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*The Impact of the First World War on Civilian Health in Britain*¹

By J. M. WINTER

THE impact of the First World War on the "home fronts" is a subject on which much scholarly work has been published in the years since the armistice. In the immediate aftermath of the war, the Carnegie Endowment for International Peace sponsored a series of studies on this theme. The books dealing with British society covered most areas of social and economic activity, with one notable exception. A book was commissioned on the health of the civilian population, but apparently it was never completed.² Consequently, we do not have a full account of the immediate demographic consequences of the war for Britain.

As a result, more recent studies have had to rely on sketchy and incomplete treatments of civilian health in war time. Most of these writers shared the view that the war's effect on the health of all combatant nations was wholly negative. As the Swiss demographer Hersch put it: "War kills not only directly, . . . but also indirectly by causing an increase of mortality among the civilian population of the belligerent countries and even in many neutral countries."³ This belief was echoed by the American sociologist Willard Waller, who asserted that: "War decimates the population, killing many men in battle and a comparable number of civilians by disease."⁴ The distinguished British pediatrician R. W. B. Ellis concurred, stating that "war must inevitably have an adverse effect on child health." Although he was referring directly to the 1939-45 war, he presented data which supported the view that the same applied to the 1914-18 conflict.⁵ In a discussion of French infant mortality during the two world wars, Ibarolla took a similar position:

The struggle against death must be a permanent struggle. When society neglects this combat, because it devotes its principal effort to equipping a war machine with lavish supplies of money and men, the thanatogenic factor, in the phrase of M. Villey, re-asserts its rights and interrupts and at times even temporarily arrests the spectacular progress due to medical treatment.⁶

¹ Thanks are due to Dr Fiona Caldicott, Dr Ronald MacKeith, and Dr Michael Teitelbaum for help and advice on this article.

² All of the Carnegie volumes on the social and economic history of the war appended lists of books in preparation. One such was 'The Health of the Civilian Population during the War', by Dr A. W. J. MacFadden, C.B. What became of it is a mystery. MacFadden was Senior Medical Officer of the Ministry of Health.

³ L. Hersch, 'La mortalité causée par la guerre mondiale', *Metron*, v (1925), 3. Repeated in his 'Demographic Effects of Modern Warfare', in N. Angell et al. *What Would be the Character of a New War?* (1933), p. 283.

⁴ Willard Waller, *War and the Family* (New York, 1940), p. 19.

⁵ R. W. B. Ellis, 'Social Change and Child Health', *Pediatrics*, xx (1955), 1042.

⁶ J. Ibarolla, *Les incidences des deux conflits mondiaux sur l'évolution démographique française* (Paris, 1964), p. 161. The reference is to D. Villey, *Leçons de démographie* (Paris, 1957).

Other statisticians and demographers have helped propagate the thesis of the negative effects of the war on standards of health in Europe. Many writers have produced estimates of war losses which include figures for "excess civilian mortality". Several have settled on the total of 292,000 civilian "excess deaths" in Britain during the 1914-18 war.¹ A more sophisticated study undertaken by the Office of Population Research at Princeton University for the League of Nations yielded a somewhat higher total. Comparing official figures for the war period with a hypothetical progression of mortality in 1914-18 on the basis of an average of prewar and postwar data, they concluded that over 400,000 British civilians died as a result of war conditions.²

These estimates of the adverse effects of the war on civilian death-rates in Britain have never been seriously examined. Neither have the principal assumptions upon which these estimates rest. One such assumption is that deaths due to the influenza pandemic of 1918-19 are attributable to the war. War conditions may have helped to spread the disease, but since the mutant virus which caused the disease attacked populations on every continent, near and far from the battlefields, and since the pandemic continued in its lethal path after the armistice, it is difficult to accept the contention that the course of the disease was in any meaningful sense war-related. Some have argued that more people succumbed to influenza because their resistance to the disease was reduced by war shortages and overwork on war production.³ Prof. Abel Smith contended that the 1918 epidemic "struck hard at a tired and neglected civilian population" which by the end of the war "began making its own contribution to casualty lists".⁴ Drummond and Wilbraham, in their study of English nutrition, claimed that:

There is clear evidence that the general state of health [in England] did decline. The most obvious sign was the lowered resistance to infection. The people could not stand up to the terrible epidemic of influenza which swept across Europe in 1918. They died like flies; the mortality in London in some weeks was as high as 2,500. At the time it was thought that the severity of the epidemic was due to a particularly virulent strain of the infective organism. With our modern knowledge of the influence of diet on resistance to infective diseases, we can see that vitamin deficiencies had prepared the way.⁵

Several objections can be raised to this argument. Firstly, the claim rejected by these authors, that the 1918 influenza virus was particularly virulent, is probably valid.⁶ Secondly, there is hardly any difference between the incidence of "Spanish

¹ Hersch, 'Demographic Effects', p. 291; B. Uralis, *Wars and Population* (Moscow, 1971), p. 268. M. Greenwood, in 'British Loss of Life in the Wars of 1794-1815 and 1914-18', *Journal of the Royal Statistical Society*, cv (1942), 6, settles on 281,000, drawn from a calculation by S. Dumas and K. O. Vedel-Peterson, *Losses of Life Caused by War* (Oxford, 1923), pp. 133 ff.

² F. Notestein et al. *The Future Population of Europe and the Soviet Union* (Geneva, 1944), p. 75. They added 67,000 to correct for the reduction of infant deaths due to the decline in the birth-rate, to the figure of 402,000 for excess civilian deaths over age one to yield a grand total of 469,000 excess civilian deaths.

³ Greenwood, loc. cit. 6; L. Hersch, 'La Guerre et la grippe', *Bibliothèque universelle et revue de Genève* (1924), pp. 709-11.

⁴ B. Abel Smith, *The Hospitals, 1850-1948* (1964), p. 280.

⁵ J. C. Drummond and A. Wilbraham, *The Englishman's Food* (1957), p. 529.

⁶ J. W. Harris, 'Influenza occurring in Pregnant Women', *Journal of the American Medical Association*, lxxxii (1919), 975-80; 'Pandemic and Interpandemic Influenza A', *British Medical Journal*, 27 March 1976.

'flu', as it was called, in Kensington and Chelsea as compared with Hackney and Shoreditch.¹ If Drummond and Wilbraham were right, surely poorer areas would have suffered more from the vitamin deficiencies which supposedly reduced resistance. Thirdly, the contention that there was during the war a decline in nutritional levels must be tested against what we know of "normal", appallingly low, prewar nutritional levels. Pre-1914 Britain experienced malnutrition associated today with developing countries.² Before the impact of the war on public health can be measured the evidence of traditional deprivation in Britain requires examination, and the argument that the resistance to endemic and epidemic disease of the British population declined during the war and because of the war needs reappraisal. In particular, a reassessment is needed of the related assumption that the deterioration in standards of living and consequently in standards of health, which took place in wartime Germany, Austria, and France, also took place in Britain.

It is the contention of this article that this assumption is invalid, and that Britain's wartime demographic experience differed from that of her continental allies and enemies. I hope to prove this point by presenting evidence of improvements in wartime mortality rates in England and Wales, and by relating this phenomenon to an overall rise in the standard of living of the population, and especially of the working class. The demographic evidence is of two sorts. The first describes changes in working-class mortality at working ages as derived from data published in 1918 by the Prudential Assurance Company. The second describes wartime changes in rates of infant mortality in England and Wales. Together, these data provide statistical support for the view that the life chances of war babies, and those of working men who were fortunate enough to stay out of the trenches, improved markedly during the First World War.

I. THE MORTALITY EXPERIENCE OF WORKING-CLASS MEN, 1914-17

(a) Data

The only available data on age-specific mortality during the war are those published by the Prudential Assurance Company in the *Journal of the Institute of Actuaries* in 1918.³ By that year, the company had been in the business of providing life insurance for workingmen for sixty-four years. From modest beginnings in 1854, its industrial department grew rapidly in the following decades, with much of the work centring in the industrial Midlands, Lancashire, and Yorkshire.⁴ In fact, the Prudential was so successful that a Post Office departmental committee was set up in 1907 to discover the causes of the unpopularity of Post Office insurance schemes. Sir Edward Bradbrook, former Chief Registrar of Friendly Societies, attributed the Prudential's lion's share of industrial insurance to its good management, its reliability, and its tolerance of brief lapses in the payment of small weekly premiums. Bradbrook told the committee that for these reasons

¹ *Supplement to the 83rd Report of the Registrar-General of England and Wales, Report on the Mortality from Influenza in England and Wales during the Epidemic of 1918-19* (Parl. Papers, 1920, x), p. 12.

² D. J. Oddy, 'A Nutritional Analysis of Historical Evidence: The Working-Class Diet, 1880-1914', in D. J. Oddy and D. S. Mellor, eds. *The Making of the Modern British Diet* (1976), p. 229.

³ Burns, 'Industrial Mortality in 1915-17', *Journal of the Institute of Actuaries*, LI (1918), 69-71.

⁴ R. W. Barnard, ed. *A Century of Service: The Story of the Prudential, 1848-1948* (1948), pp. 13, 16.

the Prudential "has deservedly got the great position of influence which it has amongst the working classes".¹ In 1915, there were nearly 21 million Prudential life insurance policies in force, which covered the lives of about five million men. Perhaps one-third of these men served in the war. Thus the data describe the mortality experience of about one-quarter of the over six million men in uniform and about one-half of the male population which manned the war economy.²

There is no way of knowing how representative of the British working class were the five million men who held Prudential policies. On the one hand, some unskilled or casual workers may have been unable to keep up the premiums, no matter how small. Since their mortality rates were well above the national average, their absence in the insured population means that some distortion is bound to occur in the use of the Prudential data.³ But on the other hand, there is evidence that about 50 per cent of all miners, or over 400,000 men, held Prudential policies at the end of the nineteenth century.⁴ Their mortality due to accident and disease was relatively high, which introduces a compensating distortion in the data. It may be concluded that the Prudential population was probably composed of the urban, semi-skilled, and skilled working class of the industrial Midlands, the north, and the London area. On the shoulders of these men fell the burden of war production, and it is safe to judge from their mortality experience the immediate impact of the First World War on the health of the civilian male population.

(b) *Method*

Elsewhere I have used these data to calculate the age structure of British war losses.⁵ It is possible to exploit them in another way in order to evaluate the war's effects on civilian health. I have located the incidence of war losses at ages 16–49. Ninety-seven per cent of all British men who died in the war never reached the age of 40.⁶ The Prudential data extend to age 60. This allows comparison of the mortality experience of men who were likely to see active military service with those who were too old to have fought in the trenches. This exercise should throw some light on the validity of the hypothesis of improved civilian health during the war in Britain.

The Prudential data describe, in an approximate fashion, the life expectation of working-class men. To see the implications of the differences between working-class and general mortality rates, two counterfactual progressions have been prepared, the first designated Counterfactual Estimate 1 (CFE 1); the second,

¹ Ibid. p. 78; *Report of the Departmental Committee on the Encouragement of the Life Insurance System of the Post Office, with the Evidence* (P.P. 1908, xxv), pp. 275 ff.

² Private communication of R. D. Clarke of the Prudential Assurance Co. to me, 25 Feb. 1975. Over six million men served out of a male working population in Britain that numbered over 11 million in 1911.—See N. B. Dearle, *The Labour Cost of the World War* (New Haven, Conn. 1940).

³ *Supplement to the 75th Report of the Registrar-General of England and Wales. Part IV, The Mortality of Men in Certain Occupations in the Three Years 1910, 1911, and 1912* (1914). This supplement was printed separately and is not to be found among parliamentary papers.

⁴ J. Benson, 'English Coal Mines' Trade Union Accident Funds, 1850–1900', *Economic History Review*, 2nd ser. xxviii (1975), 403.

⁵ J. M. Winter, 'Some Aspects of the Demographic Consequences of the First World War in Britain', *Population Studies*, xxx (1976), 539–52.

⁶ This may underestimate slightly losses over age 40. See Winter, loc. cit. for a discussion of the reliability of the estimates.

Counterfactual Estimate 2 (CFE 2). CFE 1 is a progression of the male census population of England and Wales from 1911 to 1917 on the assumption of constant mortality according to English Life Table no. 8, which describes general mortality in England and Wales in 1910-12. CFE 2 is a progression through the same period on the assumption of constant mortality according to an abridged life table constructed from the Prudential data for 1913. These two progressions show what the male population of England and Wales might have looked like in 1911-17 without the war. They are purely notional and flawed by the impossibility of correcting accurately for out-migration in the immediate prewar period. But for comparative purposes, the counterfactual estimates are adequate. The use of both helps to evaluate the extent of the prewar divergence between working-class life expectations and that of the male population as a whole.

CFE 1 and 2 provide the base lines against which war-related age-specific mortality can be measured. To calculate actual wartime mortality, one other progression, deemed War Estimate 1 (WE 1), was made. In this case, the 1911 male census population was projected forward to 1914 on the basis of survival ratios derived from the 1913 abridged Prudential life table, and then to 1917 on the basis of survival ratios derived from abridged life tables prepared for 1914-17. In each estimate, the age-structure of deaths was calculated by multiplying age-specific death-rates by the relevant mid-year populations.¹

(c) Results

Table 1 lists all three estimates of male deaths in 1914-17 at ages 16-59, in quinquennial age groups. The difference between WE 1 and CFE 2 may be viewed as an estimate of total war-related deaths by age. This table shows that war-related mortality peaked in the early 20's cohort and then declined in

Table 1. *Estimates of Total Deaths, Male Population of England and Wales, in 1914-17, at Ages 16-59, according to Different Life Tables*

Age	CFE 1	CFE 2	WE 1	War-related deaths (WE 1 - CFE 2)	Percentage increase or decrease of deaths attributable to war (war-related deaths/CFE 2)
16-19	15,935	18,522	65,583	47,061	254.08
20-24	24,043	25,250	167,065	141,815	561.64
25-29	25,088	27,619	109,552	81,933	296.65
30-34	30,391	31,768	86,093	54,325	171.01
35-39	36,962	37,846	68,687	30,841	81.49
40-44	44,179	45,170	53,857	8,687	19.23
45-49	49,561	52,222	52,800	578	1.11
50-54	58,841	64,174	62,716	-1,458	-2.27
55-59	66,932	76,387	73,579	-2,808	-3.68
Total	351,932	378,958	739,932	360,974	95.25

Sources: See text.

intensity until the early 40's. War-related deaths were six times "normal" mortality at ages 20-4, twice as high at ages 30-4, and about the same at age 45.

¹ In calculating life tables, death-rates, and survival ratios, I have followed G. W. Barclay, *Techniques of Population Analysis* (New York, 1958).

After age 46, totals of war-related mortality become negative. In other words, men over the age at which they were likely to see active service had improved chances of survival during the 1914-18 war.

The timing of the wartime diminution of civilian death-rates can be located more specifically. Fig. 1 (Appendix) describes the pattern of war-related deaths at ages 40-59 in each year 1914-17. Positive totals of war-related deaths show the war's adverse effects; negative totals show wartime improvements in the mortality experience of the Prudential population. The latter appear after age 46 in both 1916 and 1917. The possible causes of this surprisingly favourable side of the war will be discussed below.

Was the improvement in the life chances of working men in their late 40's and 50's great enough to bridge the prewar gap between "normal" working-class and general death-rates? The answer is no, as the figures in Table 2 illustrate. Taking CFE 1 as the basis of comparison, total deaths at working ages in the industrial population in 1913 were about 8 per cent higher than that of the general population. This comparison is flawed because of the difference in the age-structure of different classes, but nevertheless this figure can be taken as an approximation of the extent to which prewar male working-class mortality exceeded the national average. In 1914-17, the index figures in WE 1 show enormous increases in deaths at ages 16-49, which are combat losses. The drop in mortality registered from age 47 onward represents civilian gains. These improvements do not approach the level of CFE 1.

Table 2. *Index of Three Estimates of Total Deaths, Male Population of England and Wales, in 1914-17, at Ages 16-59, according to Different Life Tables*

Age	CFE 1	CFE 2	WE 1
16-19	100	116	412
20-24	100	105	695
25-29	100	110	437
30-34	100	105	283
35-39	100	102	186
40-44	100	102	122
45-49	100	105	106
50-54	100	109	107
55-59	100	114	110
Total	100	108	210

Source: Table 1.

It is unfortunate that no data survive for 1918; hence there is no certainty that this change for the better continued in the war's final year, or that it was confined to the working class. But the evidence does suggest that by 1918 working-class mortality rates had been reduced, although not enough to eliminate completely the demographic disadvantage of being a working man in early twentieth-century Britain.

II. INFANT MORTALITY DURING THE WAR

The second type of demographic evidence on the social effects of the First World War in Britain concerns infant mortality. Throughout Europe the birth-rate

declined drastically during the war. Since fewer babies were born, the number of infant deaths (in the first year of life) dropped as well. But among the major combatant powers there were significant differences in the war's effect on infant mortality rates. In Germany, infant mortality rates were fairly stable, despite wartime shortages and the Allied blockade which continued long after the armistice. But there was in Germany "a break in the prewar pattern of decline", and in France, Italy, and Austria, a serious deterioration in infant mortality rates at different periods of the war.¹ As Fig. 2 (Appendix) shows, only in Britain were there improvements in infant mortality rates during the 1914-18 war. It might be argued that a drop in the birth-rate would mean that newborns would receive relatively more attention and that a greater proportion would survive. But the data described in Fig. 2 belie such a direct correlation between the birth-rate and the infant mortality rate. Birth deficit is thus not a sufficient explanation for the course of infant mortality during the war.

Hersch argued that "the industrial mobilization of women, their employment en masse in different branches of the economy, as well as the scarcity of certain commodities such as milk, etc. contributed without a doubt to the recrudescence of infant mortality" in central and western Europe.² The British case appears to be the exception to the rule. The contribution of women to war production was just as widespread and intensive as it was on the Continent. Infant mortality rates in this country, though, do not bear the traces of maternal exhaustion or neglect. In reference to Britain, Hersch was closer to the mark when he related infant health to food supply, a subject discussed below.

The variation in the infant mortality rate in each month of the first year of life in the war decade is shown in Table 3. An average of the death-rates for 1911, 1912, and 1913 should provide a good indication of infant mortality immediately prior to the war. It should be noted, though, that there were sharp differences in the mortality registered in these years. The summer of 1911 was the hottest on record, and led, in conjunction with dislocation associated with a national transport strike, to a sharp rise in infant mortality in 1911, and in particular to infant

Table 3. *Infant Mortality by Month, England and Wales, 1911-20,
Deaths per 1,000 Live Births*

Month	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
1st	40.65	38.44	39.44	38.46	37.90	36.90	37.50	36.50	39.79	35.18
2nd	13.91	10.21	11.62	11.04	10.90	9.83	10.00	9.97	9.30	9.31
3rd	10.85	7.42	8.72	8.33	8.11	7.01	7.40	7.02	6.19	6.39
4th	9.78	5.79	7.62	7.12	7.05	5.80	6.20	5.92	5.07	5.02
5th	8.71	4.73	6.36	6.08	6.16	5.07	5.30	5.09	4.19	4.03
6th	7.62	4.30	5.79	5.57	5.89	4.31	4.60	4.87	3.94	3.43
7th	7.41	4.20	5.44	5.23	5.74	4.05	4.50	4.70	3.82	3.25
8th	6.91	4.07	5.19	4.90	5.68	4.00	4.30	4.65	3.55	3.12
9th	6.54	4.21	4.82	4.89	5.82	3.69	4.30	4.81	3.56	2.93
10th	6.16	3.92	4.82	4.52	5.59	3.67	4.20	4.59	3.32	2.59
11th	6.77	3.79	4.27	4.36	5.44	3.33	4.10	4.34	3.33	2.43
12th	5.75	3.77	4.32	4.12	5.44	3.55	4.10	4.70	3.07	2.26
Total	130.06	94.85	108.41	104.62	109.72	91.21	96.50	97.16	89.13	79.73

Source: *Annual Reports of the Registrar-General for England and Wales.*

¹ Hersch, 'La mortalité', 11.

² Ibid.

mortality due to diarrhoea and enteritis. The spoilage of milk and other foodstuffs presented a real danger to infant health. In addition, the strike disrupted industrial activity throughout the country, which meant shut-downs and diminished pay for thousands of workers. In 1912, despite a major coal strike in March, infant mortality rates dropped significantly. The wetter, cooler, and quieter summer of that year was probably responsible for the higher rate of infant survival. The figures for 1913 are roughly at the mid-point of the two previous years.

The data in Table 4 permit a discussion of wartime changes in neonatal and post-neonatal mortality. Detailed figures on infant mortality by month of death were first published in 1905. Between the years 1905-10 and 1911-13 a 7 per cent drop in infant mortality rates had taken place. But by 1919 there had been a further 20 per cent decline in overall infant mortality rates. The most rapid improvements were registered after the first months of life. The sole exception is for 1915, when mortality rates after age six months rose steeply. In every other war year, though, after children were weaned and lost the protection of their mothers' antibodies against infectious diseases, post-neonatal mortality rates dropped. In 1914, 1916, 1917, and 1918, infants in Britain showed better resistance to or were less afflicted by endemic infectious diseases, and in particular, by gastro-enteritis. In the quinquennium 1911-15, the infant mortality rate attributable to this one cause was 19.05 per 1,000 live births. In 1916-20, it had fallen to 9.46. No other single source of infant deaths was checked as suddenly or effectively.¹ In the early 1920's, the rapid pace of improvement in infant health set during the war was maintained.

Table 4. *Index of Infant Mortality Rates in England and Wales, 1905-25*
(1911-13 = 100)

Month of death	1905-10	1911-13	1914	1915	1916	1917	1918	1919	1920	1921-25
1st	102	100	97	96	93	95	92	101	89	84
2nd-3rd	110	100	93	91	81	83	81	74	75	61
4th-6th	107	100	90	91	73	77	76	63	60	55
7th-9th	109	100	92	106	72	81	87	67	57	58
10th-12th	107	100	92	116	97	87	96	68	51	62
Total	107	100	95	99	82	87	87	80	72	68

Source: As for Table 3.

Less startling, but nevertheless important, improvements in infant mortality in the first month of life also took place during the war. This change is attributable to a steady decline in perinatal mortality. Mortality in the first day and in the first week of life in England and Wales was lower in every war year than in either the prewar or the immediate postwar periods. Fig. 3 (Appendix) illustrates the pattern of wartime neonatal mortality within the two decades after 1906, when full data on mortality in the first month of life were first published. The sole exception to the pattern of wartime improvement was that of illegitimate neonatal mortality, which peaked in 1917, but which dropped in every other war year. It seems likely that conditions of confinement during the war were certainly no worse, and probably better, than those of the prewar period. Neither the over-

¹ Wallis Taylor, 'The Changing Pattern of Mortality in England and Wales. I. Infant Mortality', *British Journal of Preventive and Social Medicine*, viii (1954), 3.

crowding in those centres of war production which grew rapidly after 1914, nor the absence on military service of over 13,000 doctors, adversely affected the life chances of newborns. Indeed, when most doctors returned in 1919, the neonatal mortality rate rose for both legitimate and illegitimate births. This phenomenon was probably related to the influenza epidemic of 1918-19. Mothers who contracted the disease in 1918 may have been weakened and/or their foetuses damaged sufficiently to diminish the life chances of children born in the following year.¹

The unusual rise in infant mortality in 1915 is attributable to a change in the virulence of certain endemic diseases. A severe outbreak of spring measles accounted for a rise of 67 per cent over infant deaths in 1914 due to common infectious diseases. There were also outbreaks of whooping cough and meningitis in England and Wales in 1915, as well as a rise in the incidence of infant deaths due to bronchitis and pneumonia. These respiratory diseases are common complications of viral infections and may be seen as adjuncts of them. There was at the same time a slight drop in deaths due to diarrhoea and enteritis, which is probably related to the relatively wet and cool conditions of the summer of 1915.

The data illustrated in Fig. 4 (Appendix) permit discussion of the exceptionally high death-rates at ages 6-12 months in 1915. The graph shows the overall pattern of decline, which the war did not alter. Within these two decades of improving chances of infant survival, there were four peaks of infant mortality after age six months, in 1906, 1911, 1915, and 1918. The downward trend was also checked in 1908 and 1921-2. The 1915 figures therefore reflect one of a series of outbreaks of infant disease which occurred in the early part of this century, at roughly three-year intervals, and with diminished intensity after 1911.

No one knows precisely why a flare-up of a particular viral infection occurs, but Scrimshaw, Taylor, and Gordon have shown that measles and other diseases of infancy occur in three-year cycles. The high mortality of 1915, therefore, may be linked to the normal periodicity of such diseases. Therein may lie as well the explanation of the sudden disappearance of the same viral infections in 1916 and 1917 both in Scotland and in England and Wales.²

Finally, it seems that this general improvement in infant survival during the war was not limited to one part of the country. From Table 5 it is clear that the

Table 5. *Index of Regional Infant Mortality Rates in England and Wales, 1911-25*
(England and Wales, 1911-13 = 100)

Region	1911-								1921-
	13	1914	1915	1916	1917	1918	1919	1920	25
North	121	110	112	96	97	102	94	88	82
Midlands	101	86	92	76	77	78	74	64	62
South	93	80	89	71	77	78	68	59	57
Wales	110	99	101	83	85	86	83	77	73
England and Wales	100	95	95	82	87	87	80	72	68

Source: As for Table 3.

¹ J. B. Hardy, 'Fatal Consequences of Viral Infections in Pregnancy', *Archives of Otolaryngology*, xcvi (1973), 218-27.

² 78th Report of the Registrar-General of England and Wales for 1915 (P.P. 1917-18, v); 61st Report of the Registrar-General of Scotland for 1915 (P.P. 1916, vi); N. Scrimshaw, C. E. Taylor, J. E. Gordon, *Interactions of Nutrition and Infection* (Geneva, 1968), p. 245.

outbreak of disease and the resultant infant mortality in 1915 were more severe in the south and in the Midlands than in Wales or in the north of England. But in the following years all regions showed impressive improvements over 1911-13, when regional figures were first published. In 1918, there was a slight increase in infant mortality throughout the country, but not enough to obscure the real gains in infant health during the war which were maintained in the years after the armistice.

III. STANDARDS OF HEALTH AND STANDARDS OF LIVING

One reason for the wartime decline in infant mortality rates was an improvement in standards of care of pregnant women and infants. Just before the outbreak of war, the Local Government Board (L.G.B.) circularized county council and sanitary authorities "asking that they undertake infant and maternal welfare work and offering to pay fifty per cent of the cost of such work".¹ Their suggestions amounted to a comprehensive system of antenatal and postnatal care. The L.G.B. was willing to assist in the establishment of antenatal clinics, in the provision of home visitors for expectant mothers, and more hospital space for complicated pregnancies. Support was offered to enable skilled midwives to attend confinements, which would take place in hospital if necessary. In addition, further backing was available to help provide hospital treatment of postnatal complications, for infant and child-care clinics, and for home visitors to the families of young children.²

The positive response to this circular led Arthur Newsholme, the chief medical officer of the L.G.B. to claim in November 1916 that: "The war has had the effect of directing greatly increased attention to means for improving the health of mothers and their children during the first five years of life."³ By that year, the L.G.B. was prepared to go beyond the 1914 circular. It offered grants for the salaries and expenses of inspectors of midwives, and for nurses and health visitors engaged in maternity and child welfare work. Money was also allocated for the provision of midwives and doctors for the poor and for understaffed regions, such as the north of England, for the full expenses of antenatal clinics, and for hospital treatment of infants.⁴ There is no evidence here of pressure to reduce public expenditure in war time.

Better health care for mothers and infants was the objective of other wartime administrative developments. In 1915, the Board of Education undertook to set up classes for mothers to help them prevent and treat infant illness more effectively. In the same year, the 1907 Notification of Births Act was extended to allow for the appointment of committees, with women members, empowered to pro-

¹ L.G.B. circular no. 1 on Maternity and Child Health, in *44th Report of the Local Government Board for 1914-15*, appendix to pt 1 (P.P. 1916, xii).

² L.G.B. circular no. 3 on 'Notification of Births (Extension) Act 1915. Circular Letter to County Councils and Sanitary Authorities', dated 29 July 1915, and L.G.B. circular no. 4 on 'Regulations under which Grant Will be Paid by the Local Government Board to Maternity Centres during the Year Ending 31st March 1916' dated 7 July 1916 (P.P. 1917-18, xxv), pp. 103 ff.

³ Mabel Bell, 'Review of Reports on War Work in England, France, and Germany, with Special Reference to the Care of Women during Pregnancy and Labour', *American Journal of Obstetrics*, LXXXVII (1918), 475.

⁴ *Ibid.*

vide in any way they saw fit for the care of expectant mothers. The Midwives Act of 1902 was amended in 1916 in order to make midwifery training more rigorous. Under the new Act, midwives had to have six months' training, to attend at 20 cases, and to pass a written examination before qualifying. Since nearly half of the 12,000 midwives who gave notice to practise in 1915 were untrained, and since between 50 and 75 per cent of all women were delivered by midwives, this change in training standards was of real importance.¹ This was especially so during the war, when so many doctors were abroad on active military service.

The fact that doctors were unavailable during the war may have affected perinatal mortality in another way. By and large, midwives did not practise instrumental deliveries. The absence of so many doctors may have led to a decline in the use of forceps, and consequently in the number of babies damaged by them. Newsholme and T. H. C. Stevenson, Superintendent of Statistics for England and Wales, both believed that this factor contributed to the wartime drop in the mortality of infants in the first twenty-four hours of life.² While this explanation is consistent with the rise of perinatal mortality in 1919, when most army doctors were demobilized, it is suspect because perinatal and maternal mortality resumed their downward trend in the early 1920's. It was influenza and not changes in the management of delivery which accounted for the aberrant 1919 perinatal mortality figures.

In the war period itself, the most important cause of the decline of early infant mortality appears to have been the growth of state support for infant welfare. One example of how such support was used was the establishment of an infant welfare centre in Wandsworth in 1915. On 12 May, a conference was held in the borough to consider starting a school for mothers. On the first Tuesday in July, the "Mothers' Welcome" was opened at the Anchor Mission, which was situated in a "thickly populated district which has the highest infant mortality rate of the borough". Twenty-three mothers attended. They had their babies weighed, consulted a doctor, were able to purchase at cost price foods such as a popular brand of dried milk called Glaxo, and they had a cup of tea.³ Anyone with experience of infant welfare centres today will note that nothing has changed in the intervening sixty years. In the course of the year, 35 mothers a day came to the centre. Its popularity led to the opening of a similar centre in Putney in 1916. Yearly expenditure in each totalled £160, of which £47 went to the doctor, usually a woman, £28 to the attending nurse, and the bulk of the remainder on food and incidental expenses.⁴

By the end of the war, the same story was repeated in every other metropolitan borough, in most large cities, and to a lesser extent in rural districts throughout the country.⁵ Still, only 60,000 of the roughly 700,000 babies born in each war

¹ Bell, loc. cit.

² *47th Annual Report of the Local Government Board for 1917-18. Supplement Containing the Report of the Medical Officer for 1917-18* (P.P. 1918, xi), p. xxiii. *79th Annual Report of the Registrar-General of England and Wales for 1916* (P.P. 1917-18, vi), p. xxxiv.

³ *Mothers' Welcome. Metropolitan Borough of Wandsworth, Wandsworth and Putney Centres. First Annual Report, 1915-16* (1916), pp. 3-5.

⁴ Ibid.

⁵ *Local Government Board. Maternity and Child Welfare. Report on Provision Made by Public Health Authorities and Voluntary Agencies in England and Wales* (1917). See also reports in the Public Record Office of maternity

year were under care at an infant welfare centre.¹ We ought not exaggerate, therefore, the immediate effectiveness of these measures.

What had changed during the war were attitudes to infant welfare, and the surge of popular support for the new centres was apparent to all. As G. F. McCleary, medical officer of health in Battersea, put it, many people saw the establishment of centres for antenatal and postnatal care as "a form of war-work that called for the enlistment of many workers".² Sir Arthur Acland, a former president of the Board of Education, helped spread the creed by forming an "Infant Welfare Propaganda Fund" from which travelling organizers were paid to stimulate interest. Acland claimed a hand in the establishment of 200 health centres by his work.³ Similarly motivated were the "public-spirited ladies" who in 1917 set up the Children's Jewel Fund with offices in New Bond Street. They solicited money, jewels, and other valuables to help finance infant welfare centres. Their slogan was "a jewel for a baby's life". Thousands poured in. One sale of jewels in June 1918 realized £26,000, of which £5,000 was accounted for by the Duchess of Marlborough's pearl necklace. A special performance of *Manfred* in Drury Lane added £500, and a dolls show raised £4,000.⁴ The proceeds went to child welfare associations.

The most spectacular of these demonstrations of support for infant welfare was the convening of a special "Baby Week" in early July 1917. The week opened with an exhibition at Central Hall, Westminster, attended by the Queen. She was received by a guard of honour of 120 mothers and children, who were drawn from 80 maternal and infant welfare centres in London.⁵ On the same day, the Bishop of London spoke at a meeting of the Fulham Babies Hospital and Training Centre for Mothers. His address brought out well the mixture of philanthropy and patriotism which lay behind what *The Times* called the growing "cult of the child".⁶ The Bishop told his audience that "While nine soldiers died every hour in 1915, twelve babies died every hour, so that it was more dangerous to be a baby than a soldier. The loss of life in this war had made every baby's life doubly precious."⁷ A few weeks earlier, the leader writer of the *Daily Telegraph* had been even more specific about the strategic considerations behind support for infant welfare: "If we had been more careful for the last fifty years to prevent the unheeded wastage of infant life, we should now have had at least half a million more men available for the defence of the country."⁸ One writer in the *Nineteenth Century* called for support for infant welfare in order to help make up "the huge loss in the man-power of the Empire due to the war". He complained that "no benedictions have yet been showered on health visitors and others, who by saving infant lives are doing something to meet our huge war losses."⁹

and child welfare schemes in Durham, Kent, Birmingham, Bradford, Liverpool, and Norwich. P.R.O. MH 48/42, 69, 164, 182, 196, 251, 268, 513.

¹ Ibid. ² G. F. McCleary, *The Maternity and Child Welfare Movement* (1935), p. 16.

³ Ibid. p. 18n. ⁴ Ibid. pp. 19-20. ⁵ 'Baby Week', *Daily Telegraph*, 3 July 1917.

⁶ 'Baby Week', *The Times*, 3 July 1917. ⁷ 'Bishop and the Babies', *Daily Telegraph*, 2 July 1917.

⁸ 'National Baby Week', *Daily Telegraph*, 28 May 1917. Dr A. E. Harris, medical officer of health for Islington, was disturbed by this remark. He noted that the *Daily Telegraph* leader "may express the military point of view, which, though a practical one, is, nevertheless, a very poor reason in a Christian country".—*61st Annual Report on the Health and Sanitary Condition of the Metropolitan Borough of Islington* (1917), p. 11.

⁹ J. Caesar Ewart, 'The Saving of Child Life', *Nineteenth Century and After*, LXXXII (1918), 119.

Concern for the health of future soldiers was deepened by the recognition that large numbers of men were deemed by the army to be unfit for combat duty on grounds of poor health. Over 40 per cent of the 2,500,000 men examined by the National Service Medical Boards in 1917-18 were placed in grade III, for men with "marked physical disabilities" fit only for clerical work, or in grade IV, for men "totally and permanently unfit for any military service".¹ The infant welfare movement was bolstered by the support of all those who wanted to maximize the future military potential of the country. Admittedly, in the aftermath of the Boer War, similar sentiments had been voiced. But the scale of military participation and casualties in the 1914-18 war gave to the proponents of public health measures a standing they had never had before.

This consensus accounts for the speed with which infant welfare measures were enacted. In 1914, there were only 600 full-time health visitors in England and Wales. The number had risen to 1,355 in 1918. L.G.B. grants totalling £22,000 went to 42 voluntary societies and 32 borough or county councils in 1916-17 alone.² The number of midwives rose from 37,000 in 1914 to 43,000 in 1918.³ Since the birth-rate declined so rapidly during the war, there was more assistance for women in labour and after. All these steps helped lessen the risks of childbirth and those of the early months of life.

Better care and advice were probably responsible for the drop in early neonatal mortality. The wartime improvement in post-neonatal mortality was the result of rising living standards during the war. Both the data on infant mortality and those on adult male mortality point to a major improvement in nutrition after 1914. Indeed, full employment, higher real wages, especially for unskilled and semi-skilled workers, the growth of women's work in industry, and the provision of separation allowances for soldiers' and sailors' wives, all meant that more money was available during the war for working-class family expenditure. It is generally accepted that a higher proportion of income was spent on food in working-class homes than in middle-class or upper-class homes.⁴ Better nutrition for mother and child and better conditions of confinement were made possible by the relatively greater prosperity of working-class families in war time. A Canadian study on the effects of prenatal diet on mother and child showed that "the nutrition of the mother during the prenatal period influences to a considerable degree the whole course of pregnancy and in addition, directly affects the health of the child during the first six months of life."⁵ An improved diet for pregnant women and their children in Britain during the 1914-18 war may have strengthened the resistance of infants to endemic infectious diseases.

The wages of most, but not all, workers kept pace with the wartime rise in the cost of living. Skilled workers in several trades probably suffered a decline in real wages between 1914 and 1917. Unskilled and semi-skilled men fared much

¹ *Ministry of National Service, 1917-19, Report Vol. 1 upon the Physical Examination of Men of Military Age by National Service Medical Boards from November 1st 1917-October 31st 1918* (P.P. 1919, xxvi).

² *Return of Grants by the Local Government Board in 1916-17 to the 27 London Boroughs and the City of Westminster, and to the Cities of Birmingham, Manchester, Liverpool, Leeds, and Bradford, in Aid of Municipal and Voluntary Infant Welfare Centres, with the Names of the Institutions* (P.P. 1917-18, xxv).

³ *Report of the Work of the Central Midwives Board for 1918-19* (P.P. 1920, xxi).

⁴ J. Boyd Orr, *Food, Health and Income* (1937), *passim*.

⁵ J. H. Ebbs, F. F. Tisdall, and W. A. Scott, "The Influence of Prenatal Diet on the Mother and Child", *Journal of Nutrition*, xxxii (1941), 525-6.

better, and since they formed the majority of the work-force, aggregate figures show an improvement of about 100 per cent in wage rates during the war. In addition, overtime payments added enough to most pay packets at least to match the roughly 100 per cent increase in the cost of living during the war.¹

The implications of better wages for infant mortality levels were sketched by Dr F. J. Allen, in his presidential address to the Society of Medical Officers of Health in November 1916. He said that "whatever may be the condition after the War, the circumstances of the working class are now better than they have ever been." The result was "the better feeding of the children they have".² Robert Roberts's perceptive memoir of working-class life in Salford records the same impression of the war's beneficial effect on standards of living:

By late 1916 abject poverty began to disappear from the neighbourhood. Children looked better fed. There were far fewer prosecutions for child neglect. Well before the end of the war the number of pupils taking free dinners at our school fell to one fifth of the pre-1914 figures.³

For low-paid workers, there was an undoubted improvement in food consumption during the war. Other sections of the working class may not have benefited so much, if at all, but there is little hard evidence of severe pressure on their standards of living.

There were countless complaints and protests about rising prices and profiteering. But many of the wartime campaigns about food prices served as forums for people who wished to express obliquely their opposition to the war, and their anxieties and frustrations over the mismanagement of the war effort. It is clearly unwise to use the fact of agitation about living standards as the sole guide as to whether they rose or fell during the war.

This is not to deny that there were significant variations in the impact of the war on levels of consumption. Retail food prices rose by 110 per cent between 1914 and 1918. An inquiry into working-class living standards, known as the Sumner Committee Report, found that between July 1914 and July 1918 there was only a 90 per cent increase in the weekly expenditure on food in working-class families. But what seems to have occurred was a change in the composition of diets rather than a decline in overall food consumption. More milk, potatoes, bread, flour, rice, tapioca, and oatmeal were consumed per family in 1918 than in 1914. Meat was replaced by bacon, and bland white bread by the more nutritious, though less aesthetically pleasing, brown bread.⁴ The result may have been less appetizing, starchier meals, but aside from a decline in sugar consumption, wartime diets maintained prewar calorific levels. In sum, as the Sumner Committee pointed out,

Fuller employment, and more profitable employment do result in improvements in the worker's position under war conditions which, in turn, ensure largely to the collective benefit of the family, of which the worker forms part . . . we have found,

¹ A. L. Bowley, *Prices and Wages in the United Kingdom, 1914-20* (1921), chs. 6-7; 'The Rise in Rates of Wages during the War', *Labour Gazette*, xxvii, 5 (May 1919), 172-4.

² F. J. Allan, 'The Coming Race', *Public Health*, xxix (1915), 30.

³ Robert Roberts, *The Classic Slum* (1971), p. 203.

⁴ Bowley, *op. cit.* p. 36. *Report of the Sumner Committee on the Working Classes Cost of Living* (P.P. 1918, vii), pp. 6-7.

on the evidence of the budgets of working-class expenditure, that in June 1918, the working-classes as a whole, were in a position to purchase food of substantially the same nutritive value as in June 1914. Indeed, our figures indicate that the families of unskilled workmen were slightly better fed at the later date, in spite of the rise in the cost of food.¹

The committee also reported the findings of the medical officers of the London Educational Authority that the percentage of entering school-children "found in a poorly nourished condition is considerably less than half that percentage in 1913". The same was true in Birmingham, Bristol, Glasgow, and Nottingham.²

The major weakness of the Sumner Committee Report is that it had little data on families of munitions workers.³ But the 20 memoranda issued by the Health of Munitions Workers Committee of the Ministry of Munitions covered the population the Sumner Committee missed, and confirmed its findings. An "Investigation of Workers' Food and Suggestions as to Dietary" examined the calorific value of meals in canteens of munitions factories and found it satisfactory.⁴ By October 1917, 710 canteens had been set up in works employing 920,000 munitions workers. Of course, this meant that only half of the labour force in the munitions factories had such provisions. But this growth in industrial canteens represents a substantial improvement over prewar conditions.⁵ There is additional corroborating evidence of a general improvement in working-class nutrition during the war in a study of family budgets and dietaries in Glasgow, which was a centre of munitions production.⁶

Two other changes in consumption patterns contributed to the improvement in infant survival rates. The first was the increase in the provision of condensed and dried milk as a substitute for cows' milk during the war. Milk substitutes were less likely to carry the tubercle bacillus and therefore wartime shortages of milk led to a change in the constituents of the milk supply which was indirectly advantageous to child health. The resort to milk substitutes may have been a function of employment as much as scarcity. It is possible that the growth of the female labour force led to a decline in breast-feeding among working mothers. There is no evidence that their children suffered as a result. Finally, the fixing of the price of milk after October 1917, and its rationing in the last year of the war, ensured a regular quota of milk for every family with young children.⁷ The role of milk in the decline of infant mortality has been recognized,⁸ but not that part of the story related to the war.

A second war-related change in patterns of consumption which indirectly affected infant mortality rates concerns alcohol. Control of the liquor trade and a limit to opening hours for pubs reduced the incidence of alcoholism and infant neglect associated with it. Before the war, there was a peculiar pattern in the weekly distribution of infant deaths due to suffocation. Deaths reported on

¹ *Report of the Sumner Committee on the Working Classes Cost of Living* (P.P. 1918, vii), pp. 8-9.

² *Ibid.* p. 9. ³ *Ibid.* pp. 12-13.

⁴ *Health of Munitions Workers Committee. Memorandum No. 11* (P.P. 1916, xxiii).

⁵ *Health of Munitions Workers Committee. Memorandum No. 19* (P.P. 1917-18, xx). See also, F. N. Curtis-Bennett, *The Food of the People* (1949), ch. 8.

⁶ N. Ferguson, 'The Family Budgets and Dietaries of Forty Labouring Class Families in Glasgow in War Time', *Proceedings of the Royal Society of Edinburgh*, xxvii (1916-17), 117-36.

⁷ *Interim Report of the Committee on the Production and Distribution of Milk* (P.P. 1917-18, xvi).

⁸ M. W. Beaver, 'Population, Infant Mortality and Milk', *Population Studies*, xxvii (1973), 243-54.

Sundays outnumbered those on any other day of the week. The Registrar-General believed that there was a large number of Sunday discoveries of infants who had suffocated the night before because parents were too drunk on Saturday nights to take proper care of their children. Wartime controls protected infants by lowering the incidence of parental alcoholism, and consequently reducing the rate of infant deaths due to "overlying" or suffocation. This change was clearest in the winter months, when more blankets were used to cover children.¹ One could also speculate that a reduction in alcoholism meant a reduction in the drain it caused on family incomes. Certainly, the price of spirits rose drastically during the war, from 3·94 shillings a pint in 1914 to 13·75 shillings a pint in 1918. Beer too was more expensive, and even though people could afford the additional expenditure, consumption of alcoholic beverages during the war dropped significantly.² The scarcity of alcohol and the restriction on opening hours of pubs were undoubtedly annoying to a population that could more readily afford such indulgences. But such deprivation pales in comparison with the drop in levels of consumption of basic foodstuffs in other European countries.

IV

All indications point to a rise in the standard of living of the British working class between 1914 and 1918 as well as to what Richard Titmuss described as an increased wartime "concern about the health and well-being of the whole population, and, in particular, of children—the next generation of recruits".³ Taken together, these changes in incomes and attitudes account for some of the ways in which the experience of war contributed positively to the preservation of child life in Britain in this century. When the Prudential evidence of increased life expectation for civilian workers is also taken into account, it is clear that war conditions benefited in particular the non-combatant labouring population.

The experience of war was certainly not uniform. Some sections of the population did not share the general improvement in public health during the war. There was about a 6 per cent increase in deaths due to tuberculosis between 1914 and 1916.⁴ Collis and Greenwood attributed this phenomenon to the growth of the work-force, and in particular, of the female work-force in heavy industry.⁵ There is no evidence, however, of the adverse effects of such employment on the health of pregnant women or the survival rate of their children. In addition, the elderly died at higher rates during the war than before it. The Registrar-General of England and Wales wrote in 1916 that "the shock of the war seems to have rendered the aged more vulnerable to disease in general . . . it appears only natural that the anxieties and bereavements of the time, as well as any exceptional hardships endured, should take their toll of these relatively feeble existences".⁶ No more tangible explanation was offered for the deterioration in their health, which was an exception to the general pattern of improvement.

The evidence provided in this article, therefore, suggests a much more opti-

¹ *Registrar-General's Report for England and Wales for 1916*, p. xl.

² A. R. Prest, *Consumer Expenditure in the United Kingdom, 1900-19* (Cambridge, 1954), ch. xiii.

³ R. Titmuss, *Essays on 'the Welfare State'* (1958), p. 80.

⁴ *Medical Research Council. Report of the Committee on Tuberculosis in Wartime* (1942), p. 34.

⁵ E. L. Collis and M. Greenwood, *The Health of the Industrial Worker* (1921), pp. 132-3.

⁶ *Registrar-General's Report for England and Wales for 1916*, p. xlviii.

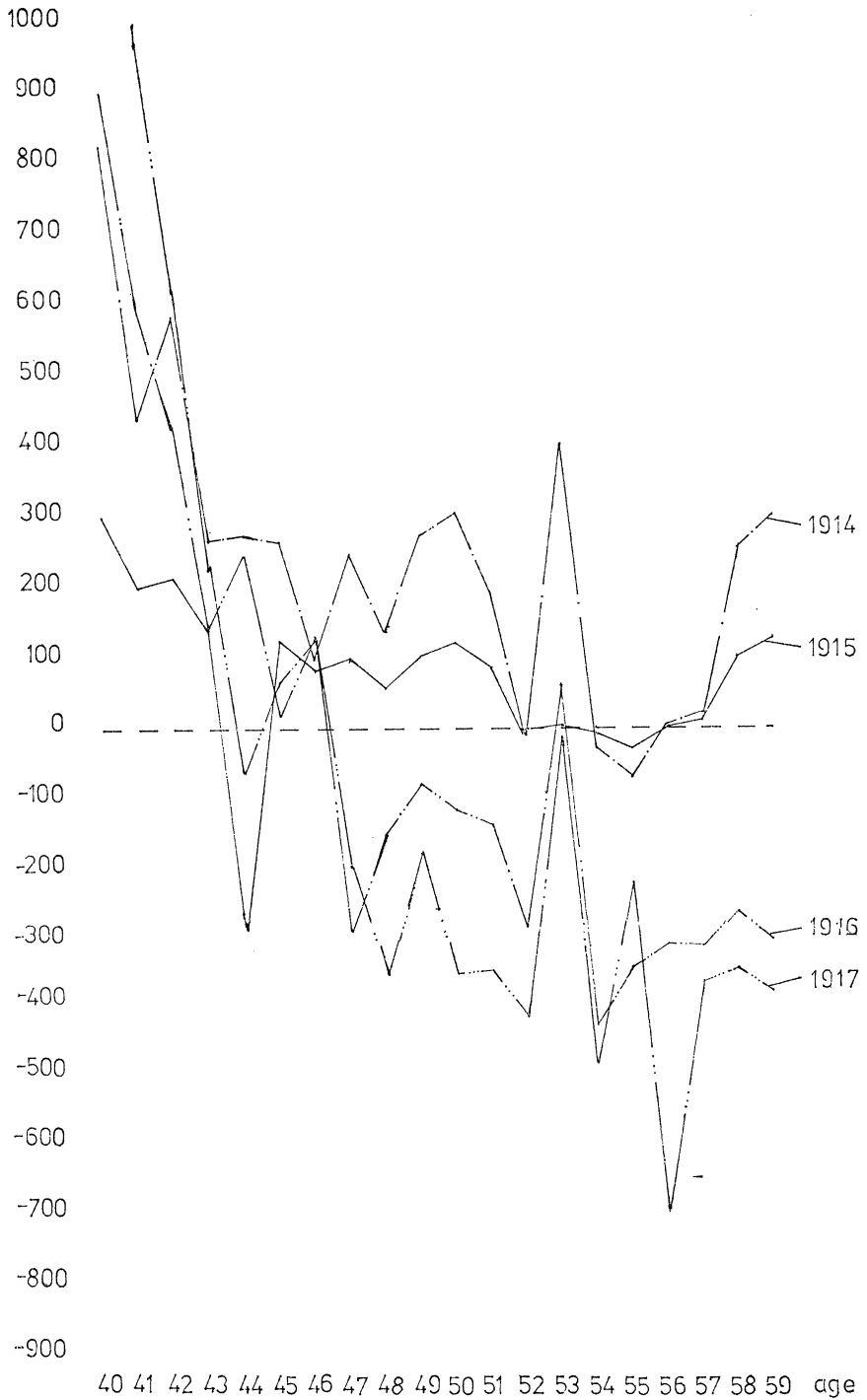
mistic view of the impact of war on the health of most of the British population than that taken by other writers. It is possible that wounds, disease, strain, or anxiety during the war affected the morbidity and mortality of ex-soldiers in the generation following the armistice. But there is no basis for the claim that in the short term or in the long term, war conditions were damaging or injurious to the men who stayed at home, or to their families. Perhaps the concept of civilian war-related mortality has some bearing on the continental experience of the 1914-18 war, but it is positively misleading in reference to Britain. In this country, victory in the First World War was not won at the expense of the health of the civilian population.

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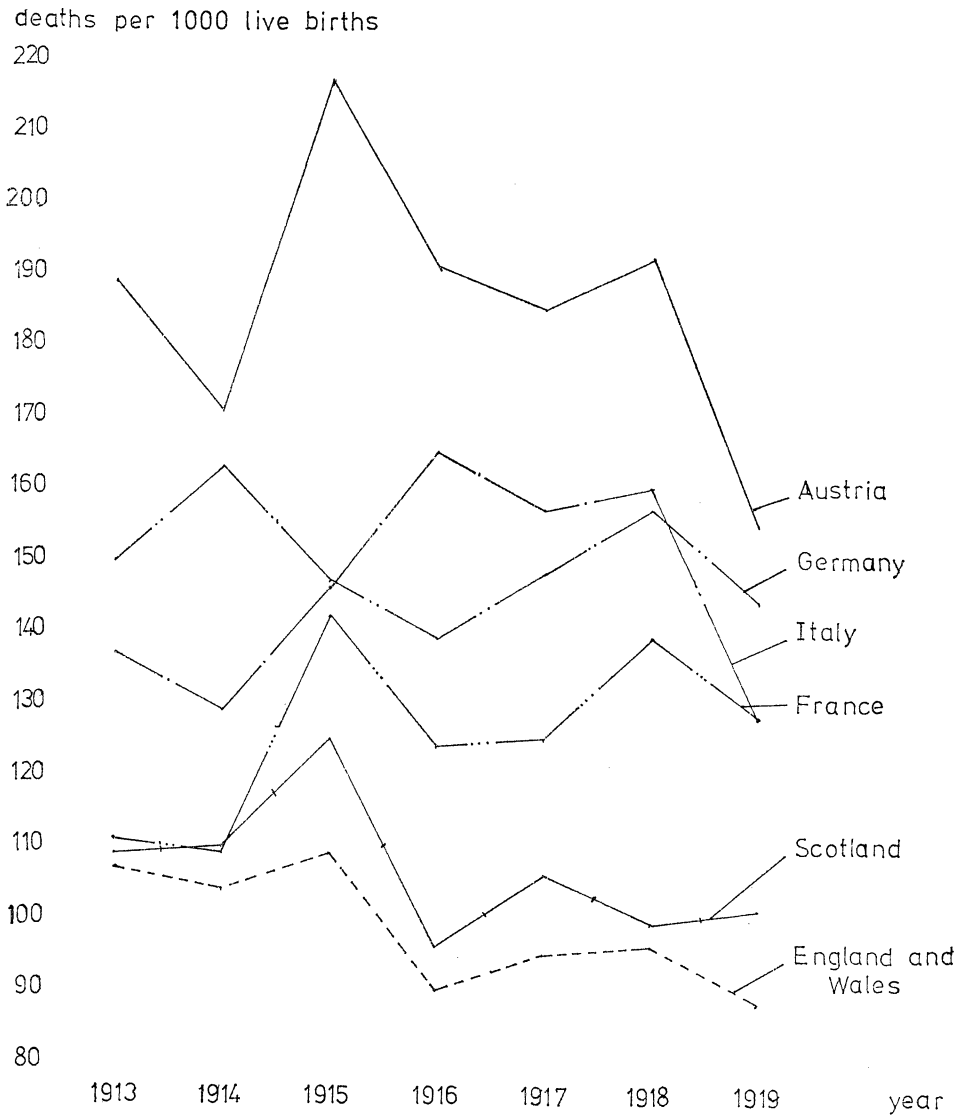
APPENDIX

Fig. 1. *Increase or Decrease of Deaths at Ages 40-59 Attributable to War, Male Population of England and Wales, 1914-17*

war-related deaths

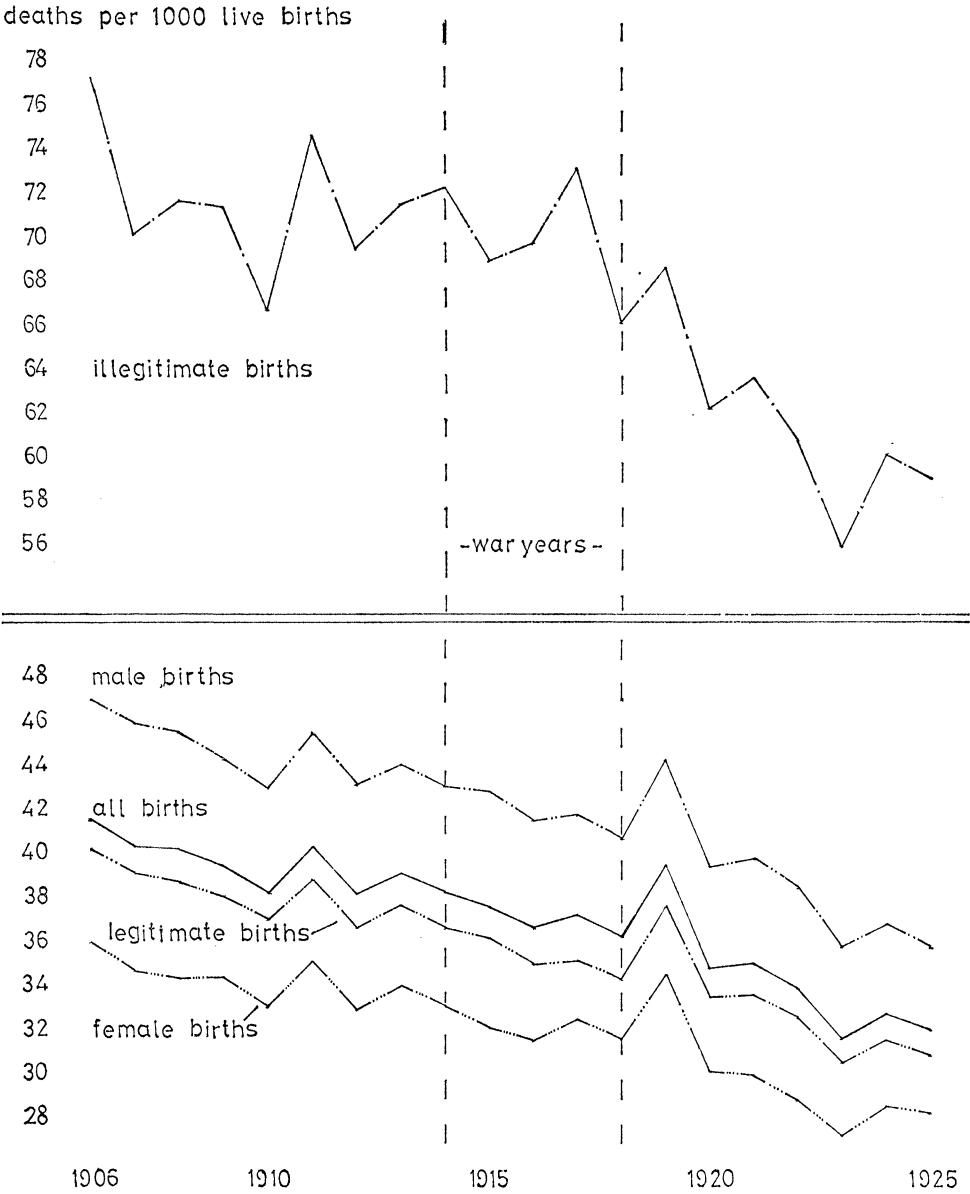


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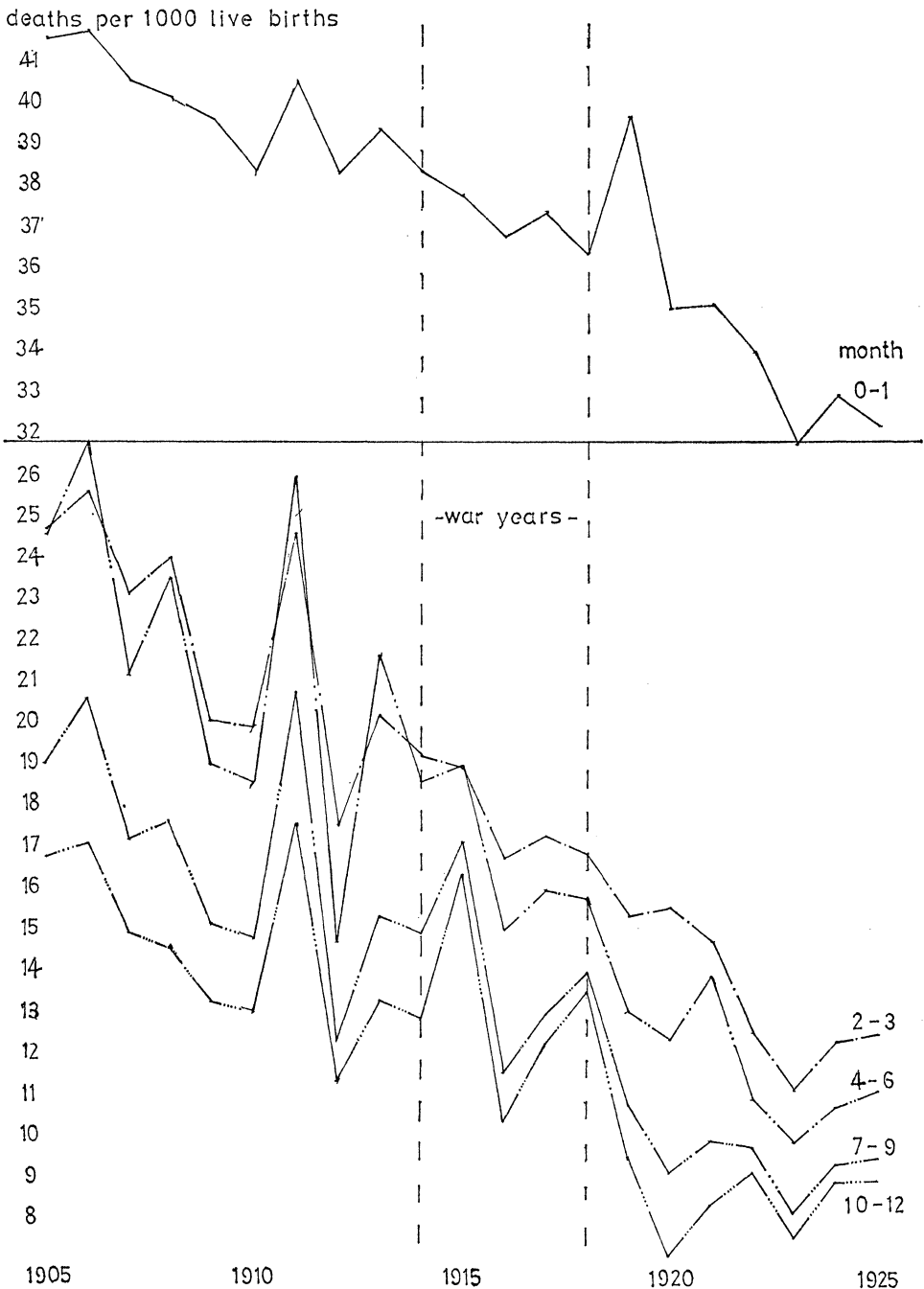
Fig. 2. *Infant Mortality in Several European Countries, 1913-19*

Sources: L. Hersch, 'La mortalité causée par la guerre mondiale', *Metron*, vii (1927), 111.; B. R. Mitchell, *European Historical Statistics, 1750-1950* (1975), pp. 130-1. I have followed Hersch when the two sources differed.

Fig. 3. Neonatal Mortality Rates, England and Wales, 1906-25



Source: 69th-88th Annual Reports of the Registrar-General for England and Wales, 1906-25.

Fig. 4. *Infant Mortality Rates, England and Wales, 1905-25*

Source: 68th-88th Annual Reports of the Registrar-General for England and Wales, 1905-25.