

THE RECENT MORTALITY OF MALES IN ENGLAND AND WALES IN LATER MIDDLE LIFE

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DURING the discussion on Beard's paper (*J.I.A.* LXXVII, 425) A. C. Edwards commented on the relatively heavy death-rate during the last twenty years among men in England and Wales who were aged 20-40 in 1916. He pointed out that, in the tables on the Trend of Mortality in England and Wales that appear in *J.I.A.* from time to time, there is a peak in the ratios of men's mortality to the 1930-32 standard that has moved from ages 45-49 in 1933 to 60-64 in 1944-48, and he put forward as a possible explanation that this age-group lost a number of its fittest members during the 1914-18 war and that the survivors who had been on active service have been suffering from delayed and cumulative after-effects. He added that the excess mortality at the top of the hump might be 10-15% and suggested that some marked changes in male annuitants' mortality in the 60's and 70's might be observed during the next few years.

The subject, to which the picturesque title of 'burnt-out veterans' has sometimes been applied, is one on which the writer has been trying to obtain convincing evidence for the past fifteen years. A note by Dr P. Stocks in *The Lancet* (1 May 1943) pointed out that there had been no increase in ${}_{15}p_{50}$ for males between 1930-32 and 1937-39, though there had been a fairly regular improvement in each decennium between 1891 and 1931, and the improvement in ${}_{25}p_{25}$ for males and ${}_{15}p_{50}$ for females was well up to the average between 1930-32 and 1937-39.

It might be thought that the excess mortality in the age-groups to which Edwards referred was caused by the high death-rate of men in receipt of war pensions arising from the 1914-18 war, but this is by no means a sufficient explanation. War pensioners now amount to little more than 5% of the male population at these ages, and their mortality of recent years has been not more than 25% above the 1930-32 standard. The excess mortality of war pensioners therefore accounts for only 1 or 2% of the 10-15% excess on which Edwards comments.

The difficulty of arriving at a definite conclusion on this subject is enhanced by the rapid changes in mortality that occur both when the age is kept constant and the calendar year changed and also when the calendar year is kept constant and the age changed. It is thus difficult to disentangle any 'veterans' factor from both age and secular trends. It has occurred to the writer recently, however, that this difficulty might perhaps be met by using female mortality as a base-line, since this would be subject to age and secular forces broadly similar to those operating on males. No originality is claimed for this comparison; the ratios of male to female mortality were examined by Dr W. J. Martin (*J.R.S.S.* CXIV, 287) and a similar comparison appears in Table IV of the *Registrar General's Statistical Review for 1946-47* (Text, Vol. I, Medical). In both cases the ratios for England and Wales in each quinquennium from 1841-45 to 1941-45 are tabulated, but over age 25

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decennial age-groups are used; they are thus not very satisfactory for observing the trends with which we are concerned, though further reference is made to them later.

In Table 1 are set out the ratios of male to female mortality in England and Wales for quinquennial age-groups from 20-24 to 80-84, in groups of three calendar years at five-yearly intervals from 1920-22 onwards, with ratios for 1910-12 as representing the pre-1914 position, and those for 1949-50 as giving the latest available information.

Table 1. Ratios of male to female group mortality rates
in England and Wales

Age-group attained	Years of experience							
	1910-12	1920-22	1925-27	1930-32	1935-37	1940-42*	1945-47*	1949-50
20-24	1·21	1·16	1·11	1·17	1·12	1·87	1·47	1·18
25-29	1·17	1·09	1·09	1·08	1·08	1·58	1·24	1·12
30-34	1·17	1·17	1·12	1·09	1·09	1·49	1·27	1·10
35-39	1·21	1·26	1·24	1·21	1·21	1·45	1·27	1·17
40-44	1·25	1·30	1·38	1·32	1·30	1·45	1·37	1·33
45-49	1·29	1·31	1·36	1·39	1·39	1·46	1·49	1·50
50-54	1·30	1·31	1·32	1·38	1·47	1·57	1·61	1·62
55-59	1·31	1·35	1·35	1·38	1·49	1·66	1·72	1·77
60-64	1·32	1·34	1·35	1·37	1·43	1·59	1·70	1·79
65-69	1·28	1·32	1·35	1·38	1·37	1·47	1·56	1·63
70-74	1·21	1·28	1·28	1·34	1·35	1·36	1·39	1·44
75-79	1·19	1·22	1·27	1·27	1·32	1·35	1·33	1·31
80-84	1·14	1·17	1·21	1·22	1·27	1·32	1·29	1·25

* Civilian only.

It will be seen that in 1910-12 male mortality was about 20% above female mortality, though the ratio gradually rose from age 35 to a peak of 1·32 at ages 60-64 and fell away thereafter to 1·14 at ages 80-84. For ages under 45, if the years 1940-42 and 1945-47 are ignored as affected by the withdrawals of healthy lives to the Forces, there is no very pronounced change in the ratios during the period since 1910-12, though there is a small 'peak' at ages 35-39 in 1920-22 and at ages 40-44 five years later. For ages 45 and over, however, the percentage excess of male mortality has broadly doubled (a little less than doubled at ages 45-49 and 75-79; $2\frac{1}{2}$ times at 55-64). Here again, it is possible to observe a series of peaks in the ratios that travels down the calendar years as age advances. This trend would seem to afford strong support to the 'burnt-out veterans' theory, since the peaks relate to the groups who were aged 30-34 or 35-39 in 1916.

The evidence may be seen more clearly if the ratios in Table 1 are rearranged in generation form, as in Table 2. The averages of the ratios from 1920-22 to 1949-50 are seen to rise to a maximum in respect of the age-groups of men who were 30-34 in 1916, and it is tempting to suggest that the hardships of trench warfare had a more damaging effect on the older men than on their younger comrades. There are two criticisms of any deductions from these tables, however:

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(1) the ratios in any given column are those of rapidly increasing mortality rates; those of more recent years are therefore based on larger numbers of deaths than the earlier ones, and this is not allowed for in a simple addition of the ratios;

(2) a more serious criticism is that the range of ages covered by successive columns becomes steadily older and therefore traverses the hump in the ratios set out as in Table 1 at different points.

Table 2. Ratios of male to female group mortality rates in England and Wales

Years of experience	Age-group in 1916								
	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
1910-12	—	—	1·04	1·21	1·17	1·17	1·21	1·25	1·29
1920-22	1·07	1·16	1·09	1·17	1·26	1·30	1·31	1·31	1·35
1925-27	1·11	1·09	1·12	1·24	1·38	1·36	1·32	1·35	1·35
1930-32	1·08	1·09	1·21	1·32	1·39	1·38	1·38	1·37	1·38
1935-37	1·09	1·21	1·30	1·39	1·47	1·49	1·43	1·37	1·35
1940-42	1·45	1·45	1·46	1·57	1·66	1·59	1·47	1·36	1·35
1945-47	1·37	1·49	1·61	1·72	1·70	1·56	1·39	1·33	1·29
1949-50	1·50	1·62	1·77	1·79	1·63	1·44	1·31	1·25	—
Average of ratios, 1920-22 to 1949-50	1·24	1·30	1·37	1·46	1·50	1·45	1·37	1·33	—

It is legitimate, however, to point out that the ratios for the age-groups who were 25-39 in 1916, whether examined in Table 1 or Table 2, show higher ratios than those on either side of them.

If the ratios in Table 1 are plotted in graphical form and are joined up (a) by lines linking the ratios for the calendar years of experience (Chart A), and (b) by lines linking up the generation ratios (Chart B), the following points emerge clearly.

(1) Since 1910-12 there has been a hump in the curve of ratios (Chart A) but this hump has steadily grown more pronounced and exhibited a sharper apex. Whereas in 1910-12 there was something of a plateau from 45 to 70 at about 30% above women's rates (which by 1930-32 had advanced to 37%, but still extended from 45 to 70), by 1945-47 and 1949-50 the peak had narrowed to the ages 55 to 65 and was between 70 and 80% above women's rates.

(2) Though the age-group that was aged 30-34 in 1916 shows the highest ratios for each group of three years from 1925-27 to 1940-42 (with one minor exception in 1935-37), in 1945-47 and 1949-50 the maximum ratio has passed to the group that was aged 25-29 in 1916 and in 1949-50 the next younger age-group is well in the running for the first place. This would suggest that, if the 'burnt-out veteran' theory be a valid one, it has its maximum intensity in the age range 55 to 65, and thereafter the mortality tends to return towards 'normal', presumably because the damaged lives have succumbed and the survivors are a relatively select class.

(3) When, however, the data are set out in the form of Chart B, which links up successive generations through their ratios at attained ages, the

theory appears to be untenable. It will be seen that the ratios for a generation have roughly the form of the ribs of a fan, and those for the persons who were aged 20 to 39 in 1916 fall into place between those for earlier and later

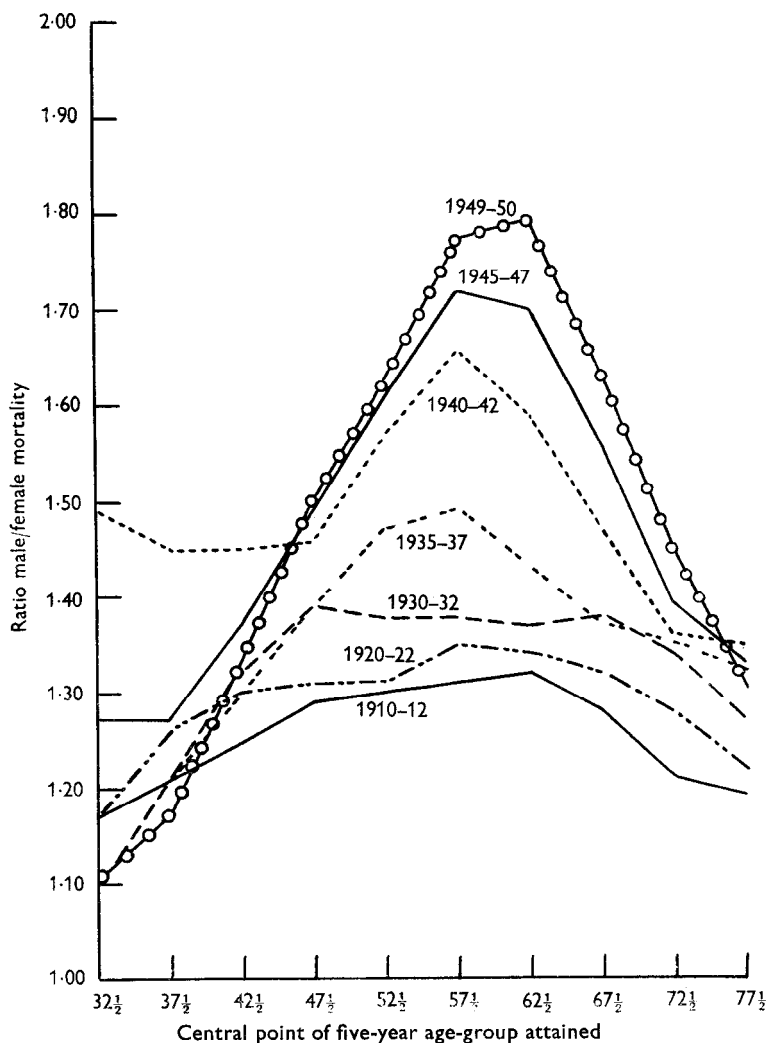


Chart A. Ratios of male to female group mortality rates in England and Wales in specimen years.

generations. The important point in this connexion is that, although they are so far very incomplete, the ratios for those who were aged 10-14 and 15-19 in 1916 and who therefore were less affected, or not at all, by 1914-18 war conditions appear to be tending towards even higher levels than those for the generations mostly affected by the war. It would thus appear that some

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explanation other than the 'burnt-out veteran' theory is required to explain the phenomenon.

It should perhaps be emphasized at this stage of the investigation that the high ratios of male to female mortality in Tables 1 and 2 do not connote any

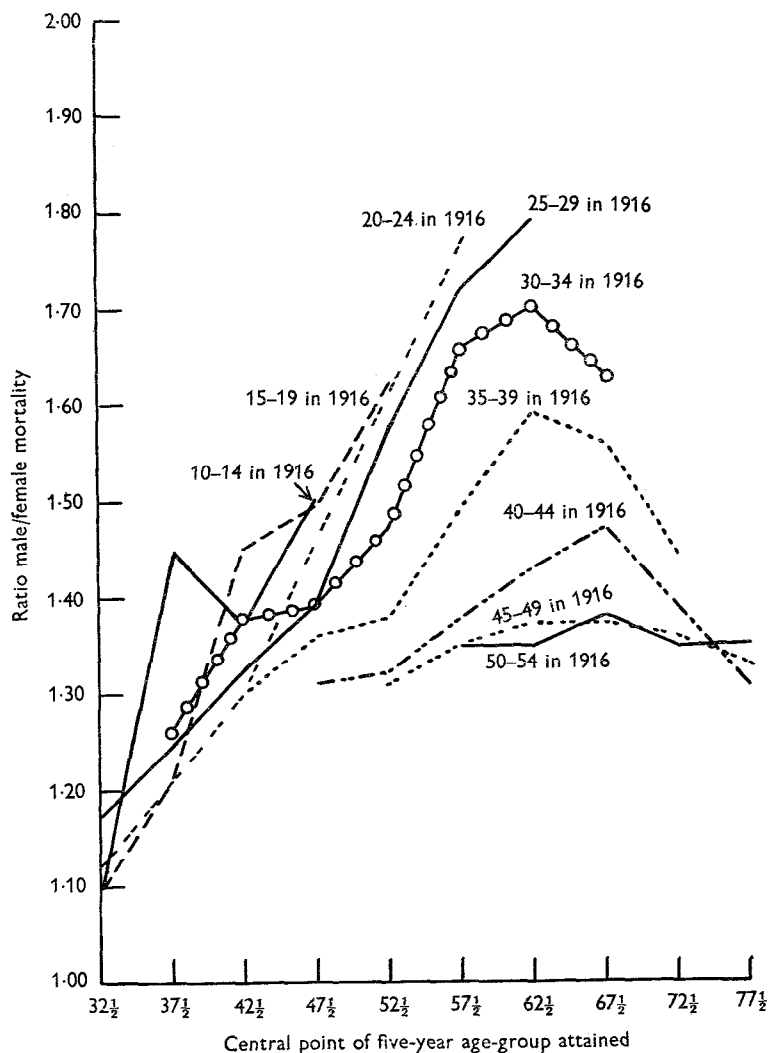


Chart B. Ratios of male to female group mortality rates in England and Wales, showing the experience at later ages of various quinquennial age-groups in 1916.

absolute increase in male mortality at any age (with very minor exceptions). Examination of the actual mortality rates over a long series of years—they are conveniently set out in graphical form on pages 80 and 81 of the *Reports and Selected Papers of the Statistics Committee of the Royal Commission on*

Population—shows that what is happening is that there is a pronounced slackening in the rate of improvement of male mortality at the ages concerned, whereas the improvement in female mortality continues at its long-term rate. The death-rates in 1910-12 and 1949-50 given in Table 3 show the extent of the changes for the two sexes that have taken place during the period under review.

Table 3. Group mortality rates in England and Wales

Ages last birthday (1)	Males			Females		
	1910-12 (2)	1949-50 (3)	(3)/(2) (4)	1910-12 (5)	1949-50 (6)	(6)/(5) (7)
20-24	·00378	·00149	·39	·00313	·00126	·40
25-29	·00425	·00164	·39	·00364	·00146	·40
30-34	·00528	·00182	·34	·00451	·00165	·37
35-39	·00695	·00240	·35	·00575	·00206	·36
40-44	·00909	·00365	·40	·00730	·00275	·38
45-49	·01231	·00650	·53	·00956	·00432	·45
50-54	·01701	·01049	·62	·01304	·00646	·50
55-59	·02444	·01748	·72	·01865	·00988	·53
60-64	·03521	·02842	·81	·02676	·01588	·59
65-69	·05102	·04312	·85	·03975	·02640	·66
70-74	·07613	·06661	·87	·06274	·04612	·74
75-79	·11406	·10396	·91	·09586	·07918	·83
80-84	·16419	·16078	·98	·14367	·12869	·90

Some light is thrown on the causes of this slackening by the analyses of causes of death in the papers by Dr Stocks and Dr Martin to which reference has been made above. Dr Stocks points out that the increase in the death-rate from heart diseases accounts broadly for the variations in the mortality of males aged 50-65 between 1921-23 and 1941 and largely offsets improvement in other causes of death, while Dr Martin analyses the mortality sex-ratios by cause for the years 1936-39 and shows that tuberculosis, circulatory and respiratory diseases account for the bulk of the excess mortality of males at ages 45-65.

In Table 4 the death-rates at ages 55-64 for men and women from various causes in the years from 1931 to 1950 used in the earlier analysis are set out. Before 1931 the classification used differed considerably, and it is therefore not possible to carry the investigation back to 1930 and earlier years. Since 1940 the underlying cause of death, as stated by the doctor, has been accepted by the Registrar General in making his assignment, instead of the cause formerly chosen under certain rules of selection in joint causes, and this may have led to some changes in the incidence of the various causes of death, as may certain changes in 'fashion' in diagnosis among doctors. A new system of classification was introduced in 1950, but the 1940-49 classification has been retained for the sake of comparability and, where necessary, the published group rates have been adjusted to conform as nearly as possible with the earlier classification. (B. Benjamin, of the General Register Office, has been good enough to check the classifications adopted in this section of the note.) There seems to be no reason why these modifications in the classification should affect male and female mortality figures in seriously differing degrees, and so invalidate the comparisons of the trends of causes of death for the two sexes.

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It will be seen that the most important numerical difference between the trends of mortality for the two sexes lies in the circulatory (including heart) disease group and that for bronchitis, with which heart disease is often associated on death certificates, and which seems to have been given a certain preference since 1940 under the revised system of classification then introduced (see preceding paragraph). The percentage of women's deaths at these ages attributed to these causes rose slightly during the period from 28% to 32%, but in the case of men the percentage rose more rapidly from 29% in 1931-32 to 41% in 1949-50. During the two decades the mortality rate from these

Table 4. Death-rates at ages 55-64 from certain causes in England and Wales

		1931-32	1935-37	1940-42	1945-47	1949-50
Tuberculosis (all forms)	Men	00132	00127	00130	00123	00113
	Women	00051	00042	00035	00028	00026
Cancer	Men	00467	00472	00463	00483	00508
	Women	00405	00401	00386	00374	00362
Intra-cranial vascular lesions (including cerebral haemorrhage and associated arterio-sclerosis)	Men	00198	00199	00214	00200	00193
	Women	00176	00183	00204	00193	00184
Heart disease and other circulatory diseases (excluding arterio- sclerosis associated with intra-cranial vascular lesions)	Men	00588	00681	00639	00648	00727
	Women	00430	00433	00381	00342	00360
Bronchitis	Men	00086	00079	00237	00211	00207
	Women	00050	00035	00080	00056	00049
Pneumonia and other respiratory diseases	Men	00159	00176	00183	00143	00128
	Women	00088	00076	00078	00057	00053
All other causes	Men	00710	00675	00663	00440	00382
	Women	00515	00474	00398	00271	00238
All causes	Men	02340	02409	02529	02248	02258
	Women	01715	01644	01562	01321	01272

causes has risen by no less than 39% in the case of men compared with a fall of 15% for women. The cancer death-rates at these ages for the two sexes show a similar divergence of trends, though the rate of change is smaller, the men's rate increasing by about 9% between 1931-32 and 1949-50 and the women's rate falling by about 11%. Tuberculosis is not a major cause of death at these ages, but it is surprising to find that while the male death-rate fell by about 14% during the period, the female rate went down by nearly 50% and is now less than a quarter of the male rate at this period of life. In the case of pneumonia and other respiratory diseases, despite the use of sulphur drugs and penicillin the death-rate for men aged 55-64 has fallen by only 19%, while that for women has fallen by 40%. It will be noted that the death-rate from intra-cranial vascular lesions remained fairly constant for both sexes during the period. Deaths from all causes other than those specified above constituted, for each sex, rather less than a third of the total deaths in

1931-32 but only a little over a sixth in 1949-50, the death-rate from these miscellaneous causes declining during the period by about 45% in the case of men and about 55% in the case of women. Finally, it will be seen that the male death-rate for all causes declined by only 4% in the eighteen years, when the female rate was being reduced by over 25%.

Valuable supporting evidence is offered by the experience of certain other countries for which data are readily available, some of which were affected by the 1914-18 war. In both France and the United States the ratios of male to female mortality show a peak in late middle life that has become more pronounced in recent years, though the peak occurs at an earlier age than in England and Wales. Thus, in France the ratio at ages around 50 has risen from about 1.40 in 1920-22 and 1.65 in 1933-38 to 1.85 in 1948, while in the United States the ratio at ages 55-59 has risen from about 1.25 in 1929-31 and 1.50 in 1941 to 1.70 in 1947 and 1948. In France the men aged 50 in 1948 (20 in 1918) would not have been subjected for long, if at all, to the worst rigours of the 1914-18 war period. In the case of the United States, in view of the smaller proportion of men involved in war service in 1914-18 and the shorter period during which United States troops participated actively in that war, it is unlikely that war service could account for ratios of male to female mortality at age 57 that are so close to those of England and Wales in the same calendar years.

On the other hand, in the less highly industrialized and neutral Sweden the ratios in later middle life have increased only from about 1.15 in the 1920's to about 1.30 in the late 1940's, whilst in the more rural Republic of Ireland the ratios at these ages, which were around parity in 1926, were only about 10% higher in 1946. Denmark's experience is broadly similar to that of Sweden, whilst in Switzerland the ratio between ages 40 and 65 has fluctuated round 1.40 throughout the present century, and exhibits only a slow upward trend.

Whilst it would appear from the above analysis that in the more highly industrialized countries the ratios of male to female mortality in later middle life tend to be high and to be increasing, extensive further analysis of the experiences of the two sexes and of the trends of their mortality by cause is necessary before it can be stated with confidence that this conclusion is a valid one.

To sum up, the correctness or otherwise of the 'burnt-out veteran' theory must be regarded as not proved, though it may well be that at least part of the relatively high male mortality in later middle life of recent years is to be accounted for by the delayed effect of 1914-18 war experiences. On the other hand, there has been a noticeable increase in fatal cases of heart disease at these ages among males, but not among females, possibly due to the stress of modern life in highly industrialized countries.

It is to be noticed, however, that the relative excess of male mortality does not persist with the same intensity after age 65, and up to the present it does not appear that the marked changes in male mortality in the 60's and 70's during the next few years that Edwards expected will be realized.

It remains to acknowledge the writer's indebtedness to a number of colleagues, notably P. R. Cox and C. M. Stewart, for much valuable criticism and help with the calculations and charts.