EPIDEMIOLOGY
Changes in the Social Class Gradient of Cirrhosis Mortality in England and Wales across the 20th Century
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Abstract — Aim: To explore the nature of the social class gradient of cirrhosis mortality in England and Wales across the 20th century. Methods: Data on male cirrhosis mortality by social class were obtained from the Registrar General’s Decennial Supplements for the years 1921–1991. Data for 1941 were not collected because of the second World War. Results: In 1921, cirrhosis mortality was substantially higher among the professional and managerial classes (I and II) than among the other social classes (III–V). This marked social class difference persisted until 1961 when the differences between the social classes were inconsistent. By 1991, the gradient had reversed and the lower social classes (IV and V) had the higher mortality. The excess mortality was greatest for social class V. The change in the mortality gradient is stark: in 1921 social classes I and II had a cirrhosis mortality at least twice that of social classes IV and V, but by 1991 this ratio had reversed. Conclusions: The reversal in the social class gradient of cirrhosis mortality indicates a major change in risk factor distribution across social classes. Differential changes in alcohol consumption are a possible explanation for this change, although the 1991 social class gradient in cirrhosis is inconsistent with alcohol consumption data from national surveys. Further research is required to clarify the explanation for the observed gradient, so that appropriate preventive measures can be put into place.

INTRODUCTION
Cirrhosis mortality is increasing rapidly in England and Wales (Leon and McCambridge, 2006). However, the burden of disease is not evenly spread throughout society. Across the UK, there is a marked social class gradient in alcohol-related morbidity and mortality among men for the period 1988–1994 (Harrison and Gardiner, 1999). A similar pattern of higher mortality among disadvantaged groups has been found in other developed countries. Alcohol-related deaths contribute to socio-economic differentials in survival in Sweden (Hemmingsson et al., 1997) and Finland (Makela et al., 1997). In Australia, cirrhosis mortality is more than twice as high among manual workers than non-manual (Najman et al., 2007).

There is evidence that the social class gradient in alcohol has increased markedly in recent years. Data from Scotland show that the ratio of cirrhosis mortality in the most deprived to least deprived increased from 4:1 in 1980 to 15:1 in 2000 (Audit Scotland, 2007). In Australia, the difference between manual workers and non-manual has increased in recent years (Najman et al., 2007). A Swedish study speculated whether the social class gradient of mortality may have reversed over time, although the data were not sufficient to permit firm conclusions (Norstrom and Romelsjo, 1998). These findings raise the question of whether the social class gradient in cirrhosis mortality has undergone major change during the 20th century. The Registrar General’s Decennial Supplements for England and Wales enable the social class gradients in cirrhosis mortality to be explored over the period 1921–1991.

METHODS

Social class mortality data
Standardized mortality ratios (SMRs) for cirrhosis mortality of men by social class for the years were obtained from the Registrar General’s Decennial Supplements for England and Wales. These use occupation to derive social class. Death certificates are used to obtain numbers of deaths, and census data are used to establish the population at risk to calculate rates. Data were obtained for the years 1921 (General Register Office, 1927), 1931 (General Register Office, 1938) and 1951–1991 (General Register Office, 1958); (General Register Office, 1971; Office of Population Censuses and Surveys, 1978; 1986; 1995). Data for 1941 were not available because of the second World War. These Decennial Supplements span years in which the manual for disease coding, the International Classification of Disease (ICD), was revised several times. Thus the age ranges for the SMR calculations also change slightly. The details are: 1931 used ICD 4, ages 20–64 years; 1951 used ICD 6, ages 20–64 years; 1961 used ICD 7, ages 15–64 years; 1970–1972 used ICD 8, ages 15–64 years; 1979–1980 and 1982–1983 used ICD 9, ages 20–64 years; and 1991 used ICD 9, ages 20–64 years.

Ninety-five per cent confidence intervals were derived from the stated observed and expected values using the method described by Gardner and Altman (Gardner and Altman, 1989). Confidence intervals could not be calculated for 1921 as observed and expected values were not given.

The social class classification used by the Registrar General’s from 1921 to 1991 assigns individuals to one of five ordinal groups by their occupation:

(a) I Professional
(b) II Managerial and technical
(c) III Skilled occupations
(d) IV Partly skilled occupations
(e) V Unskilled occupations

This classification was widely used in official statistics and data are available over a 70-year period. In 1971, code III was divided into IIIN—non-manual and IIIM—manual.
The classification was initially developed as a measure of social prestige or social standing, judged by the Registrar General’s staff and other experts (Brewer, 1986; Rose and Pevalin, 2002). In 1980, the concept of social standing was abandoned in favour of a classification based on the level of occupational skill. This change had little effect on allocation groups; a recoding on the 1970 data to the 1980 classification showed that only 7% were allocated to a new group, which almost always moved people up or down by only one position (Brewer, 1986). A concern about these data is the so-called numerator denominator problem, which could arise because the numerator data come from death certificates, whereas the denominator data are obtained from the census. It is possible that occupation is coded differently on the death certificate compared with the census. A careful analysis showed that this bias did not influence mortality gradients by social class (Pamuk, 1985).

Mortality data for 2001 have been published (Breakwell et al., 2007; Erskine et al., 2010), but only for all alcohol-related mortality; separate data for cirrhosis are not given. However, as cirrhosis deaths comprise 86% of all deaths in this category (Baker and Rooney, 2003), cirrhosis will dominate trends by deprivation. Data were aggregated to an area level (wards) and socio-economic status was coded using the Carstairs and Morris index (Morgan, 2006). The Carstairs codes are area based, assigning to individual wards a deprivation score based on unemployment, house overcrowding, car ownership and social class. Wards were ranked from least to most deprived by their Carstairs scores and divided into deprivation 20th (5% of the population) or 5th (20% of the population).

RESULTS

For England and Wales in 1921, the professional and managerial classes had substantially higher cirrhosis mortality than the other social classes (Table 1). This pattern persisted until 1961 when all social classes, except for social class V, moved towards the national average (100). By 1961, social class V had moved from a lower than average mortality to one as high as that of social class II. Over the period from 1961 to 1981, there was little change in relative positions of the social class groups. By 1991, there was a clear pattern of lowest mortality in social class I with a progressive increase in mortality through to social class V. The change in the mortality gradient is stark: in 1921, social classes I and II had a cirrhosis mortality at least twice that of social classes IV and V, but by 1991, this ratio had reversed with the higher social classes having only half the mortality.

The Registrar General in the 1921 Supplement commented on the social class distribution of cirrhosis mortality, noting that the frequency of disease varies with ‘the financial means of obtaining so expensive a luxury’ (General Register Office, 1927, p. xiv). The higher mortality in social class II than I was in part attributed to a greater prudence of social class I. However, the Registrar General also pointed out that publicans (SMR 1155) accounted for 55% of the excess mortality in social class II. Excluding publicans from social class II would reduce the cirrhosis SMR to 136. Occupational exposure is clearly important because increased SMRs were seen in cellarmen (470), barmen (583) and brewers (800), occupations which were assigned to social classes III and IV.

The 1931 Registrar General’s report also drew attention to cirrhosis mortality, labelling it as one of the few ‘diseases of affluence’ (General Register Office, 1938, p. 73). A short table compared the occupational units with the highest and lowest cirrhosis mortality (General Register Office, 1938, p. 160). As well as those exposed to alcohol in their work the professional groups with the highest cirrhosis SMRs included judges, barristers and solicitors (300) and proprietors of wholesale (253) and retail (222) businesses and doctors (183). The professions with the lowest SMRs included coal mine workers (29), carpenters (30), bakers (30), gardeners (40) and boot makers and repairers (30).

Recent data on the social class trends in mortality have been published, but are presented for a new category: all alcohol-related deaths. They also use a different social class classification system, the Carstairs and Morris index (Morgan, 2006). This is an area-based score in which wards are assigned a deprivation score based on unemployment, house overcrowding, car ownership and social class. The data show a progressive increase in alcohol-related death rates as deprivation increases (Breakwell et al., 2007). Aggregating the wards into five ranked groups, the ratio of death rates in the most deprived to the least deprived groups is 3.39 (95% confidence interval 3.10–3.71; Erskine et al., 2010). Further, this gradient is most marked in young to middle-aged men, consistent with the effect being stronger in more recent birth cohorts.

DISCUSSION

This study has found that in the first half of the 20th century cirrhosis mortality was highest in social classes I and II. The rates began to equalize in 1961, and by 1991, cirrhosis
mortality showed a pronounced gradient so that the SMR in social classes IV and V was more than twice that in social classes I and II.

Possible explanations for the reversal in mortality gradients include alcohol, diet and obesity. Alcohol has traditionally been viewed as the major risk factor for cirrhosis (Babor et al., 2003). However, alcohol consumption may not explain the observed social class gradient in cirrhosis mortality; survey data from England and Wales in 1988 and 1990 show semi-skilled and manual workers are more likely to drink less than professional men (Foster et al., 1990; Smyth and Browne, 1992). It is possible that selective underreporting could explain this finding, but this issue remains to be resolved. Case-control studies have suggested that dietary factors could be associated with cirrhosis mortality (Corrao et al., 1991; Rotily et al., 1990). Obesity has also been implicated in liver disease (Ioannou et al., 2003). Convincing evidence to explain the observed social class cirrhosis gradient is lacking. Exploring reasons for this finding should be a high priority for research.

A potential limitation of this study could result from the changes in the classification of liver disease across the 20th century, as the ICD underwent successive revisions. However, the body responsible for producing these data, the Office of National Statistics, has sufficient confidence in the cirrhosis mortality classification to publish mortality trends from 1916 to 1992 (Donnan and Haskey, 1977; Noble, 1994).

Another possible limitation of this study is that it is based on a classification of occupations that has changed over time. There have been major changes in the definitions of occupations and their allocation to social class groups. For example, in 1931, many labourers were transferred from social class IV to V and some 500,000 clerical workers were transferred from social class II to III (General Register Office, 1938). In 1960, airline pilots were promoted from class III to II and postmen were demoted from II to IV (Rose, 1995). One careful analysis of the classification system concluded that its limitations primarily affected comparisons between adjacent classes (Bland, 1979). A second study also concluded that long-term trends in social class mortality were robust to classification changes (Pamuk, 1985). Thus, it is unlikely that the major reversal of the gradient that was seen between 1921 and 1991 could be explained simply by changes in social class or cirrhosis mortality classification.

In summary, this study has shown that the social class gradient in cirrhosis mortality reversed during the 20th century. The 1991 social class gradient is inconsistent with contemporaneous survey data on alcohol consumption. Further research is required to clarify the explanation for the cirrhosis gradient, so that appropriate preventive measures can be put into place.

REFERENCES


