | 266 | | 290 | | 1·8 | 1·9 | 25,818 | 697 | | 679 | | 4·3 | 4·2 |
| 80 | 20,623 | | 366 | | 345 | 2·5 | 2·4 | 24,639 | | 728 | | 693 | 4·6 | 4·4 |
| 81 | 18,352 | | 384 | | 368 | 2·8 | 2·7 | 23,110 | | 348 | | 266 | 2·3 | 1·8 |
| 82 | 17,510 | 441 | | 443 | | 3·3 | 3·4 | 22,741 | 418 | | 546 | | 2·8 | 3·6 |
| 83 | 15,457 | 90 | | 72 | | ·7 | ·6 | 21,727 | 103 | | 259 | | ·7 | 1·8 |
| 84 | 13,955 | 407 | | 378 | | 3·4 | 3·2 | 20,244 | 44 | | 205 | | ·3 | 1·4 |
| 85 | 11,489 | | 12 | | 51 | ·1 | ·5 | 17,704 | | 97 | 41 | | ·7 | ·3 |
| 86 | 10,036 | 358 | | 310 | | 3·6 | 3·1 | 16,045 | 232 | | 341 | | 1·8 | 2·7 |
| 87 | 8,044 | 100 | | 42 | | 1·1 | ·5 | 13,548 | | 189 | | 118 | 1·6 | 1·0 |
| Total | | 6,384 | 6,006 | 6,407 | 5,461 | 116·2 | 112·1 | | 5,457 | 5,523 | 5,748 | 4,951 | 112·1 | 105·1 |

## APPENDIX III

### (1) Rates of Mortality at ages 0–5

In the construction of English Life Tables it has become customary not to rely on the Census populations in obtaining death rates at ages 0–5 ; instead, they have been derived, by processes akin to those described in Appendix I to the report on the 1930–32 Life Tables, from the records of births and deaths. This method is based on the assumptions (i) that migration up to age 6 can be ignored, and (ii) that the birth registrations are more complete than are the Census enumerations at the youngest ages.

On this occasion the customary method has again been adopted, but it is of interest to compare the values of $q_x$ thus obtained with those derived directly from the enumerated populations and the deaths in the three years 1950–52. The values of $q_x$ by the two methods are as follows :

| Age $x$ | Rates of mortality ($q_x$) derived from | | | |
|---|---|---|---|---|
| | (*a*) Births | (*b*) Census | (*a*) Births | (*b*) Census |
| | Males | | Females | |
| 0 | ·03266 | ·03345 | ·02510 | ·02573 |
| 1 | ·00241 | ·00243 | ·00213 | ·00214 |
| 2 | ·00141 | ·00142 | ·00118 | ·00119 |
| 3 | ·00102 | ·00100 | ·00086 | ·00084 |
| 4 | ·00084 | ·00077 | ·00066 | ·00062 |
| 5 | ·00081 | ·00092 | ·00058 | ·00066 |

At ages 0 to 3 the differences are small and could conceivably be attributable to the effect of migration ; but at age 0 at any rate the rates at (*a*) are probably to be preferred since they take into account the uneven distribution of deaths over the first year of age. At ages 4 and 5 the differences are greater, and here the rates at (*a*) are unquestionably preferable, since they take into account the uneven distribution of births over the years 1946 and 1947, by reason of which the enumerated population at a particular date in 1951 is not a good denominator for the calculation of death rates at the ages in question in the 1950–52 period.

### (2) Abridged Life Tables for Wales and Greater London

These tables were based on values of $q_x$ at each individual age from 0 to 4 and on pivotal values at ages 7, 12, 17 . . . . 87. From age 5 onwards the successive values of $l_x$ were obtained by the formula

$$\text{colog}\ {}_5p_x = 5(1 + \delta)\ \text{colog}\ p_{x+2},$$

the small fraction $\delta$ (taken in all four tables as ·008) being introduced over the age range 40–85 only, to give effect to the fact that in this range colog $p_x$ increases in geometrical rather than in arithmetical progression.

$\mathring{e}_x$ was obtained by means of the formula

$$T_x = \tfrac{5}{3}(l_x + 4l_{x+5} + 2l_{x+10} + 4l_{x+15} + 2l_{x+20} + \ldots).$$

In calculating the values of $l_x$ at advanced ages the death rates used were obtained by multiplying the values of $q_x$ from the English Life Tables No. 11 by the ratios of actual deaths to the number " expected " according to those Tables in the age group 85 and over. The ratios used were :—

Wales : .. .. 1·017 (men), 1·064 (women).
Greater London: .. ·988 (men), ·962 (women).



## APPENDIX IV

### English Life Table No. 11, 1950–52

MALES

| Age $x$ | $l_x$ | $d_x$ | $p_x$ | $q_x$ | $\mathring{e}_x$ | Age $x$ |
|---|---|---|---|---|---|---|
| 0 | 100,000 | 3,266 | ·96734 | ·03266 | 66·42 | 0 |
| 1 | 96,734 | 233 | ·99759 | ·00241 | 67·66 | 1 |
| 2 | 96,501 | 136 | ·99859 | ·00141 | 66·82 | 2 |
| 3 | 96,365 | 98 | ·99898 | ·00102 | 65·91 | 3 |
| 4 | 96,267 | 81 | ·99916 | ·00084 | 64·98 | 4 |
| 5 | 96,186 | 78 | ·99919 | ·00081 | 64·04 | 5 |
| 6 | 96,108 | 72 | ·99925 | ·00075 | 63·09 | 6 |
| 7 | 96,036 | 61 | ·99937 | ·00063 | 62·13 | 7 |
| 8 | 95,975 | 56 | ·99942 | ·00058 | 61·17 | 8 |
| 9 | 95,919 | 53 | ·99945 | ·00055 | 60·21 | 9 |
| 10 | 95,866 | 50 | ·99948 | ·00052 | 59·24 | 10 |
| 11 | 95,816 | 50 | ·99948 | ·00052 | 58·27 | 11 |
| 12 | 95,766 | 50 | ·99948 | ·00052 | 57·30 | 12 |
| 13 | 95,716 | 54 | ·99944 | ·00056 | 56·33 | 13 |
| 14 | 95,662 | 61 | ·99936 | ·00064 | 55·36 | 14 |
| 15 | 95,601 | 70 | ·99927 | ·00073 | 54·40 | 15 |
| 16 | 95,531 | 78 | ·99918 | ·00082 | 53·44 | 16 |
| 17 | 95,453 | 87 | ·99909 | ·00091 | 52·48 | 17 |
| 18 | 95,366 | 101 | ·99894 | ·00106 | 51·53 | 18 |
| 19 | 95,265 | 114 | ·99880 | ·00120 | 50·58 | 19 |
| 20 | 95,151 | 123 | ·99871 | ·00129 | 49·64 | 20 |
| 21 | 95,028 | 128 | ·99865 | ·00135 | 48·71 | 21 |
| 22 | 94,900 | 129 | ·99864 | ·00136 | 47·77 | 22 |
| 23 | 94,771 | 130 | ·99863 | ·00137 | 46·84 | 23 |
| 24 | 94,641 | 132 | ·99861 | ·00139 | 45·90 | 24 |
| 25 | 94,509 | 133 | ·99859 | ·00141 | 44·96 | 25 |
| 26 | 94,376 | 135 | ·99857 | ·00143 | 44·03 | 26 |
| 27 | 94,241 | 138 | ·99854 | ·00146 | 43·09 | 27 |
| 28 | 94,103 | 140 | ·99851 | ·00149 | 42·15 | 28 |
| 29 | 93,963 | 143 | ·99848 | ·00152 | 41·21 | 29 |
| 30 | 93,820 | 147 | ·99843 | ·00157 | 40·27 | 30 |
| 31 | 93,673 | 152 | ·99838 | ·00162 | 39·34 | 31 |
| 32 | 93,521 | 158 | ·99831 | ·00169 | 38·40 | 32 |
| 33 | 93,363 | 165 | ·99823 | ·00177 | 37·46 | 33 |
| 34 | 93,198 | 173 | ·99814 | ·00186 | 36·53 | 34 |
| 35 | 93,025 | 183 | ·99803 | ·00197 | 35·60 | 35 |
| 36 | 92,842 | 195 | ·99790 | ·00210 | 34·67 | 36 |
| 37 | 92,647 | 209 | ·99774 | ·00226 | 33·74 | 37 |
| 38 | 92,438 | 226 | ·99756 | ·00244 | 32·81 | 38 |
| 39 | 92,212 | 244 | ·99735 | ·00265 | 31·89 | 39 |
| 40 | 91,968 | 267 | ·99710 | ·00290 | 30·98 | 40 |
| 41 | 91,701 | 292 | ·99682 | ·00318 | 30·06 | 41 |
| 42 | 91,409 | 322 | ·99648 | ·00352 | 29·16 | 42 |
| 43 | 91,087 | 356 | ·99609 | ·00391 | 28·26 | 43 |
| 44 | 90,731 | 395 | ·99565 | ·00435 | 27·37 | 44 |
| 45 | 90,336 | 439 | ·99514 | ·00486 | 26·49 | 45 |
| 46 | 89,897 | 488 | ·99457 | ·00543 | 25·61 | 46 |
| 47 | 89,409 | 543 | ·99393 | ·00607 | 24·75 | 47 |
| 48 | 88,866 | 604 | ·99320 | ·00680 | 23·90 | 48 |
| 49 | 88,262 | 671 | ·99240 | ·00760 | 23·06 | 49 |
| 50 | 87,591 | 745 | ·99150 | ·00850 | 22·23 | 50 |
| 51 | 86,846 | 824 | ·99051 | ·00949 | 21·42 | 51 |
| 52 | 86,022 | 911 | ·98941 | ·01059 | 20·62 | 52 |
| 53 | 85,111 | 1,004 | ·98820 | ·01180 | 19·83 | 53 |
| 54 | 84,107 | 1,103 | ·98689 | ·01311 | 19·06 | 54 |

MALES—*contd.*

| Age $x$ | $l_x$ | $d_x$ | $p_x$ | $q_x$ | $\mathring{e}_x$ | Age $x$ |
|---|---|---|---|---|---|---|
| 55 | 83,004 | 1,208 | ·98545 | ·01455 | 18·31 | 55 |
| 56 | 81,796 | 1,318 | ·98389 | ·01611 | 17·57 | 56 |
| 57 | 80,478 | 1,432 | ·98221 | ·01779 | 16·85 | 57 |
| 58 | 79,046 | 1,551 | ·98038 | ·01962 | 16·15 | 58 |
| 59 | 77,495 | 1,672 | ·97843 | ·02157 | 15·46 | 59 |
| 60 | 75,823 | 1,796 | ·97631 | ·02369 | 14·79 | 60 |
| 61 | 74,027 | 1,921 | ·97405 | ·02595 | 14·14 | 61 |
| 62 | 72,106 | 2,047 | ·97161 | ·02839 | 13·50 | 62 |
| 63 | 70,059 | 2,173 | ·96899 | ·03101 | 12·88 | 63 |
| 64 | 67,886 | 2,297 | ·96616 | ·03384 | 12·28 | 64 |
| 65 | 65,589 | 2,420 | ·96311 | ·03689 | 11·69 | 65 |
| 66 | 63,169 | 2,539 | ·95981 | ·04019 | 11·12 | 66 |
| 67 | 60,630 | 2,653 | ·95625 | ·04375 | 10·57 | 67 |
| 68 | 57,977 | 2,762 | ·95236 | ·04764 | 10·03 | 68 |
| 69 | 55,215 | 2,865 | ·94812 | ·05188 | 9·50 | 69 |
| 70 | 52,350 | 2,958 | ·94349 | ·05651 | 9·00 | 70 |
| 71 | 49,392 | 3,041 | ·93843 | ·06157 | 8·49 | 71 |
| 72 | 46,351 | 3,112 | ·93286 | ·06714 | 8·02 | 72 |
| 73 | 43,239 | 3,167 | ·92675 | ·07325 | 7·56 | 73 |
| 74 | 40,072 | 3,205 | ·92002 | ·07998 | 7·12 | 74 |
| 75 | 36,867 | 3,221 | ·91262 | ·08738 | 6·70 | 75 |
| 76 | 33,646 | 3,214 | ·90449 | ·09551 | 6·29 | 76 |
| 77 | 30,432 | 3,178 | ·89558 | ·10442 | 5·90 | 77 |
| 78 | 27,254 | 3,111 | ·88584 | ·11416 | 5·54 | 78 |
| 79 | 24,143 | 3,013 | ·87522 | ·12478 | 5·19 | 79 |
| 80 | 21,130 | 2,880 | ·86371 | ·13629 | 4·86 | 80 |
| 81 | 18,250 | 2,714 | ·85129 | ·14871 | 4·54 | 81 |
| 82 | 15,536 | 2,517 | ·83796 | ·16204 | 4·25 | 82 |
| 83 | 13,019 | 2,294 | ·82377 | ·17623 | 3·97 | 83 |
| 84 | 10,725 | 2,051 | ·80876 | ·19124 | 3·72 | 84 |
| 85 | 8,674 | 1,795 | ·79301 | ·20699 | 3·48 | 85 |
| 86 | 6,879 | 1,537 | ·77663 | ·22337 | 3·26 | 86 |
| 87 | 5,342 | 1,284 | ·75973 | ·24027 | 3·07 | 87 |
| 88 | 4,058 | 1,045 | ·74247 | ·25753 | 2·88 | 88 |
| 89 | 3,013 | 829 | ·72499 | ·27501 | 2·71 | 89 |
| 90 | 2,184 | 639 | ·70745 | ·29255 | 2·56 | 90 |
| 91 | 1,545 | 479 | ·69003 | ·30997 | 2·42 | 91 |
| 92 | 1,066 | 349 | ·67288 | ·32712 | 2·30 | 92 |
| 93 | 717 | 246 | ·65616 | ·34384 | 2·19 | 93 |
| 94 | 471 | 170 | ·63998 | ·36002 | 2·08 | 94 |
| 95 | 301 | 113 | ·62448 | ·37552 | 1·99 | 95 |
| 96 | 188 | 73 | ·60975 | ·39025 | 1·91 | 96 |
| 97 | 115 | 47 | ·59584 | ·40416 | 1·84 | 97 |
| 98 | 68 | 28 | ·58284 | ·41716 | 1·78 | 98 |
| 99 | 40 | 17 | ·57073 | ·42927 | 1·72 | 99 |
| 100 | 23 | 10 | ·55955 | ·44045 | 1·67 | 100 |
| 101 | 13 | 6 | ·54928 | ·45072 | 1·62 | 101 |
| 102 | 7 | 3 | ·53989 | ·46011 | 1·58 | 102 |
| 103 | 4 | 2 | ·53136 | ·46864 | 1·53 | 103 |
| 104 | 2 | 1 | ·52364 | ·47636 | 1·50 | 104 |





FEMALES

| Age $x$ | $l_x$ | $d_x$ | $p_x$ | $q_x$ | $\mathring{e}_x$ | Age $x$ |
|---|---|---|---|---|---|---|
| 0 | 100,000 | 2,510 | ·97490 | ·02510 | 71·54 | 0 |
| 1 | 97,490 | 208 | ·99787 | ·00213 | 72·38 | 1 |
| 2 | 97,282 | 115 | ·99882 | ·00118 | 71·53 | 2 |
| 3 | 97,167 | 84 | ·99914 | ·00086 | 70·61 | 3 |
| 4 | 97,083 | 64 | ·99934 | ·00066 | 69·67 | 4 |
| 5 | 97,019 | 56 | ·99942 | ·00058 | 68·72 | 5 |
| 6 | 96,963 | 51 | ·99947 | ·00053 | 67·76 | 6 |
| 7 | 96,912 | 43 | ·99956 | ·00044 | 66·79 | 7 |
| 8 | 96,869 | 39 | ·99960 | ·00040 | 65·82 | 8 |
| 9 | 96,830 | 36 | ·99963 | ·00037 | 64·85 | 9 |
| 10 | 96,794 | 34 | ·99965 | ·00035 | 63·87 | 10 |
| 11 | 96,760 | 34 | ·99965 | ·00035 | 62·90 | 11 |
| 12 | 96,726 | 36 | ·99963 | ·00037 | 61·92 | 12 |
| 13 | 96,690 | 39 | ·99960 | ·00040 | 60·94 | 13 |
| 14 | 96,651 | 43 | ·99955 | ·00045 | 59·97 | 14 |
| 15 | 96,608 | 48 | ·99950 | ·00050 | 58·99 | 15 |
| 16 | 96,560 | 56 | ·99942 | ·00058 | 58·02 | 16 |
| 17 | 96,504 | 62 | ·99936 | ·00064 | 57·05 | 17 |
| 18 | 96,442 | 69 | ·99928 | ·00072 | 56·09 | 18 |
| 19 | 96,373 | 73 | ·99924 | ·00076 | 55·13 | 19 |
| 20 | 96,300 | 80 | ·99917 | ·00083 | 54·17 | 20 |
| 21 | 96,220 | 84 | ·99913 | ·00087 | 53·22 | 21 |
| 22 | 96,136 | 89 | ·99907 | ·00093 | 52·26 | 22 |
| 23 | 96,047 | 91 | ·99905 | ·00095 | 51·31 | 23 |
| 24 | 95,956 | 96 | ·99900 | ·00100 | 50·36 | 24 |
| 25 | 95,860 | 102 | ·99894 | ·00106 | 49·41 | 25 |
| 26 | 95,758 | 105 | ·99890 | ·00110 | 48·46 | 26 |
| 27 | 95,653 | 111 | ·99884 | ·00116 | 47·51 | 27 |
| 28 | 95,542 | 114 | ·99881 | ·00119 | 46·57 | 28 |
| 29 | 95,428 | 117 | ·99877 | ·00123 | 45·62 | 29 |
| 30 | 95,311 | 121 | ·99873 | ·00127 | 44·68 | 30 |
| 31 | 95,190 | 126 | ·99868 | ·00132 | 43·73 | 31 |
| 32 | 95,064 | 131 | ·99862 | ·00138 | 42·79 | 32 |
| 33 | 94,933 | 138 | ·99855 | ·00145 | 41·85 | 33 |
| 34 | 94,795 | 145 | ·99847 | ·00153 | 40·91 | 34 |
| 35 | 94,650 | 153 | ·99838 | ·00162 | 39·97 | 35 |
| 36 | 94,497 | 163 | ·99828 | ·00172 | 39·04 | 36 |
| 37 | 94,334 | 173 | ·99817 | ·00183 | 38·10 | 37 |
| 38 | 94,161 | 185 | ·99804 | ·00196 | 37·17 | 38 |
| 39 | 93,976 | 198 | ·99789 | ·00211 | 36·24 | 39 |
| 40 | 93,778 | 213 | ·99773 | ·00227 | 35·32 | 40 |
| 41 | 93,565 | 230 | ·99754 | ·00246 | 34·40 | 41 |
| 42 | 93,335 | 248 | ·99734 | ·00266 | 33·48 | 42 |
| 43 | 93,087 | 269 | ·99711 | ·00289 | 32·57 | 43 |
| 44 | 92,818 | 291 | ·99686 | ·00314 | 31·66 | 44 |
| 45 | 92,527 | 316 | ·99659 | ·00341 | 30·76 | 45 |
| 46 | 92,211 | 342 | ·99629 | ·00371 | 29·86 | 46 |
| 47 | 91,869 | 371 | ·99596 | ·00404 | 28·97 | 47 |
| 48 | 91,498 | 404 | ·99559 | ·00441 | 28·09 | 48 |
| 49 | 91,094 | 438 | ·99519 | ·00481 | 27·21 | 49 |
| 50 | 90,656 | 475 | ·99476 | ·00524 | 26·34 | 50 |
| 51 | 90,181 | 515 | ·99429 | ·00571 | 25·48 | 51 |
| 52 | 89,666 | 559 | ·99377 | ·00623 | 24·62 | 52 |
| 53 | 89,107 | 606 | ·99320 | ·00680 | 23·77 | 53 |
| 54 | 88,501 | 656 | ·99259 | ·00741 | 22·93 | 54 |

## English Life Table No. 11, 1950–52

**FEMALES**—*contd.*

| Age $x$ | $l_x$ | $d_x$ | $p_x$ | $q_x$ | $\mathring{e}_x$ | Age $x$ |
|---|---|---|---|---|---|---|
| 55 | 87,845 | 711 | ·99191 | ·00809 | 22·10 | 55 |
| 56 | 87,134 | 770 | ·99116 | ·00884 | 21·28 | 56 |
| 57 | 86,364 | 834 | ·99034 | ·00966 | 20·46 | 57 |
| 58 | 85,530 | 904 | ·98943 | ·01057 | 19·65 | 58 |
| 59 | 84,626 | 980 | ·98842 | ·01158 | 18·86 | 59 |
| 60 | 83,646 | 1,063 | ·98729 | ·01271 | 18·07 | 60 |
| 61 | 82,583 | 1,154 | ·98603 | ·01397 | 17·30 | 61 |
| 62 | 81,429 | 1,252 | ·98462 | ·01538 | 16·54 | 62 |
| 63 | 80,177 | 1,360 | ·98304 | ·01696 | 15·79 | 63 |
| 64 | 78,817 | 1,476 | ·98127 | ·01873 | 15·05 | 64 |
| 65 | 77,341 | 1,604 | ·97926 | ·02074 | 14·33 | 65 |
| 66 | 75,737 | 1,742 | ·97700 | ·02300 | 13·62 | 66 |
| 67 | 73,995 | 1,891 | ·97445 | ·02555 | 12·93 | 67 |
| 68 | 72,104 | 2,050 | ·97157 | ·02843 | 12·26 | 68 |
| 69 | 70,054 | 2,219 | ·96833 | ·03167 | 11·60 | 69 |
| 70 | 67,835 | 2,396 | ·96468 | ·03532 | 10·97 | 70 |
| 71 | 65,439 | 2,582 | ·96055 | ·03945 | 10·35 | 71 |
| 72 | 62,857 | 2,769 | ·95594 | ·04406 | 9·75 | 72 |
| 73 | 60,088 | 2,958 | ·95077 | ·04923 | 9·18 | 73 |
| 74 | 57,130 | 3,142 | ·94500 | ·05500 | 8·63 | 74 |
| 75 | 53,988 | 3,316 | ·93857 | ·06143 | 8·10 | 75 |
| 76 | 50,672 | 3,474 | ·93144 | ·06856 | 7·59 | 76 |
| 77 | 47,198 | 3,606 | ·92359 | ·07641 | 7·11 | 77 |
| 78 | 43,592 | 3,707 | ·91497 | ·08503 | 6·66 | 78 |
| 79 | 39,885 | 3,767 | ·90556 | ·09444 | 6·23 | 79 |
| 80 | 36,118 | 3,780 | ·89534 | ·10466 | 5·83 | 80 |
| 81 | 32,338 | 3,741 | ·88433 | ·11567 | 5·46 | 81 |
| 82 | 28,597 | 3,645 | ·87254 | ·12746 | 5·11 | 82 |
| 83 | 24,952 | 3,493 | ·86000 | ·14000 | 4·78 | 83 |
| 84 | 21,459 | 3,288 | ·84677 | ·15323 | 4·48 | 84 |
| 85 | 18,171 | 3,035 | ·83295 | ·16705 | 4·20 | 85 |
| 86 | 15,136 | 2,746 | ·81860 | ·18140 | 3·94 | 86 |
| 87 | 12,390 | 2,430 | ·80386 | ·19614 | 3·71 | 87 |
| 88 | 9,960 | 2,103 | ·78884 | ·21116 | 3·49 | 88 |
| 89 | 7,857 | 1,778 | ·77369 | ·22631 | 3·30 | 89 |
| 90 | 6,079 | 1,468 | ·75854 | ·24146 | 3·12 | 90 |
| 91 | 4,611 | 1,183 | ·74353 | ·25647 | 2·97 | 91 |
| 92 | 3,428 | 930 | ·72879 | ·27121 | 2·81 | 92 |
| 93 | 2,498 | 713 | ·71446 | ·28554 | 2·69 | 93 |
| 94 | 1,785 | 534 | ·70063 | ·29937 | 2·57 | 94 |
| 95 | 1,251 | 391 | ·68741 | ·31259 | 2·47 | 95 |
| 96 | 860 | 280 | ·67488 | ·32512 | 2·38 | 96 |
| 97 | 580 | 195 | ·66308 | ·33692 | 2·30 | 97 |
| 98 | 385 | 134 | ·65205 | ·34795 | 2·22 | 98 |
| 99 | 251 | 90 | ·64181 | ·35819 | 2·15 | 99 |
| 100 | 161 | 59 | ·63236 | ·36764 | 2·09 | 100 |
| 101 | 102 | 38 | ·62370 | ·37630 | 2·04 | 101 |
| 102 | 64 | 25 | ·61580 | ·38420 | 2·00 | 102 |
| 103 | 39 | 15 | ·60862 | ·39138 | 1·95 | 103 |
| 104 | 24 | 10 | ·60213 | ·39787 | 1·91 | 104 |
| 105 | 14 | 6 | ·59628 | ·40372 | 1·88 | 105 |
| 106 | 8 | 3 | ·59104 | ·40896 | 1·85 | 106 |
| 107 | 5 | 2 | ·58635 | ·41365 | 1·82 | 107 |
| 108 | 3 | 1 | ·58217 | ·41783 | 1·80 | 108 |
| 109 | 2 | 1 | ·57845 | ·42155 | 1·75 | 109 |



Aggrega

| Age $x$ | don and |
|---|---|
| 0 | 511 |
| 2 | 13 |
| 7 | 59 |
| 12 | 48 |
| 17 | 86 |
| 22 | 17 |
| 27 | 23 |
| 32 | 48 |
| 37 | 05 |
| 42 | 09 |
| 47 | 86 |
| 52 | 15 |
| 57 | 05 |
| 62 | 70 |
| 67 | 14 |
| 72 | 04 |
| 77 | 01 |
| 82 | 31 |
| 87 | 42 |
| 0 | 96 |
| 2 | 86 |
| 7 | 44 |
| 12 | 33 |
| 17 | 55 |
| 22 | 70 |
| 27 | 98 |
| 32 | 22 |
| 37 | 61 |
| 42 | 40 |
| 47 | 68 |
| 52 | 69 |
| 57 | 87 |
| 62 | 83 |
| 67 | 35 |
| 72 | 08 |
| 77 | 15 |
| 82 | 06 |
| 87 | 30 |

## APPENDIX V

### Table V.1

### Rates of mortality ($q_x$) at selected ages in Regions and Aggregates

| Age $x$ | England and Wales | Northern | | | East and West Ridings | | | North Western | | | | North Midland | Midland | | | Eastern | London and South Eastern | | | Southern | South Western | Wales (including Monmouthshire) | | | Conurbations | Areas outside conurbations | | | | Age $x$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Tyneside Conurbation | Remainder | Total | West Yorkshire Conurbation | Remainder | Total | South East Lancashire Conurbation | Merseyside Conurbation | Remainder | | Total | West Midlands Conurbation | Remainder | | Total | Greater London | Remainder | | | Total | Wales I (South East) | Wales II (Remainder) | | Urban areas with populations of 100,000 and over | Urban areas with populations of 50,000 and under 100,000 | Urban areas with populations under 50,000 | Rural Districts | |
| **MALES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | ·03266 | ·03982 | ·03964 | ·03988 | ·03566 | ·03440 | ·03650 | ·03732 | ·03691 | ·03915 | ·03650 | ·03209 | ·03416 | ·03374 | ·03458 | ·02733 | ·02611 | ·02558 | ·02789 | ·02733 | ·02989 | ·03835 | ·03830 | ·03849 | ·03140 | ·03379 | ·03380 | ·03310 | ·03150 | 0 |
| 2 | ·00141 | ·00183 | ·00173 | ·00186 | ·00157 | ·00144 | ·00166 | ·00147 | ·00155 | ·00144 | ·00142 | ·00142 | ·00159 | ·00152 | ·00167 | ·00113 | ·00113 | ·00109 | ·00125 | ·00167 | ·00130 | ·00158 | ·00149 | ·00183 | ·00132 | ·00147 | ·00156 | ·00146 | ·00149 | 2 |
| 7 | ·00067 | ·00073 | ·00072 | ·00074 | ·00070 | ·00069 | ·00070 | ·00074 | ·00079 | ·00067 | ·00074 | ·00068 | ·00071 | ·00071 | ·00071 | ·00062 | ·00059 | ·00057 | ·00063 | ·00058 | ·00071 | ·00077 | ·00084 | ·00060 | ·00065 | ·00069 | ·00069 | ·00065 | ·00071 | 7 |
| 12 | ·00052 | ·00060 | ·00056 | ·00061 | ·00052 | ·00054 | ·00051 | ·00049 | ·00050 | ·00046 | ·00050 | ·00048 | ·00057 | ·00059 | ·00054 | ·00050 | ·00048 | ·00042 | ·00065 | ·00052 | ·00050 | ·00074 | ·00069 | ·00087 | ·00048 | ·00050 | ·00056 | ·00058 | ·00055 | 12 |
| 17 | ·00093 | ·00103 | ·00107 | ·00102 | ·00087 | ·00078 | ·00093 | ·00095 | ·00083 | ·00107 | ·00096 | ·00096 | ·00102 | ·00095 | ·00106 | ·00096 | ·00086 | ·00084 | ·00089 | ·00084 | ·00094 | ·00104 | ·00106 | ·00100 | ·00088 | ·00101 | ·00084 | ·00095 | ·00096 | 17 |
| 22 | ·00138 | ·00162 | ·00152 | ·00166 | ·00146 | ·00133 | ·00154 | ·00143 | ·00128 | ·00157 | ·00147 | ·00144 | ·00152 | ·00152 | ·00151 | ·00132 | ·00117 | ·00110 | ·00140 | ·00133 | ·00133 | ·00149 | ·00140 | ·00171 | ·00126 | ·00132 | ·00147 | ·00140 | ·00153 | 22 |
| 27 | ·00145 | ·00176 | ·00183 | ·00174 | ·00146 | ·00128 | ·00158 | ·00154 | ·00137 | ·00194 | ·00149 | ·00143 | ·00155 | ·00153 | ·00157 | ·00134 | ·00123 | ·00120 | ·00136 | ·00125 | ·00152 | ·00179 | ·00171 | ·00203 | ·00136 | ·00140 | ·00138 | ·00149 | ·00164 | 27 |
| 32 | ·00172 | ·00225 | ·00243 | ·00219 | ·00176 | ·00176 | ·00176 | ·00184 | ·00181 | ·00223 | ·00166 | ·00160 | ·00180 | ·00182 | ·00178 | ·00134 | ·00148 | ·00145 | ·00159 | ·00150 | ·00182 | ·00225 | ·00210 | ·00265 | ·00169 | ·00168 | ·00175 | ·00173 | ·00176 | 32 |
| 37 | ·00224 | ·00275 | ·00288 | ·00270 | ·00234 | ·00225 | ·00240 | ·00259 | ·00255 | ·00284 | ·00250 | ·00205 | ·00225 | ·00240 | ·00209 | ·00179 | ·00205 | ·00203 | ·00211 | ·00203 | ·00201 | ·00273 | ·00278 | ·00259 | ·00227 | ·00246 | ·00224 | ·00222 | ·00204 | 37 |
| 42 | ·00343 | ·00432 | ·00460 | ·00422 | ·00365 | ·00372 | ·00361 | ·00401 | ·00402 | ·00443 | ·00380 | ·00315 | ·00335 | ·00352 | ·00318 | ·00285 | ·00309 | ·00318 | ·00279 | ·00280 | ·00328 | ·00406 | ·00416 | ·00382 | ·00355 | ·00365 | ·00345 | ·00338 | ·00306 | 42 |
| 47 | ·00611 | ·00730 | ·00819 | ·00698 | ·00630 | ·00673 | ·00599 | ·00721 | ·00744 | ·00781 | ·00672 | ·00550 | ·00601 | ·00657 | ·00543 | ·00490 | ·00586 | ·00598 | ·00544 | ·00498 | ·00544 | ·00697 | ·00714 | ·00654 | ·00658 | ·00641 | ·00638 | ·00598 | ·00495 | 47 |
| 52 | ·01060 | ·01232 | ·01320 | ·01202 | ·01084 | ·01161 | ·01025 | ·01265 | ·01327 | ·01369 | ·01163 | ·00924 | ·01091 | ·01168 | ·01012 | ·00833 | ·01015 | ·01041 | ·00921 | ·00908 | ·00936 | ·01156 | ·01202 | ·01039 | ·01150 | ·01154 | ·01039 | ·01024 | ·00853 | 52 |
| 57 | ·01770 | ·01896 | ·02123 | ·01812 | ·01873 | ·02040 | ·01748 | ·02068 | ·02162 | ·02284 | ·01894 | ·01611 | ·01833 | ·01975 | ·01692 | ·01429 | ·01705 | ·01766 | ·01502 | ·01509 | ·01581 | ·01945 | ·02006 | ·01784 | ·01936 | ·01866 | ·01820 | ·01720 | ·01403 | 57 |
| 62 | ·02873 | ·03096 | ·03315 | ·03016 | ·03048 | ·03226 | ·02915 | ·03314 | ·03482 | ·03496 | ·03091 | ·02627 | ·02950 | ·03195 | ·02715 | ·02292 | ·02770 | ·02882 | ·02431 | ·02499 | ·02634 | ·03193 | ·03394 | ·02681 | ·03115 | ·03170 | ·02840 | ·02799 | ·02298 | 62 |
| 67 | ·04401 | ·04723 | ·05316 | ·04521 | ·04763 | ·05157 | ·04482 | ·05073 | ·05290 | ·05275 | ·04807 | ·04134 | ·04589 | ·04943 | ·04266 | ·03622 | ·04214 | ·04427 | ·03655 | ·03940 | ·03901 | ·04750 | ·04957 | ·04282 | ·04805 | ·04814 | ·04307 | ·04303 | ·03586 | 67 |
| 72 | ·06664 | ·06692 | ·06985 | ·06589 | ·07365 | ·08070 | ·06862 | ·07605 | ·07833 | ·08230 | ·07172 | ·06258 | ·06843 | ·07211 | ·06513 | ·05816 | ·06504 | ·06823 | ·05732 | ·05815 | ·05876 | ·07170 | ·07387 | ·06714 | ·07274 | ·07152 | ·06645 | ·06470 | ·05585 | 72 |
| 77 | ·10401 | ·10967 | ·11706 | ·10712 | ·11562 | ·12103 | ·11176 | ·11713 | ·12081 | ·11957 | ·11339 | ·09948 | ·10642 | ·11057 | ·10283 | ·09125 | ·10001 | ·10376 | ·09160 | ·09349 | ·09698 | ·10596 | ·10895 | ·09982 | ·11089 | ·10878 | ·10074 | ·10239 | ·09363 | 77 |
| 82 | ·16203 | ·17782 | ·18596 | ·17529 | ·17491 | ·18344 | ·16917 | ·18064 | ·18740 | ·17984 | ·17601 | ·15661 | ·16765 | ·17279 | ·16347 | ·14844 | ·15431 | ·15977 | ·14309 | ·14852 | ·15272 | ·16860 | ·17326 | ·15991 | ·17022 | ·16737 | ·15520 | ·16078 | ·15170 | 82 |
| 87 | ·24182 | ·24758 | ·25098 | ·24662 | ·24847 | ·24859 | ·24839 | ·24632 | ·24704 | ·24897 | ·24458 | ·24667 | ·24789 | ·24164 | ·25271 | ·23912 | ·23542 | ·23995 | ·22713 | ·23934 | ·24206 | ·24190 | ·23754 | ·24979 | ·24301 | ·25191 | ·23507 | ·23598 | ·24375 | 87 |
| **FEMALES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | ·02510 | ·03076 | ·03164 | ·03045 | ·02698 | ·02685 | ·02706 | ·02910 | ·02934 | ·03065 | ·02783 | ·02573 | ·02609 | ·02602 | ·02616 | ·02067 | ·01996 | ·01976 | ·02063 | ·02116 | ·02177 | ·03090 | ·03097 | ·03070 | ·02457 | ·02572 | ·02618 | ·02556 | ·02386 | 0 |
| 2 | ·00118 | ·00151 | ·00144 | ·00153 | ·00129 | ·00118 | ·00136 | ·00136 | ·00111 | ·00165 | ·00143 | ·00118 | ·00141 | ·00151 | ·00130 | ·00102 | ·00086 | ·00082 | ·00098 | ·00093 | ·00131 | ·00147 | ·00153 | ·00131 | ·00111 | ·00115 | ·00114 | ·00141 | ·00117 | 2 |
| 7 | ·00047 | ·00048 | ·00045 | ·00049 | ·00049 | ·00053 | ·00047 | ·00049 | ·00046 | ·00046 | ·00053 | ·00044 | ·00051 | ·00051 | ·00050 | ·00041 | ·00044 | ·00044 | ·00044 | ·00048 | ·00049 | ·00057 | ·00061 | ·00046 | ·00046 | ·00045 | ·00052 | ·00045 | ·00052 | 7 |
| 12 | ·00036 | ·00045 | ·00046 | ·00045 | ·00039 | ·00046 | ·00034 | ·00039 | ·00036 | ·00045 | ·00039 | ·00032 | ·00036 | ·00033 | ·00040 | ·00031 | ·00033 | ·00031 | ·00038 | ·00029 | ·00038 | ·00038 | ·00040 | ·00034 | ·00035 | ·00043 | ·00035 | ·00036 | ·00033 | 12 |
| 17 | ·00065 | ·00073 | ·00069 | ·00074 | ·00059 | ·00049 | ·00065 | ·00078 | ·00071 | ·00086 | ·00078 | ·00067 | ·00076 | ·00078 | ·00074 | ·00057 | ·00055 | ·00055 | ·00057 | ·00048 | ·00061 | ·00081 | ·00081 | ·00080 | ·00064 | ·00071 | ·00070 | ·00062 | ·00065 | 17 |
| 22 | ·00091 | ·00127 | ·00140 | ·00123 | ·00094 | ·00085 | ·00101 | ·00100 | ·00097 | ·00129 | ·00086 | ·00104 | ·00092 | ·00101 | ·00083 | ·00074 | ·00070 | ·00066 | ·00081 | ·00077 | ·00096 | ·00118 | ·00122 | ·00106 | ·00086 | ·00100 | ·00097 | ·00095 | ·00088 | 22 |
| 27 | ·00116 | ·00146 | ·00174 | ·00136 | ·00118 | ·00110 | ·00124 | ·00137 | ·00134 | ·00176 | ·00117 | ·00114 | ·00124 | ·00125 | ·00123 | ·00086 | ·00098 | ·00101 | ·00087 | ·00089 | ·00111 | ·00151 | ·00156 | ·00138 | ·00119 | ·00127 | ·00114 | ·00115 | ·00103 | 27 |
| 32 | ·00141 | ·00171 | ·00200 | ·00160 | ·00144 | ·00138 | ·00149 | ·00172 | ·00156 | ·00213 | ·00165 | ·00144 | ·00144 | ·00151 | ·00136 | ·00110 | ·00122 | ·00122 | ·00121 | ·00118 | ·00126 | ·00164 | ·00169 | ·00150 | ·00143 | ·00157 | ·00147 | ·00140 | ·00120 | 32 |
| 37 | ·00182 | ·00206 | ·00214 | ·00203 | ·00178 | ·00181 | ·00175 | ·00215 | ·00222 | ·00223 | ·00204 | ·00185 | ·00191 | ·00204 | ·00177 | ·00164 | ·00161 | ·00164 | ·00152 | ·00155 | ·00162 | ·00220 | ·00226 | ·00205 | ·00186 | ·00188 | ·00176 | ·00181 | ·00172 | 37 |
| 42 | ·00259 | ·00299 | ·00312 | ·00294 | ·00263 | ·00271 | ·00257 | ·00300 | ·00309 | ·00315 | ·00284 | ·00252 | ·00260 | ·00259 | ·00262 | ·00230 | ·00240 | ·00240 | ·00240 | ·00214 | ·00246 | ·00297 | ·00311 | ·00264 | ·00264 | ·00273 | ·00255 | ·00268 | ·00230 | 42 |
| 47 | ·00414 | ·00450 | ·00456 | ·00447 | ·00426 | ·00451 | ·00406 | ·00472 | ·00498 | ·00474 | ·00449 | ·00404 | ·00441 | ·00461 | ·00419 | ·00371 | ·00368 | ·00369 | ·00368 | ·00371 | ·00403 | ·00492 | ·00516 | ·00435 | ·00419 | ·00433 | ·00419 | ·00420 | ·00382 | 47 |
| 52 | ·00619 | ·00692 | ·00706 | ·00686 | ·00650 | ·00665 | ·00638 | ·00685 | ·00718 | ·00663 | ·00666 | ·00605 | ·00636 | ·00648 | ·00623 | ·00554 | ·00569 | ·00581 | ·00529 | ·00562 | ·00611 | ·00666 | ·00673 | ·00650 | ·00631 | ·00641 | ·00607 | ·00625 | ·00577 | 52 |
| 57 | ·00962 | ·01090 | ·01117 | ·01080 | ·01020 | ·01072 | ·00976 | ·01081 | ·01120 | ·01054 | ·01059 | ·00913 | ·00965 | ·00970 | ·00960 | ·00881 | ·00887 | ·00885 | ·00893 | ·00818 | ·00927 | ·01074 | ·01112 | ·00983 | ·00975 | ·00975 | ·00952 | ·00983 | ·00903 | 57 |
| 62 | ·01541 | ·01738 | ·01775 | ·01723 | ·01709 | ·01801 | ·01631 | ·01773 | ·01856 | ·01725 | ·01719 | ·01503 | ·01624 | ·01683 | ·01565 | ·01310 | ·01383 | ·01398 | ·01342 | ·01378 | ·01415 | ·01682 | ·01747 | ·01538 | ·01589 | ·01619 | ·01470 | ·01551 | ·01402 | 62 |
| 67 | ·02568 | ·02953 | ·03041 | ·02921 | ·02899 | ·03049 | ·02774 | ·03019 | ·03118 | ·02908 | ·02981 | ·02516 | ·02706 | ·02713 | ·02699 | ·02255 | ·02235 | ·02307 | ·02050 | ·02167 | ·02398 | ·02860 | ·02931 | ·02716 | ·02639 | ·02670 | ·02491 | ·02563 | ·02387 | 67 |
| 72 | ·04387 | ·04974 | ·05148 | ·04909 | ·04928 | ·05127 | ·04756 | ·05172 | ·05458 | ·04962 | ·05015 | ·04398 | ·04434 | ·04438 | ·04431 | ·03820 | ·03908 | ·04012 | ·03658 | ·03854 | ·03975 | ·04804 | ·04949 | ·04538 | ·04533 | ·04527 | ·04229 | ·04369 | ·04081 | 72 |
| 77 | ·07655 | ·08891 | ·09081 | ·08824 | ·08660 | ·09198 | ·08190 | ·09003 | ·09249 | ·08798 | ·08880 | ·07837 | ·07829 | ·08094 | ·07577 | ·06842 | ·06815 | ·07004 | ·06375 | ·06761 | ·06937 | ·08130 | ·08268 | ·07876 | ·07918 | ·07916 | ·07386 | ·07579 | ·07167 | 77 |
| 82 | ·12678 | ·14308 | ·14538 | ·14226 | ·14274 | ·14982 | ·13688 | ·14901 | ·15259 | ·14501 | ·14785 | ·12485 | ·13233 | ·13600 | ·12902 | ·11544 | ·11606 | ·11903 | ·10950 | ·11185 | ·11744 | ·13937 | ·14081 | ·13702 | ·13116 | ·13090 | ·11994 | ·12514 | ·12107 | 82 |
| 87 | ·19523 | ·20972 | ·21018 | ·20933 | ·20659 | ·20637 | ·20669 | ·20967 | ·21295 | ·20391 | ·20969 | ·19633 | ·19608 | ·19799 | ·19471 | ·19017 | ·18730 | ·18880 | ·18413 | ·18603 | ·19423 | ·20411 | ·20618 | ·20106 | ·19581 | ·19945 | ·18693 | ·19476 | ·19568 | 87 |

## Table V.2

**Ratio of Actual Deaths (1950–52) in Regions and Aggregates to those expected on the basis of the national experience**

| Age Group | Northern | | | East and West Ridings | | | North Western | | | | North Midland | Midland | | | Eastern | London and South Eastern | | | Southern | South Western | Wales (including Monmouthshire) | | | Conurbations | Areas outside conurbations | | | | Age Group |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Tyneside Conurbation | Remainder | Total | West Yorkshire Conurbation | Remainder | Total | South East Lancashire Conurbation | Merseyside Conurbation | Remainder | | Total | West Midlands Conurbation | Remainder | | Total | Greater London | Remainder | | | Total | Wales I (South East) | Wales II (Remainder) | | Urban areas with populations of 100,000 and over | Urban areas with populations of 50,000 and under 100,000 | Urban areas with populations under 50,000 | Rural Districts | |
| **MALES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0–4 | 1·26 | 1·23 | 1·27 | 1·09 | 1·06 | 1·10 | 1·16 | 1·13 | 1·29 | 1·12 | ·99 | 1·07 | 1·06 | 1·09 | ·83 | ·79 | ·78 | ·85 | ·87 | ·94 | 1·22 | 1·21 | 1·22 | ·97 | 1·04 | 1·04 | 1·02 | ·99 | 0–4 |
| 5–9 | 1·09 | 1·06 | 1·10 | 1·03 | 1·03 | 1·03 | 1·10 | 1·17 | 1·00 | 1·10 | 1·01 | 1·06 | 1·06 | 1·05 | ·91 | ·87 | ·85 | ·94 | ·86 | 1·05 | 1·15 | 1·24 | ·89 | ·97 | 1·02 | 1·03 | ·97 | 1·06 | 5–9 |
| 10–14 | 1·14 | 1·08 | 1·16 | 1·00 | 1·02 | ·98 | ·95 | ·98 | ·90 | ·95 | ·92 | 1·08 | 1·10 | 1·05 | ·95 | ·90 | ·81 | 1·19 | ·99 | ·97 | 1·36 | 1·29 | 1·54 | ·92 | ·95 | 1·07 | ·99 | 1·06 | 10–14 |
| 15–19 | 1·10 | 1·11 | 1·10 | ·94 | ·84 | 1·00 | 1·01 | ·89 | 1·14 | 1·03 | 1·03 | 1·09 | 1·04 | 1·13 | 1·02 | ·91 | ·90 | ·96 | ·90 | 1·01 | 1·12 | 1·12 | 1·11 | ·95 | 1·07 | ·92 | 1·02 | 1·04 | 15–19 |
| 20–24 | 1·18 | 1·10 | 1·20 | 1·05 | ·95 | 1·12 | 1·04 | ·93 | 1·14 | 1·07 | 1·05 | 1·10 | 1·11 | 1·10 | ·95 | ·85 | ·80 | 1·01 | ·96 | ·97 | 1·09 | 1·03 | 1·24 | ·92 | ·97 | 1·06 | 1·01 | 1·11 | 20–24 |
| 25–29 | 1·22 | 1·27 | 1·20 | 1·01 | ·89 | 1·09 | 1·06 | ·95 | 1·32 | 1·03 | ·98 | 1·07 | 1·05 | 1·08 | ·92 | ·85 | ·83 | ·94 | ·87 | 1·05 | 1·24 | 1·18 | 1·40 | ·94 | ·97 | ·96 | 1·03 | 1·12 | 25–29 |
| 30–34 | 1·30 | 1·39 | 1·27 | 1·03 | 1·03 | 1·03 | 1·08 | 1·06 | 1·30 | ·98 | ·93 | 1·04 | 1·05 | 1·03 | ·78 | ·87 | ·85 | ·93 | ·88 | 1·05 | 1·30 | 1·22 | 1·50 | ·99 | ·98 | 1·02 | 1·01 | 1·03 | 30–34 |
| 35–39 | 1·23 | 1·28 | 1·21 | 1·05 | 1·01 | 1·07 | 1·16 | 1·14 | 1·27 | 1·11 | ·92 | 1·00 | 1·07 | ·93 | ·80 | ·91 | ·91 | ·93 | ·90 | ·90 | 1·22 | 1·24 | 1·16 | 1·02 | 1·09 | 1·00 | ·99 | ·91 | 35–39 |
| 40–44 | 1·26 | 1·34 | 1·22 | 1·06 | 1·09 | 1·05 | 1·17 | 1·18 | 1·29 | 1·11 | ·92 | ·98 | 1·03 | ·92 | ·83 | ·91 | ·93 | ·82 | ·82 | ·95 | 1·19 | 1·21 | 1·11 | 1·04 | 1·07 | 1·01 | ·99 | ·89 | 40–44 |
| 45–49 | 1·20 | 1·34 | 1·15 | 1·03 | 1·11 | ·98 | 1·18 | 1·22 | 1·28 | 1·10 | ·90 | ·98 | 1·08 | ·89 | ·80 | ·96 | ·98 | ·89 | ·82 | ·89 | 1·14 | 1·17 | 1·07 | 1·08 | 1·05 | 1·04 | ·98 | ·81 | 45–49 |
| 50–54 | 1·16 | 1·25 | 1·13 | 1·03 | 1·10 | ·97 | 1·19 | 1·25 | 1·29 | 1·10 | ·87 | 1·03 | 1·10 | ·95 | ·79 | ·96 | ·98 | ·87 | ·86 | ·89 | 1·09 | 1·14 | ·98 | 1·09 | 1·09 | ·98 | ·97 | ·80 | 50–54 |
| 55–59 | 1·07 | 1·20 | 1·03 | 1·06 | 1·15 | ·99 | 1·17 | 1·22 | 1·29 | 1·07 | ·91 | 1·03 | 1·11 | ·95 | ·81 | ·96 | 1·00 | ·85 | ·85 | ·89 | 1·10 | 1·14 | 1·00 | 1·09 | 1·06 | 1·03 | ·97 | ·79 | 55–59 |
| 60–64 | 1·08 | 1·16 | 1·05 | 1·06 | 1·13 | 1·01 | 1·16 | 1·21 | 1·22 | 1·08 | ·91 | 1·03 | 1·11 | ·95 | ·80 | ·96 | 1·00 | ·85 | ·87 | ·91 | 1·11 | 1·18 | ·94 | 1·08 | 1·10 | ·99 | ·98 | ·80 | 60–64 |
| 65–69 | 1·07 | 1·21 | 1·03 | 1·08 | 1·18 | 1·02 | 1·16 | 1·21 | 1·20 | 1·09 | ·94 | 1·04 | 1·12 | ·97 | ·82 | ·96 | 1·01 | ·83 | ·89 | ·89 | 1·08 | 1·13 | ·98 | 1·09 | 1·09 | ·98 | ·98 | ·81 | 65–69 |
| 70–74 | 1·01 | 1·06 | ·99 | 1·11 | 1·22 | 1·03 | 1·15 | 1·18 | 1·24 | 1·08 | ·94 | 1·03 | 1·09 | ·98 | ·87 | ·97 | 1·02 | ·86 | ·87 | ·88 | 1·08 | 1·11 | 1·01 | 1·09 | 1·07 | 1·00 | ·97 | ·84 | 70–74 |
| 75–79 | 1·06 | 1·13 | 1·03 | 1·12 | 1·17 | 1·08 | 1·13 | 1·17 | 1·16 | 1·09 | ·95 | 1·02 | 1·07 | ·99 | ·87 | ·96 | 1·00 | ·88 | ·89 | ·93 | 1·02 | 1·05 | ·96 | 1·07 | 1·05 | ·97 | ·98 | ·90 | 75–79 |
| 80–84 | 1·10 | 1·15 | 1·08 | 1·08 | 1·14 | 1·05 | 1·12 | 1·16 | 1·12 | 1·09 | ·96 | 1·03 | 1·07 | 1·01 | ·91 | ·95 | ·99 | ·88 | ·91 | ·94 | 1·04 | 1·07 | ·98 | 1·05 | 1·04 | ·96 | ·99 | ·93 | 80–84 |
| 85 and over | 1·06 | 1·10 | 1·05 | 1·06 | 1·08 | 1·04 | 1·08 | 1·08 | 1·09 | 1·07 | 1·00 | 1·05 | 1·06 | 1·04 | ·97 | ·96 | ·98 | ·92 | ·95 | ·98 | 1·01 | 1·03 | ·98 | 1·02 | 1·05 | ·98 | ·97 | ·99 | 85 and over |
| 0–19 | 1·23 | 1·21 | 1·24 | 1·07 | 1·04 | 1·09 | 1·14 | 1·11 | 1·24 | 1·10 | ·99 | 1·07 | 1·06 | 1·09 | ·85 | ·81 | ·79 | ·88 | ·88 | ·95 | 1·21 | 1·21 | 1·21 | ·96 | 1·04 | 1·03 | 1·02 | 1·00 | 0–19 |
| 20–49 | 1·23 | 1·31 | 1·19 | 1·04 | 1·05 | 1·03 | 1·14 | 1·14 | 1·28 | 1·08 | ·93 | 1·01 | 1·06 | ·95 | ·83 | ·91 | ·92 | ·90 | ·85 | ·94 | 1·18 | 1·19 | 1·18 | 1·03 | 1·04 | 1·02 | ·99 | ·92 | 20–49 |
| 50–69 | 1·09 | 1·20 | 1·05 | 1·06 | 1·14 | 1·00 | 1·16 | 1·22 | 1·24 | 1·08 | ·92 | 1·03 | 1·11 | ·96 | ·81 | ·96 | 1·00 | ·84 | ·87 | ·90 | 1·10 | 1·15 | ·97 | 1·09 | 1·09 | ·99 | ·97 | ·80 | 50–69 |
| 70 and over | 1·05 | 1·11 | 1·03 | 1·10 | 1·17 | 1·05 | 1·13 | 1·16 | 1·17 | 1·09 | ·96 | 1·03 | 1·07 | 1·00 | ·90 | ·96 | 1·00 | ·88 | ·90 | ·93 | 1·04 | 1·07 | ·98 | 1·07 | 1·05 | ·98 | ·98 | ·90 | 70 and over |
| **All ages** | **1·09** | **1·17** | **1·07** | **1·08** | **1·14** | **1·03** | **1·14** | **1·18** | **1·21** | **1·09** | **·94** | **1·03** | **1·09** | **·98** | **·86** | **·95** | **·98** | **·87** | **·89** | **·92** | **1·08** | **1·12** | **1·01** | **1·06** | **1·07** | **·99** | **·98** | **·88** | **All ages** |
| **FEMALES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0–4 | 1·25 | 1·26 | 1·25 | 1·07 | 1·07 | 1·07 | 1·18 | 1·15 | 1·29 | 1·13 | 1·03 | 1·07 | 1·06 | 1·08 | ·84 | ·79 | ·78 | ·80 | ·85 | ·90 | 1·26 | 1·26 | 1·25 | ·98 | 1·04 | 1·05 | 1·03 | ·97 | 0–4 |
| 5–9 | 1·02 | ·95 | 1·04 | 1·04 | 1·12 | ·99 | 1·03 | ·97 | ·97 | 1·13 | ·92 | 1·07 | 1·08 | 1·06 | ·86 | ·93 | ·92 | ·94 | 1·01 | 1·04 | 1·21 | 1·30 | ·97 | ·98 | ·95 | 1·09 | ·95 | 1·10 | 5–9 |
| 10–14 | 1·22 | 1·18 | 1·23 | 1·05 | 1·21 | ·96 | 1·09 | ·98 | 1·22 | 1·10 | ·91 | 1·01 | ·94 | 1·09 | ·88 | ·92 | ·87 | 1·04 | ·80 | 1·06 | 1·08 | 1·10 | 1·00 | ·98 | 1·18 | ·97 | ·99 | ·94 | 10–14 |
| 15–19 | 1·14 | 1·11 | 1·15 | ·91 | ·78 | 1·00 | 1·18 | 1·08 | 1·30 | 1·18 | 1·04 | 1·16 | 1·19 | 1·12 | ·86 | ·85 | ·84 | ·88 | ·75 | ·95 | 1·24 | 1·25 | 1·22 | ·98 | 1·10 | 1·08 | ·96 | ·99 | 15–19 |
| 20–24 | 1·39 | 1·51 | 1·34 | 1·03 | ·93 | 1·10 | 1·10 | 1·06 | 1·41 | ·95 | 1·13 | 1·01 | 1·10 | ·91 | ·82 | ·77 | ·74 | ·88 | ·84 | 1·06 | 1·30 | 1·34 | 1·17 | ·95 | 1·10 | 1·06 | 1·04 | ·96 | 20–24 |
| 25–29 | 1·26 | 1·48 | 1·17 | 1·02 | ·95 | 1·07 | 1·18 | 1·15 | 1·51 | 1·02 | 1·00 | 1·07 | 1·08 | 1·07 | ·75 | ·85 | ·87 | ·76 | ·77 | ·97 | 1·30 | 1·34 | 1·20 | 1·03 | 1·09 | ·98 | ·99 | ·89 | 25–29 |
| 30–34 | 1·22 | 1·43 | 1·13 | 1·03 | ·98 | 1·06 | 1·23 | 1·12 | 1·51 | 1·17 | 1·03 | 1·03 | 1·08 | ·96 | ·79 | ·87 | ·87 | ·86 | ·84 | ·90 | 1·17 | 1·20 | 1·08 | 1·02 | 1·11 | 1·04 | 1·00 | ·86 | 30–34 |
| 35–39 | 1·14 | 1·18 | 1·12 | ·98 | 1·01 | ·97 | 1·18 | 1·22 | 1·24 | 1·12 | 1·02 | 1·05 | 1·12 | ·98 | ·90 | ·89 | ·90 | ·84 | ·85 | ·90 | 1·20 | 1·24 | 1·11 | 1·02 | 1·03 | ·97 | 1·00 | ·94 | 35–39 |
| 40–44 | 1·14 | 1·19 | 1·13 | 1·02 | 1·05 | ·99 | 1·16 | 1·20 | 1·21 | 1·10 | ·97 | 1·01 | 1·00 | 1·01 | ·89 | ·92 | ·92 | ·92 | ·83 | ·95 | 1·15 | 1·20 | 1·01 | 1·02 | 1·05 | ·98 | 1·03 | ·89 | 40–44 |
| 45–49 | 1·09 | 1·11 | 1·08 | 1·03 | 1·09 | ·98 | 1·14 | 1·20 | 1·14 | 1·08 | ·97 | 1·06 | 1·11 | 1·01 | ·89 | ·89 | ·89 | ·89 | ·89 | ·97 | 1·18 | 1·24 | 1·05 | 1·01 | 1·05 | 1·01 | 1·01 | ·92 | 45–49 |
| 50–54 | 1·12 | 1·14 | 1·11 | 1·05 | 1·08 | 1·03 | 1·11 | 1·16 | 1·08 | 1·08 | ·97 | 1·02 | 1·05 | 1·00 | ·90 | ·92 | ·94 | ·86 | ·90 | ·99 | 1·08 | 1·10 | 1·05 | 1·02 | 1·03 | ·98 | 1·01 | ·93 | 50–54 |
| 55–59 | 1·13 | 1·16 | 1·12 | 1·06 | 1·12 | 1·02 | 1·13 | 1·17 | 1·10 | 1·10 | ·95 | 1·00 | 1·01 | 1·00 | ·91 | ·92 | ·92 | ·93 | ·85 | ·96 | 1·11 | 1·15 | 1·02 | 1·01 | 1·02 | ·99 | 1·02 | ·94 | 55–59 |
| 60–64 | 1·13 | 1·16 | 1·12 | 1·11 | 1·17 | 1·06 | 1·15 | 1·21 | 1·12 | 1·12 | ·97 | 1·05 | 1·09 | 1·02 | ·85 | ·90 | ·91 | ·87 | ·89 | ·92 | 1·09 | 1·13 | 1·00 | 1·03 | 1·05 | ·96 | 1·01 | ·91 | 60–64 |
| 65–69 | 1·15 | 1·18 | 1·14 | 1·13 | 1·19 | 1·08 | 1·18 | 1·22 | 1·13 | 1·16 | ·98 | 1·05 | 1·05 | 1·05 | ·88 | ·87 | ·90 | ·80 | ·85 | ·93 | 1·11 | 1·14 | 1·06 | 1·03 | 1·04 | ·97 | 1·00 | ·93 | 65–69 |
| 70–74 | 1·14 | 1·18 | 1·12 | 1·13 | 1·17 | 1·08 | 1·18 | 1·25 | 1·13 | 1·15 | 1·00 | 1·01 | 1·01 | 1·01 | ·87 | ·89 | ·91 | ·83 | ·88 | ·91 | 1·10 | 1·13 | 1·04 | 1·03 | 1·03 | ·96 | 1·00 | ·93 | 70–74 |
| 75–79 | 1·16 | 1·19 | 1·15 | 1·13 | 1·21 | 1·07 | 1·18 | 1·21 | 1·15 | 1·16 | 1·02 | 1·02 | 1·06 | ·99 | ·89 | ·89 | ·91 | ·83 | ·88 | ·91 | 1·07 | 1·08 | 1·03 | 1·03 | 1·03 | ·96 | ·99 | ·94 | 75–79 |
| 80–84 | 1·13 | 1·15 | 1·13 | 1·13 | 1·19 | 1·08 | 1·18 | 1·21 | 1·15 | 1·17 | ·99 | 1·04 | 1·07 | 1·02 | ·91 | ·91 | ·94 | ·86 | ·88 | ·93 | 1·10 | 1·11 | 1·08 | 1·03 | 1·03 | ·94 | ·99 | ·95 | 80–84 |
| 85 and over | 1·14 | 1·19 | 1·12 | 1·11 | 1·16 | 1·08 | 1·16 | 1·19 | 1·13 | 1·15 | 1·02 | 1·03 | 1·05 | 1·02 | ·94 | ·93 | ·96 | ·89 | ·92 | ·95 | 1·06 | 1·07 | 1·04 | 1·03 | 1·04 | ·94 | ·99 | ·98 | 85 and over |
| 0–19 | 1·23 | 1·23 | 1·23 | 1·06 | 1·06 | 1·06 | 1·16 | 1·13 | 1·27 | 1·13 | 1·02 | 1·07 | 1·07 | 1·08 | ·84 | ·80 | ·80 | ·83 | ·85 | ·92 | 1·25 | 1·26 | 1·22 | ·98 | 1·04 | 1·05 | 1·02 | ·97 | 0–19 |
| 20–49 | 1·16 | 1·24 | 1·13 | 1·02 | 1·03 | 1·01 | 1·16 | 1·18 | 1·27 | 1·09 | 1·00 | 1·04 | 1·08 | 1·00 | ·86 | ·88 | ·89 | ·87 | ·85 | ·95 | 1·20 | 1·24 | 1·07 | 1·01 | 1·06 | 1·00 | 1·01 | ·91 | 20–49 |
| 50–69 | 1·14 | 1·16 | 1·12 | 1·10 | 1·15 | 1·05 | 1·15 | 1·20 | 1·11 | 1·13 | ·97 | 1·04 | 1·05 | 1·02 | ·88 | ·89 | ·91 | ·85 | ·87 | ·94 | 1·10 | 1·13 | 1·03 | 1·02 | 1·04 | ·97 | 1·01 | ·93 | 50–69 |
| 70 and over | 1·14 | 1·18 | 1·13 | 1·13 | 1·18 | 1·08 | 1·18 | 1·22 | 1·14 | 1·16 | 1·01 | 1·03 | 1·05 | 1·01 | ·90 | ·91 | ·93 | ·85 | ·89 | ·92 | 1·08 | 1·10 | 1·05 | 1·03 | 1·03 | ·95 | ·99 | ·95 | 70 and over |
| **All ages** | **1·15** | **1·18** | **1·14** | **1·11** | **1·16** | **1·06** | **1·17** | **1·20** | **1·15** | **1·14** | **1·00** | **1·03** | **1·05** | **1·02** | **·89** | **·90** | **·91** | **·85** | **·88** | **·93** | **1·11** | **1·13** | **1·05** | **1·03** | **1·04** | **·97** | **1·00** | **·94** | **All ages** |

**Table V.3**
**Abridged Life Tables for Wales, 1950–52**

| Age $x$ | Males | | Females | |
|---|---|---|---|---|
| | $l_x$ | $\mathring{e}_x$ | $l_x$ | $\mathring{e}_x$ |
| 0 | 10,000 | 64·9 | 10,000 | 69·9 |
| 5 | 9,551 | 62·9 | 9,634 | 67·5 |
| 10 | 9,515 | 58·1 | 9,606 | 62·7 |
| 15 | 9,480 | 53·3 | 9,589 | 57·8 |
| 20 | 9,431 | 48·6 | 9,551 | 53·1 |
| 25 | 9,358 | 43·9 | 9,495 | 48·3 |
| 30 | 9,275 | 39·3 | 9,424 | 43·7 |
| 35 | 9,171 | 34·7 | 9,346 | 39·0 |
| 40 | 9,047 | 30·1 | 9,243 | 34·4 |
| 45 | 8,864 | 25·7 | 9,105 | 29·9 |
| 50 | 8,556 | 21·5 | 8,882 | 25·6 |
| 55 | 8,069 | 17·7 | 8,588 | 21·4 |
| 60 | 7,309 | 14·2 | 8,133 | 17·4 |
| 65 | 6,207 | 11·3 | 7,466 | 13·8 |
| 70 | 4,856 | 8·7 | 6,451 | 10·5 |
| 75 | 3,338 | 6·6 | 5,034 | 7·7 |
| 80 | 1,898 | 4·7 | 3,283 | 5·5 |
| 85 | 748 | 3·4 | 1,541 | 4·0 |

**Table V.4**
**Abridged Life Tables for Greater London, 1950–52**

| Age $x$ | Males | | Females | |
|---|---|---|---|---|
| | $l_x$ | $\mathring{e}_x$ | $l_x$ | $\mathring{e}_x$ |
| 0 | 10,000 | 67·3 | 10,000 | 73·0 |
| 5 | 9,702 | 64·4 | 9,765 | 69·8 |
| 10 | 9,674 | 59·6 | 9,744 | 64·9 |
| 15 | 9,654 | 54·7 | 9,729 | 60·0 |
| 20 | 9,613 | 49·9 | 9,702 | 55·2 |
| 25 | 9,560 | 45·2 | 9,671 | 50·3 |
| 30 | 9,503 | 40·4 | 9,624 | 45·6 |
| 35 | 9,435 | 35·7 | 9,565 | 40·8 |
| 40 | 9,340 | 31·0 | 9,486 | 36·2 |
| 45 | 9,191 | 26·5 | 9,372 | 31·6 |
| 50 | 8,918 | 22·2 | 9,199 | 27·1 |
| 55 | 8,461 | 18·3 | 8,933 | 22·8 |
| 60 | 7,734 | 14·7 | 8,542 | 18·8 |
| 65 | 6,674 | 11·7 | 7,958 | 14·9 |
| 70 | 5,313 | 9·0 | 7,075 | 11·5 |
| 75 | 3,721 | 6·7 | 5,756 | 8·5 |
| 80 | 2,142 | 4·9 | 3,992 | 6·1 |
| 85 | 891 | 3·5 | 2,108 | 4·3 |



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