PAPERS AND ORIGINALS

Changing social-class distribution of heart disease

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British Medical Journal, 1978, **2**, 1109-1112

Summary and conclusions

Analysis of mortality trends over 40 years in England and Wales showed that mortality from coronary heart disease had become progressively more common in working-class men and women than in those from the middle and upper classes. The change was most noticeable for men. Whereas in 1931 and 1951 heart disease was more common in men of social classes I and II, by 1961 it was more common in men of classes IV and V. This change in social-class distribution can only partly be explained by changes in diagnostic methods. The worsening mortality of classes IV and V correlated with relatively more smoking, a higher consumption of sugar, and a lower consumption of wholemeal bread in these classes. There was no correlation between change in heart disease and change in the social-class pattern of fat consumption.

Introduction

Coronary heart disease (CHD) is usually considered to be a disease of affluence[1] and is more common in wealthy, industrialised countries.[2] As the level of affluence has increased with time so has the prevalence of CHD, particularly among men.[3] Yet, contrary to popular opinion, CHD is not more common among the more affluent classes of society.[4] The most recent data (1970-2) on mortality in different social classes in England and Wales show that people in the higher social classes have a lower mortality from CHD than working-class men and women.[5] It is important to know whether this has always been true, as a reversal of a previously accepted trend might hold important aetiological clues. The purpose of our study was to determine whether there had been a change in the social-class distribution of heart disease in England and Wales, and, if so, the possible reasons for the change.

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Methods

Death rates were taken from successive Registrar General's decennial supplements for England and Wales, which report occupational mortality.[5-8] A major problem in comparing disease rates over time is the change that has occurred in the classification of disease, both in the ICD and in the way in which diagnoses are established post mortem. To minimise this we confined our analyses to all non-valvular heart disease and hypertensive diseases. This broader diagnostic category is less subject to changes in classification and coding than finer diagnoses of heart disease.[9 10] It covers all the diagnoses that are likely to be applied to a person dying from heart disease and includes also some deaths that are unlikely to be due to CHD. Thus it probably represents a conservative estimate of any "true" change in mortality from CHD.

In 1931 the fourth revision of the ICD was in use; in 1951, 1961, and 1971 it was the sixth, seventh, and eighth revisions respectively. The diagnoses used were, in 1931, non-valvular heart disease (ICD 90, 91, 93, 94, 95), and later, non-valvular heart disease and hypertensive disease (in 1951 and 1961, ICD 420-422, 440-447; in 1971, ICD 400-429). When the age-specific death rates were combined (see fig 3) age-adjustment was performed by the direct method, taking the weights as unity.[11] The social classes were those defined by the Registrar General in successive decennial supplements. Their use presents problems, as with time the social-class composition of the population and the classification of the classes have changed. In 1931, 17% of men of working age were classified as social class V compared with only 7% in 1971. By contrast, class I contained only 1·8% in 1931 but 5% by 1971.[12] There is no completely satisfactory way to handle these changes, but, to minimise their impact, the data are presented for social classes I and II combined and for social classes IV and V combined.

The food data came from reports of the National Food Survey Committee of the Ministry of Agriculture, Fisheries and Food.[13-16] They are based on interviews with a national sample of households concerning the food entering the household in a given week. The figures for consumption are reported by income groups, which are not strictly comparable with the Registrar General's social classes. Rough comparability was achieved by excluding old-age pensioners from group D and then combining the consumption figures for groups C and D, using weights proportional to sample size.

The figures for smoking came from data reported by the Tobacco Research Council (TRC).[17] The data for 1961 and 1971 were weekly consumptions of "constant-tar" cigarettes reported by social class. The figures for classes I and II and for IV and V were combined by weighting them according to the distribution of these classes in the population at the corresponding census. For 1952 (no figures were reported for 1951) the data were per cent of smokers by income group. Income groups A+B and D+E as used in the TRC report, were combined.

Results

CHANGES IN HEART DISEASE

Figure 1 shows mortality from the combined heart diseases for men during 1931-71 in three separate age groups. In the two older age groups mortality from heart disease in 1931 was slightly higher in classes I and II than in classes IV and V. In each age-class group mortality has risen over time, the rise being most rapid in classes IV and V. By 1961, in each age group, the mortality from heart disease for men in classes IV and V was higher than that for men in classes I and II. This change in social-class distribution did not occur for women (fig 2). Throughout 1931-71 women of classes IV and V had a higher mortality from heart disease than women of classes I and II. Furthermore, the increase in heart disease since 1961 has been greater in working-class women than in those from the middle and upper classes. The figures do not show that at each age and in each period the mortality for women of class III was intermediate between the rates for classes I and II and for IV and V. This was less consistently true for men.

It may seem that to account for the change in the social-class pattern of heart disease factors must be sought that operate differently for men and women. It should be emphasised, however, that although in women heart disease was more common in classes IV and V throughout the period of study, in both sexes mortality increased more rapidly in classes IV and V than in I and II. This is seem more clearly if in each period the mortality for classes I and II is expressed as a ratio of the mortality for classes IV and V (table). For both men and women the ratio progressively declined over time. Thus the contributive factors have been changing similarly in men and women.

The data for 1931 were excluded from the table because of doubt about the comparability of the disease classification. They show an increase between 1931 and 1951 in the ratio (classes I and II:classes IV and V) for men and women. Thus if the 1931 data are accepted it seems that the mortality in classes IV and V increased more slowly than that in classes I and II until 1951, and more quickly thereafter.

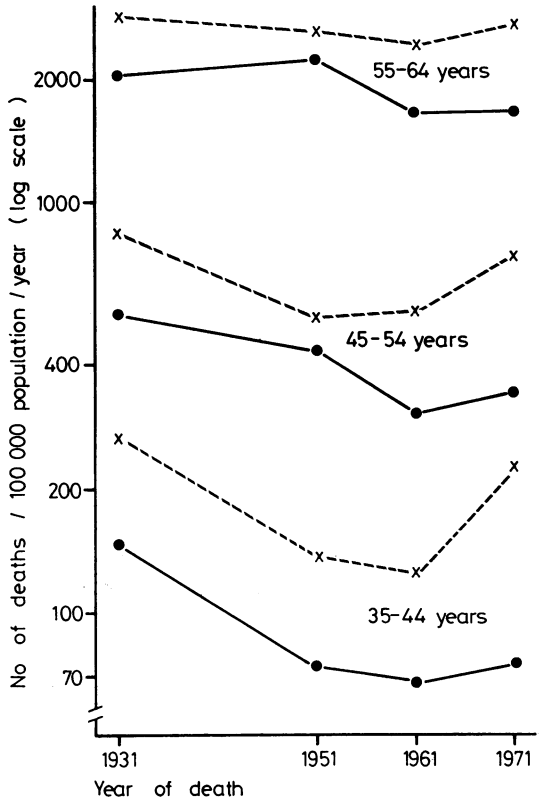

FIG 2—Mortality from non-valvular heart disease in married women during 1931-71 according to social class and age. ●——● = Social classes I and II. × - - - × = Social classes IV and V.

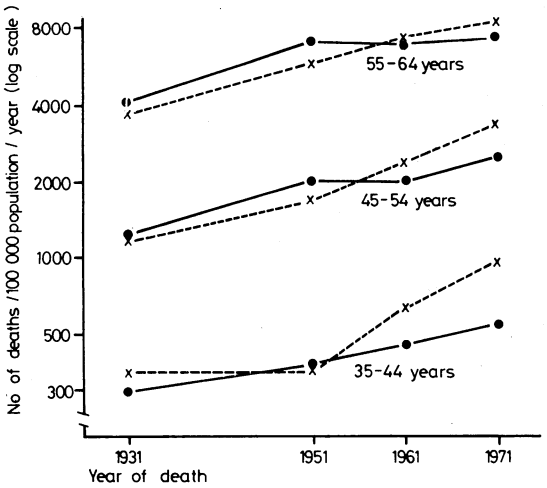

FIG 1—Mortality from non-valvular heart disease in men during 1931-71 according to social class and age. ●——● = Social classes I and II. × - - - × = Social classes IV and V.

Ratio of mortality from non-valvular heart disease (mortality in social classes I and II: mortality in social classes IV and V) by age and year of death

Year of death	Age in years		
	35–44	45–54	55–64
	Men		
1949–53	1·0	1·2	1·2
1959–63	0·7	0·9	1·0
1970–2	0·6	0·7	0·9
	Married women		
1949–53	0·5	0·7	0·8
1959–63	0·5	0·6	0·7
1970–2	0·3	0·5	0·6

ACCOUNTING FOR THE CHANGE

Possible explanations for the change in social-class distribution might be differences between the social classes in diet or smoking habits.

Diet

Average weekly household consumptions of several different foods are reported by the National Food Survey Committee. In order to compare the changing social-class pattern of food consumption with the changes in heart disease over time the food consumption was expressed as a ratio of consumption in income group A (highest) to that in groups C and D (lowest) for each period. These ratios and the age-adjusted ratios of mortality from heart disease are shown in fig 3. Those labelled "potentially harmful" should, if they are associated with the changing social-class gradient of heart disease, show a similar downward slope—that is, corresponding to a progressively lower consumption of the harmful food by the upper-income groups as compared with the lower-income groups. Only consumptions of sugar and, to a lesser extent, milk show this pattern. The relative decline in heart disease in the upper-income groups is paralleled by a relative decline in sugar intake. None of the foods containing saturated fats, with the possible exception of milk, or the per cent of total energy from fat showed this pattern.

On the other hand, the food items labelled "potentially protective" might be expected to be eaten more frequently by the upper-income groups over time. They should therefore show an upward slope. Recently it was reported that intake of cereal fibre might be protective against CHD.[18] As the fibre content of food such as breakfast cereals has changed over the the 20 years of our study it would be difficult to assess total fibre intake from available data. We took consumption of wholemeal bread as a rough indicator of cereal fibre consumption, since in the study of Morris *et al*[18] men whose intake of cereal fibre was in the upper tertile consumed more brown and wholemeal bread than men in the lower two tertiles. The data used here were for 1955, not 1951, as consumption of different types of bread by income groups was not reported until 1955. As seen in fig 3, consumption of wholemeal bread shows the hypothesised protective pattern. Fibre intake from fruit and vegetables showed little change and total energy consumption no change between the classes over the period studied. Changes in margarine consumption did not correlate with the social-class trend in heart disease, but the nature of the fats contained in margarine may vary considerably with time and between the classes.

These data are consistent with the suggestion that a greater intake of refined carbohydrate and a lower intake of cereal fibre may be contributing to the worsening mortality from heart disease in lower-income as compared with higher-income groups. Marr and Berry[19] suggested that each food item should be considered not as absolute amount consumed but relative to the total energy consumed. The above analyses were repeated expressing each item as grams (or number of eggs)/1000 kcal (4·2 MJ). The patterns were qualitatively the same as those shown in fig 3.

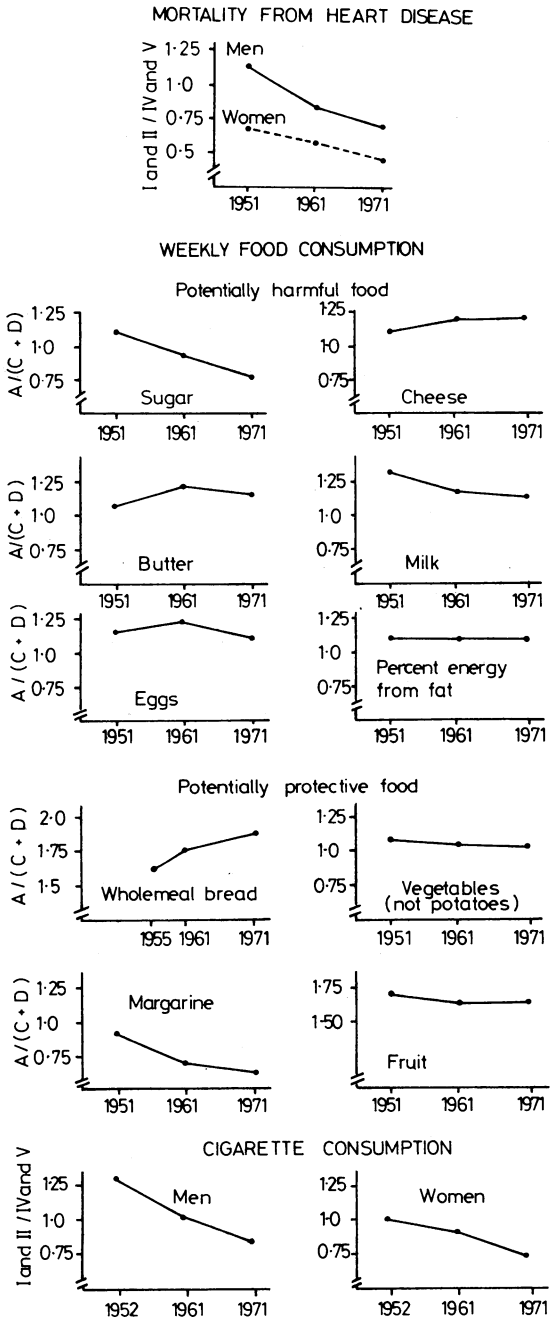

FIG 3—Ratios of mortality from heart disease, weekly consumptions of possibly harmful and protective foods, and cigarette consumptions during 1951-71. Mortality and cigarette consumption are expressed as ratios of social classes I and II to classes IV and V; weekly food consumptions are expressed as ratios of income group A (highest) to income groups C+D (lowest).

Smoking

Data on smoking by sex and social class were taken from the report by Todd.[17] For 1961 and 1971 the data were based on indices of consumption of constant-tar cigarettes. For 1952 the only data available were the percentages of smokers in different income groups. Whereas smoking expressed in this form has remained fairly constant in classes IV and V, it has been decreasing in classes I and II. To compare smoking habits with the patterns of heart disease the smoking of men and women in upper-income groups (higher social classes) was expressed as a ratio of the smoking in lower-income groups. Figure 3C shows the trend of this ratio over time. There have been noticeable changes in the social-class distribution of smoking that parallel the changes in the social-class distribution of heart disease.

Discussion

These analyses show that since 1951 the risk of heart disease has increased progressively for men and women in classes IV and V relative to those in classes I and II. As the changes in the ICD were far greater between 1931 and 1951 than between 1951 and 1961 more care needs to be taken in interpreting the 1931 figures. These suggest, however, that during 1931-51, in contrast to the later period, the increase in mortality from heart disease was greater in classes I and II than in classes IV and V. The changing composition of the social classes also affects the interpretation of the data. The dwindling proportion of the population classified as class V is due both to a real decrease in unskilled manual-labouring jobs and to changes in the assignment of occupations to social classes. Between 1951 and 1961 quite large changes were made in the definition of the social classes, which resulted in many class V jobs being reclassified upwards. We think that the technique used here, which combines classes I and II and classes IV and V, compensates for such reclassification. It might be argued that as social mobility has increased those people remaining in the jobs with the lowest status might be a selected "higher-risk" group. It seems unlikely that this could account for all the change in the prevalence of heart disease between the classes, especially as people who are upwardly mobile may have an increased risk of heart disease.[20]

Is this changing pattern specific to heart disease or have other causes of death also become more common among classes IV and V? Examination of mortality from non-cardiovascular disease shows that the position of classes IV and V has worsened relative to classes I and II, but not to the extent that it has for heart disease. In fact, the failure of total mortality to continue to decline in classes IV and V, as it has in classes I and II, is substantially due to the rise in the prevalence of heart disease. This suggests that there must be some factors specific to heart disease that have become more common among working-class people.

The data presented here are consistent with a secular trend in factors related to heart disease that has affected all ages at a similar time. They are far less consistent with a cohort pattern. They suggest not that different generations of people have had a different social-class pattern but that the changing pattern has cut across generations.

It appears that the rise in heart disease this century among men first affected classes I and II and only later involved classes IV and V. It has been suggested that the overall decline in heart disease that has been observed in the USA[21] and Australia[22] has begun in Britain.[23] On the basis of the data presented here it is reasonable to postulate that people in classes I and II would be the first to experience this decline. This appears already to be true for doctors.[24] By the time of the next reporting of occupational mortality, at around the 1981 census, these trends may be more apparent. This pattern of an increase and then decrease in disease affecting first classes I and II and later classes IV and V has been similarly reported for mortality from peptic ulcer.[25]

REASONS FOR SOCIAL-CLASS CHANGE

The rationale of the present approach was that explaining social-class differences at any one time is difficult because many factors may vary between the classes and these factors are often highly correlated with each other. By looking for explanations of the *change* in heart disease between the classes, those factors whose social-class distributions have changed may be isolated for further study. This part of the analysis had to be confined to diet and smoking because of the limitations of available historical data.

These analyses are interesting perhaps as much for the aetiological factors they exclude as for those they include. The change in social-class distribution could not be correlated with any measures of fat intake. On the other hand the observed changes were consistent with the aetiological role of smoking and either an excess of refined carbohydrate or a deficiency of unrefined carbohydrates, or both, factors that are allegedly associated with CHD.[18 26 27]

The present analysis could not distinguish between a possibly harmful effect of sugar and a possibly protective effect of cereal fibre because consumption of the two were negatively correlated; trends for both correlated with changes in smoking habits. Interestingly, however, the prospective study of Morris *et al* found cereal fibre but not vegetable fibre to be apparently protective.[18] Our findings were consistent with that observation, as consumption of vegetables (excluding potatoes) showed little change between the classes.

The lack of correlation between social-class changes in fat consumption and in heart disease does not mean that dietary fat is unimportant in the aetiology of CHD; it means that changes in fat consumption between the classes are unlikely to be responsible for changes in the social-class pattern of heart disease. Conversely, the factors isolated here as being associated with the changing social-class risk of heart disease—namely, smoking, fibre intake, and sugar consumption—do not completely explain the social-class distribution of heart disease. For example, the prevalence of smoking has decreased in men in classes I and II while that of heart disease has been increasing. Nevertheless, the worsening mortality of social classes IV and V is sufficient to warrant that any factors possibly responsible for this should receive greater attention.[28]

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(*Accepted 20 July 1978*)

ONE HUNDRED YEARS AGO SIR,—I have read with great regret the intention of the authorities at St Thomas's Hospital of admitting patients who can afford to pay such sums as three guineas a week towards their maintenance. Such an act is unfair in two ways; first, towards the junior part of the Hospital Medical Staff; secondly, and more especially, towards junior general practitioners like myself. When hospitals were first founded as truly charitable institutions, the medical staff offered their services gratuitously from a charitable point of view. But the charity of modern hospitals has so degenerated, that an act such as I noted above does away, in my opinion, with the charitable nature altogether. I, therefore, beseech the junior medical staff of St Thomas's Hospital, if not the whole staff, either to repel such an unfair innovation, or else to refuse to attend to the paying cases, unless they receive some gratuity for so doing. Unless they do so, they must be prepared to hear the grumbles and murmurs of the second class of interested persons I have before alluded to; namely, junior general practitioners. The class of persons likely to pay three guineas a week at St Thomas's Hospital are, as a rule, the main support of the majority of such men. We cannot all jump fresh fledged into a grand practice of £3,000 a year, with fees at three guineas a visit. The majority of us have to begin a somewhat ill-treated profession in a humble way, being content with the small fees given us by the class of patients that St Thomas's Hospital now seeks to engulf. At the present time, the patient's fee, whatever it may be, does support the medical man; but, under the intended new system, everyone, it seems to me, is to have a share except the medical man—butcher, baker, nurses, etc, all are to be paid; but the medical men are to give their services gratuitously —all for the honour and practice to be obtained thereby! I beseech, therefore, the junior medical staff to look to their own and to our interests in the matter, and you, Sir, to give publicity to this letter, in order to support A STRUGGLING JUNIOR. (*British Medical Journal*, 1878.)

Correction

Screening for impaired visual acuity in middle age in general practice

An error occurred in this paper by Dr Stone and Mr Shannon (23 September, p 859). In the Results section the World Health Organisation's criteria for impaired visual acuity are cited as including visual acuity of "6/18 or worse in the better eye." This should have read "worse than 6/18 in the better eye."