Social Class Variations in Mortality

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AN ANALYSIS of mortality in England and Wales in 1950 in what are customarily called the Registrar General's social classes has just been completed. The basic unit of the social class grouping is the occupational group. Every occupation in the country, of which there are many thousands, is assignable to one or another of 586 occupational unit groups. These 586 occupational groups are each assigned as a whole to one or another of 5 social classes, on the basis of the predominant characteristics of the majority of the persons in the unit group. The social class grouping is thus not a classification of individuals, and in assigning an individual to the appropriate social class no account is taken of personal circumstances other than occupation. Once the occupation of the individual has been established, the social class grading follows automatically.

In the 1951 census, 3.3 percent of the men aged 15 years and over were in social class I (professional occupations), and 15.0 percent were in class II (intermediate occupations); 52.7 percent were in class III (skilled occupations); 16.2 percent were in class IV (partly skilled occupations); and 12.8 percent were in class V (unskilled occupations).

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Development of Social Class Studies

In the same way that the social classes are constructed on the basis of an occupational classification, the study of social class mortality variations is a development from the study of mortality in individual occupational groups. It is just over 100 years since the first official study of occupational mortality in England and Wales was undertaken. This was an analysis of deaths from all causes in 1851 in several hundred occupations, related to the populations of these occupations as determined by the 1851 census (*1*). Similar studies were made of deaths in 1860–61 in relation to the 1861 census, and thereafter, at 10-year intervals, in and around each successive census year, standardized death rates having been introduced to allow for differences in the age structure of different occupations and separate causes of death studied.

In 1910–12, the occupational mortality analysis distinguished 132 occupational groups and 27 causes of death at ages 25–64 (*2*). In this analysis, and also in a study of infant mortality in 1911 (*3*), the various occupations were for the first time grouped together into social classes, of which on this occasion there were 8, the first 5 having been graded in much the same way as described above.

In 1921–23 (*4*), deaths were tabulated for 40 causes in 164 occupational groups, the occupational classification having been considerably improved and made more properly occupational as distinct from industrial, as it had previously tended to be. Five social classes only were distinguished; classes VI to VIII of the previous classification were merged with the others (*5*).

The last previous occupational mortality analysis was made for the years 1930–32 (*6*). For men, this was on the same lines as before but with further increase in the detail of causes of death and of occupations. A very important innovation at that time was the study of the mortality of single women classified by their own occupations, and of married women classified by occupation of husband. There are some special difficulties in studying the occupational mortality of single women. For example, many are unoccupied or are only transitorily in employment, and it was because of these difficulties that they had not previously been included. I would not like to claim that their inclusion in 1930–32 has really got us very far.

Analyzing the mortality of married women according to husband's occupation was, however, a great step forward. It has allowed comparison between the mortality of men in particular occupations and of their wives, who generally share the same socioenvironmental circumstances as their husbands but are not usually exposed to the husbands' occupational hazards or disadvantages. It thus became possible in 1930–32 to begin to distinguish between mortality risks that were primarily of occupational origin (though not necessarily due to direct occupational hazards) and those arising rather from the socioeconomic environments in which people in various kinds of occupations tend to live (*7*).

Limitations of This Method

There are well-recognized limitations in the study of occupational mortality and, to a less extent, of social class mortality, by the method traditionally employed. This method depends on the relating of occupational information obtained at death registration to occupational information derived from the census. These limitations have been discussed in great detail in the various official reports, and I shall only mention two.

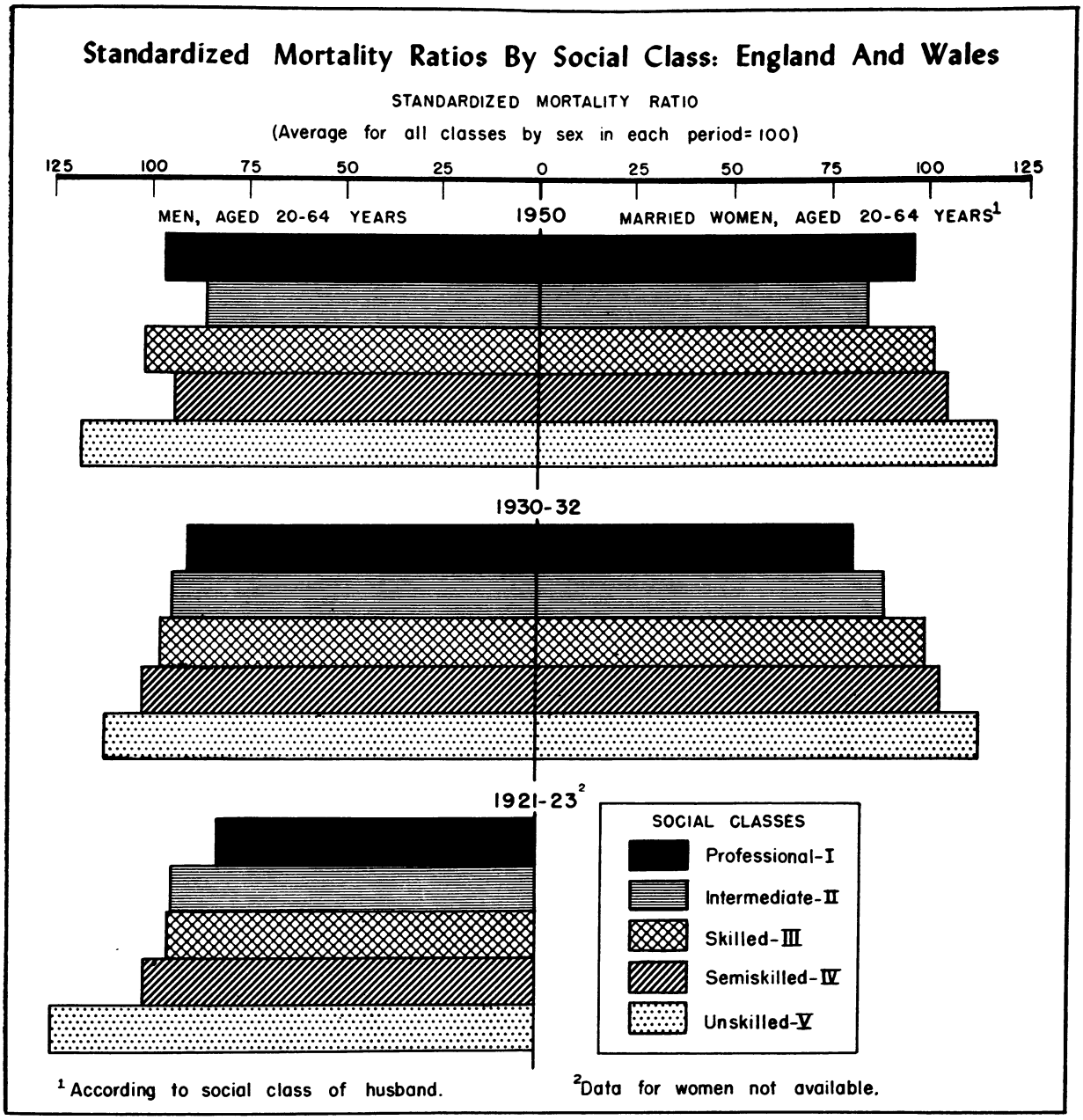
One type of error can arise from differences between the occupational description given by an individual himself on the census schedule and that given by a relative when registering the person's death. The individual probably knows best what his occupation really is but may not describe it properly or in sufficient detail on the census schedule, whereas at death registration the registrar is in a position to elicit details, including information about the previous occupation of a retired person, but occasionally the informant may not have sufficient knowledge to provide the information accurately.

A different type of difficulty arises in attempting to interpret the recorded mortality rates; it then becomes necessary to consider the extent to which an apparently high or low mortality rate recorded for an occupation may be due to physically or medically selective recruitment or discharge. An occupation such as the police may recruit only the physically fit, whereas other types of occupations may attract or become the refuge of invalids or persons of poor physique. The recorded mortality rates for such occupations might reflect the type of people engaged therein more than the risks of the occupation itself. Furthermore, the recorded mortality rate of a dangerous or of a physically onerous occupation may be understated owing to persons in failing health transferring to a less exacting job sometime before they die.

The 1950 Analysis

The latest England and Wales analysis deals with deaths in 1950 (*8*) related to the 1951 census 1-percent sample results. It constitutes a preliminary and much restricted survey of what we may expect to find in the full analysis which will shortly be commenced and which will cover deaths in the 5 years, 1949–53, probably in greater detail than ever for occupations and for causes of death. But, as this full analysis will not be completed for several years, and as it is now more than 20 years since the last one was made, it seemed desirable to take advantage of the opportunity offered by the 1-percent sample population data by preparing some advance tabulations, deliberately limited to the main social classes, and some major divisions of these, and to a few of the most important causes of death.

The accompanying chart compares the standardized mortality ratios of men aged 20–64 in the 5 social classes in 1950 with those recorded in 1921–23 and 1930–32. The same comparison



is made for married women for 1950 with 1930–32. The standardized mortality ratio is the number of deaths of men or the number of deaths of women, classed to a particular occupational or social group, expressed as a percentage of the number that would have occurred if the group had experienced at each separate age the death rates of all groups of men (or women) of corresponding age. In other words, the standardized mortality ratio is an age-standardized occupational mortality index which shows how far the mortality of a particular occupation or social class differs from the general average.

In 1921–23 and 1930–32, there was an uninterrupted upward gradient of mortality from social class I (professional) to social class V (unskilled). In 1950, the gradient was much less regular, the lowest ratios being given by social classes II and IV. All kinds of suggestions might be made to explain this departure in 1950 from the former regular gradient. But

remembering that the ratios have been calculated on the number of deaths for only 1 year, as numerator, and on a 1-percent census sample, as denominator, it would be advisable to await more comprehensive figures before exploring the various possibilities in detail. However, I find it difficult to believe that the irregular trend can have arisen only as a result of random fluctuation in the figures.

The social class mortality gradient for married women has also become less regular in 1950 than it was in 1930–32, the only previous occasion on which this group has been studied. However, only social class II was out of step; the others increased from class I to V.

Individual Causes of Death

Mortality from more than 30 causes of death has been tabulated for 1950, and table 1 shows

Table 1. Standardized mortality ratios by cause and social class for men and married women aged 20–64 years: England and Wales, for specified time periods

Cause of death and year	Men					Married women				
	Social class					Social class				
	I	II	III	IV	V	I	II	III	IV	V
All causes:										
1921–23	82	94	95	101	125	[1]	[1]	[1]	[1]	[1]
1930–32	90	94	97	102	111	81	89	99	103	113
1950	97	86	102	94	118	96	84	101	104	117
Respiratory tuberculosis:										
1921–23	49	81	95	97	137	[1]	[1]	[1]	[1]	[1]
1930–32	61	70	100	104	125	52	67	99	106	132
1950	64	62	103	95	149	*43*	52	104	107	166
Cancer of stomach:										
1921–23	60	82	100	106	130	[1]	[1]	[1]	[1]	[1]
1930–32 [2]	[3] 59	[3] 84	[3] 98	[3] 108	[3] 124	54	78	104	104	121
1950	57	67	100	114	132	*57*	72	101	106	138
Cancer of lung:										
1921–23	100	109	97	79	124	[1]	[1]	[1]	[1]	[1]
1930–32	107	95	100	92	114	*95*	100	108	81	94
1950	80	79	108	89	116	*120*	94	104	96	91
Cancer of breast:										
1930–32	[4]	[4]	[4]	[4]	[4]	136	116	103	84	82
1950	[4]	[4]	[4]	[4]	[4]	144	100	106	76	97
Cancer of cervix uteri:										
1950	[4]	[4]	[4]	[4]	[4]	*61*	69	98	109	150
Leukemia:										
1930–32	153	125	96	94	85	*167*	118	107	76	76
1950	*153*	101	107	81	88	*145*	*73*	110	*91*	*95*
Coronary heart disease:										
1930–32	[3] 237	[3] 148	[3] 95	[3] 66	[3] 67	157	126	93	85	88
1950	150	110	104	79	89	92	93	101	100	108
Myocardial degeneration:										
1930–32	[3] 77	[3] 92	[3] 94	[3] 105	[3] 122	54	75	99	110	129
1950	67	82	97	98	137	*66*	67	98	120	134
Bronchitis:										
1921–23	26	55	94	121	177	[1]	[1]	[1]	[1]	[1]
1930–32	31	57	91	124	156	*27*	56	99	119	155
1950	33	53	97	103	172	*33*	48	100	130	152
Diabetes mellitus:										
1921–23	125	145	92	75	66	[1]	[1]	[1]	[1]	[1]
1930–32	122	155	95	82	69	56	89	104	108	106
1950	*167*	97	97	91	*108*	*86*	88	98	109	117

[1] Data not available. [2] Includes esophagus. [3] Ages 35–64 years only. [4] Data not applicable.

NOTE. All social classes=100 in each specified group. Social class of married women grouped according to husband's occupation. Ratios based on less than 50 deaths are italicized. Social class groupings: I—professional, II—intermediate, III—skilled, IV—semiskilled, V—unskilled occupations.

SOURCE: See reference 8.

how the results for a few of these causes compare with earlier findings. Ratios calculated upon less than 50 actual deaths are italicized to indicate that their significance is uncertain.

Respiratory tuberculosis. For men aged 20–64, the steeply rising gradient from social class I to V seen in 1921–23 and again in 1930–32 has been repeated in 1950, but with the ratios for classes II and IV rather lower than those for classes I and III, respectively. The gradient for married women aged 20–64 has remained steep and regular.

Cancer of stomach. Each of the series of ratios indicates a regular gradient of increasing mortality from social class I to V. The steepness of gradient has remained unchanged since 1921–23.

Cancer of lung. In the two previous analyses, the evidence for an association between cancer of lung and social class was somewhat equivocal, but the 1950 figures for men aged 20–64 seems fairly definitely to suggest a rising gradient from social class I to V. There are no signs, however, of a similar gradient among married women.

Cancer of breast and of cervix uteri. The first of these two conditions displays a very definite gradient downward from social class I to V for married women. The second condition displays an opposite tendency, with lower mortality among the married women of class I and the highest mortality in class V. Cancer of these two sites is known to be correlated with childbearing. Mortality from cancer of the breast is lower and from cancer of the cervix higher among women who have borne children than among those who have not, the number of children borne being also important. It is likely therefore that the much higher fertility of classes IV and V over classes I and II goes a long way toward explaining the social class mortality pattern of these two diseases. Whether it is the whole explanation, I cannot at present say; it is something that will have to be looked into further.

Leukemia. This is one of the diseases that give a fairly definite downward gradient of mortality from social class I to class V, in both sexes, though many of the ratios shown in table 1 are based on inadequate numbers. Better diagnosis in class I than in V may be the explanation, in the same way that it may be the explanation of the steady increase year by year in the numbers of deaths that are being recorded; on the other hand, it may not.

Coronary heart disease. In 1930–32, mortality from this cause was decidedly higher in social classes I and II than in classes IV and V in both sexes. In 1950, this gradient is still quite evident for men, but for some reason the ratios for women aged 20–64 run in the opposite direction, that is, upward from class I to V instead of downward. What the explanation is of this sex difference, I have no idea. To account for the male pattern of gradient, the suggestions that have been made from time to time include social class and occupational differences in death certificate terminology, in mental stress, in dietary habits, and in physical activity. My own leaning at present is toward a combination of the last two.

Myocardial degeneration. The mortality ratios for this condition among men aged 20–64 run in the opposite direction to those for coronary disease, that is, they are lowest in social class I and increase to class V; and the gradient for women is the same as for men.

Bronchitis. This disease gives the steepest and most uniform social class mortality gradient of all, with mortality at ages 20–64 roughly 5 times higher in social class V than in class I. Clearly, this is something that has to be taken into account in any studies of geographic variations in the incidence of bronchitis in relation, let us say, to climate or to atmospheric pollution.

Diabetes mellitus. I have included this condition in order to show that the sex difference in the social class mortality gradient observed in 1930–32 has remained as evident in 1950. For men, mortality is highest in social class I and declines toward social class V. In women, the gradient runs in the opposite direction.

Stillbirths and Infant Mortality

The infant mortality rate, as has often been pointed out, is a sensitive index of social conditions, particularly with regard to the postneonatal period, that is, from 4 weeks of age up to 1 year, where, as table 2 shows, the death rate is persistently 4 times higher in social class V than in class I. It is worth noting that in

Table 2. Comparative ratios for stillbirth rates, neonatal (under 4 weeks) and postneonatal (4 weeks to 1 year) mortality rates by social class of father: England and Wales, for specified time periods

Ratio and year	Social class				
	I	II	III	IV	V
Stillbirth:					
1939	67	92	98	104	110
1950	75	87	99	109	117
Neonatal mortality:					
1921	69	83	99	108	109
1930–32	72	90	97	106	108
1950	71	90	97	109	121
Postneonatal mortality:					
1921	33	60	95	117	133
1930–32	35	57	90	111	142
1950	44	54	94	124	168

NOTE: All social classes=100 in each specified group. Data for legitimate births only. Ratios computed from stillbirth rates per 1,000 live births and stillbirths combined, and from neonatal and postneonatal mortality rates per 1,000 live births. Social class groupings: I—professional, II—intermediate, III—skilled, IV—semiskilled, V—unskilled occupations.

SOURCE: See reference 8.

spite of the tremendous reduction of infant mortality rates during the past 30 years there has been absolutely no narrowing of the difference between the various social classes, that is, no tendency for the gradient to become less steep.

There has likewise been no tendency for the social class differences in stillbirth and neonatal (under 4 weeks) mortality rates to become less in recent years. The gradient is much less steep for stillbirths and neonatal deaths than for deaths occurring later in the first year of life.

Conclusion

As a postscript to this abridged review of occupational and social class mortality variations in England and Wales, I should like to add a word about the value of this kind of analysis. To tabulate one or several years' death by sex, age, occupation, and cause and to calculate corresponding mortality rates is a big job which could only be justified if the results were really worth having and served a useful purpose whether for administration or for research. On what grounds, then, are these large occupational mortality analyses really justifiable?

Greenwood (*9*) certainly thought they were justified when he described them as "the most valuable single instrument of sociomedical research our national armory contains."

It cannot be claimed that our occupational mortality studies have revealed many specific industrial hazards that were not already known. The sandblasting risk, for instance, was not discovered by the revelation in the official mortality tables that those who followed this occupation were subject to an exceptionally high mortality. In respect of occupations such as this which have a well-known special hazard, the tabulations have confirmed rather than discovered the hazard. In addition, however, they have allowed comparisons to be made from time to time and between one occupation and another.

Sandblasting, we know, is or was dangerous. Is it, or was it, more dangerous than hotelkeeping? In 1930–32, sandblasting was much more dangerous. The respective standardized mortality ratios were 304 and 155. Coal gas workers and medical practitioners, who also suffer certain occupational risks, had standardized mortality ratios of 115 and 106, but the Anglican clergy, evidently having a less dangerous occupation, had a standardized mortality ratio of 69. We are thus given the opportunity of getting different occupations into perspective so that the relative risk can be appraised as between one occupation and another.

By grouping together occupations that seem to enjoy much the same living standards, we are able to show that "mortality is influenced more by the conditions of life implied by various occupations than by the direct occupational risks entailed" (*4*). This approach to the study of mortality variations has been greatly advanced by the decision in 1930–32 to take account also of the mortality of married women.

The cynic can of course remark, after it has been shown that a disease is closely correlated with adverse living conditions, there is little more that we can do about it. It is admittedly beyond the ordinary powers of physicians to transfer their patients from social class V to class I and so relieve them of some of their

bronchitis, tuberculosis, and myocardial degeneration (although increasing their risk of coronary thrombosis in return). But this is quite the wrong approach. Having discovered that the mortality from a disease is influenced to a significant degree by so-called social conditions, as our next step we should study these conditions in the greatest possible detail to determine precisely by what mechanism the behavior of a disease is different in one group of people from that of another, or in what way one group is receiving an advantage or a disadvantage that the other group does not have. It may even be practicable, with the recognition that the risk from a disease is greater in one group than in another, to take special precautions for the individuals within the vulnerable group and so reduce their risk.

A third contribution that these occupational and social class mortality studies make is the additional information they provide about the natural history of disease—their contribution to epidemiology and to the application of the epidemiological method. The observation that coronary disease kills men in professional and managerial occupations much more than those doing unskilled work, although not revealing the cause or causes of the disease, has at least provided some useful leads. Even if the pursuit of such leads does not in fact prove fruitful, whenever any hypothesis is propounded about the pathogenesis of a disease, that hypothesis, to be accepted, must adequately account for at least the majority of the already established epidemiological features.

For reasons such as these, I myself have no doubts about the fundamental value of these extensive occupational mortality studies as an instrument of medical research and, despite their various special limitations, I believe that these studies will be needed periodically for a long time to come.

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