

Chapter 12

Geographic variation in mortality by Social Class and alternative social classifications

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Summary

- There was a clear socio-economic gradient in all-cause mortality for all countries of the United Kingdom and regions of England, with mortality increasing between Social Class I and V.
- The relative mortality difference between the Social Classes was greater in Wales, Scotland and Northern Ireland and the northern regions of England than in the southern regions of England.
- This pattern was similar for ischaemic heart disease, stroke and cancer mortality, but was less evident for accidents and suicide.
- There was little geographic variation in mortality rates among those in Social Class I.
- Geographic differences in Social Class V were considerably greater than in all other classes.
- Although both Social Class and country/region of residence contributed to mortality variation, the contribution made by Social Class was greater.
- There were clear gradients in mortality between car access and housing tenure categories in all regions of England and Wales.
- Within each car access and housing tenure category, those in the north of England had higher mortality than those in the south.

Concern about health inequalities in modern Britain had previously appeared in the reports submitted by the Poor Law Commissioners, set up to review the workings of the New Poor Law Act 1834. They had presented evidence from inspectors² on the “*pestilential places the industrious poor are obliged to take their abode*” and given figures on “*the final results of that suffering.*”

In 1864, the Registrar General published the first decennial supplement to his annual reports, providing greater detail on mortality in the period 1851-1860. The commentary, contributed by William Farr, drew attention to the relationship between mortality, geography and social conditions.³

In the second decennial supplement, published in 1875, Farr further developed his analysis of the contrast between the healthiest districts, the unhealthiest and the impact of the social conditions of their inhabitants on these differences:

“The thousands of families of the Liverpool district are of various grades, and live in very different sanitary conditions; some may be as healthy as groups of families anywhere else, and others may suffer to the extremest extent; but the general result is seen in the Table, which may for the moment represent the unhealthy classes [this table contrasted the high mortality rates in Liverpool with those in London, Manchester and 51 “healthy districts”]... Every great city has in it a bit of Liverpool.”

Supplement to the thirty-fifth annual report of the Registrar General⁴

In later decennial supplement analyses, based on censuses between 1911 and 1991, ONS and its predecessors used Social Class (based on occupation) as the principal indicator of socio-economic status. The most recent in this series⁵ focused on health inequalities. It confirmed earlier findings that although mortality rates in England and Wales are falling, Social Class differentials have been widening since the 1930s.⁶ In 1991-3, all cause mortality in Social Class V was almost three times that of Social Class I⁷ and, for some causes of death, these differentials were even greater.

The most recent previous decennial supplement on geographic differences in mortality, *Mortality and Geography*,⁸ included an analysis that grouped local authorities according to the percentage of households with the head in Social Class I or II and examined mortality rates within these groups of local authorities. This showed that, within each region of England and within Wales, local authorities with a higher percentage of households with the head in Social Class I or II had lower mortality than those with a low percentage in these social groups.⁹ Using the ONS Longitudinal Study (LS), the analysis

12.1 Introduction

There is a long history to measuring socio-economic differentials in mortality and relating these to geographic variations. The analyses developed by the General Register Office, following its foundation in 1837, focused on representing inequalities in health in both geographic and occupational terms. The links with socio-economic status of both these dimensions were fully appreciated.

“The state of health among the people differs in different times and in different places: and the principle purpose of the registration of disease is to determine the degree of their variation in each district, and in each class of the population, as well as the extent to which they are modified by circumstances”

Sixteenth annual report of the Registrar General¹

also showed broad regional, Social Class and housing tenure differences in mortality in 1971-81 between those living in wards with similar socio-economic characteristics in 1971.

More recent analyses, using the LS, have related mortality data in 1988-94 to 1981 population characteristics. These analyses showed that in men aged 25 to 64 there were clear social gradients in mortality in the North, North West and the South East.¹⁰ In Section 12.2, we build on these earlier results to examine the relationship between mortality and Social Class in men aged 20-64 in the countries of the United Kingdom and the regions of England from 1991 to 1993 for particular causes of death.

Using the LS, inequalities in health have been examined using household-based markers of socio-economic position, such as household access to cars and housing tenure.¹¹ These indicators have been argued to act as a proxy for disposable income and wealth respectively. These analyses have consistently shown that those living in owner-occupied accommodation experienced lower mortality rates than those living in rented accommodation and those living in households with access to cars had considerably lower mortality than those without access.

Recently Reid and Harding¹² extended earlier LS analyses to look at mortality among those who experienced multiple deprivation. They found that although mortality of those aged 20 to 64 in England and Wales was highest in the north and lowest in the south between 1991 and 1997, the death rate of the most deprived individuals (defined as having at least three of the following four characteristics – being in Social Class IV or V, living in rented accommodation, having no access to a car and being unemployed) was more than twice that of the least deprived individuals (defined as being in Social Class I, II or III, living in owner occupied housing, having car access and being employed) in both the north and in the south. They also found that the death rates of the most deprived individuals had not declined in the 1990s, whereas those of the least deprived individuals had declined substantially. In another paper,¹³ they found that adjusting for differences in long-term disadvantage did not explain the north-south divide in mortality.

Section 12.3 in this chapter examines the variation in mortality rates between regions of England and for Wales by housing tenure and car access using the ONS Longitudinal Study.

The last gainful occupation of the deceased is recorded at death registration and is routinely coded for all men over the age of 16 and under the age of 75, using the latest available occupational classification. For the deaths analysis here, the 1990 Standard Occupational Classification (SOC90) was used. For those who have a stated occupation at death registration, their employment status is also recorded. These two pieces of information together determined the Social Class of the deceased. For further details and a description of the Social Class classification see chapter 3, Box 3.1.

The analyses presented relate only to men. Social Class for mortality and for the population at risk was obtained from different sources (death registration and the 1991 Census). As very different percentages of women have an occupation recorded at death than at Census, and these differences are unlikely to be independent of Social Class, we have excluded women from this analysis.

12.2 Mortality by Social Class

Methods and data

In this analysis deaths among men aged 20-64 are examined for the three years 1991-1993. The analysis is focused on this period to ensure consistency with population denominator information from the 1991 Census (as the ten-yearly Census provides the only national breakdown of the whole population by occupation and Social Class). It was necessary to combine three years of death registration data to ensure that sufficient numbers of deaths were available to present data for each Social Class by age group and by cause. Only deaths allocated to a Social Class were included.

Figure 12.1

Age-standardised all-cause mortality rates by Social Class, country and region, males aged 20-64
United Kingdom 1991-1993

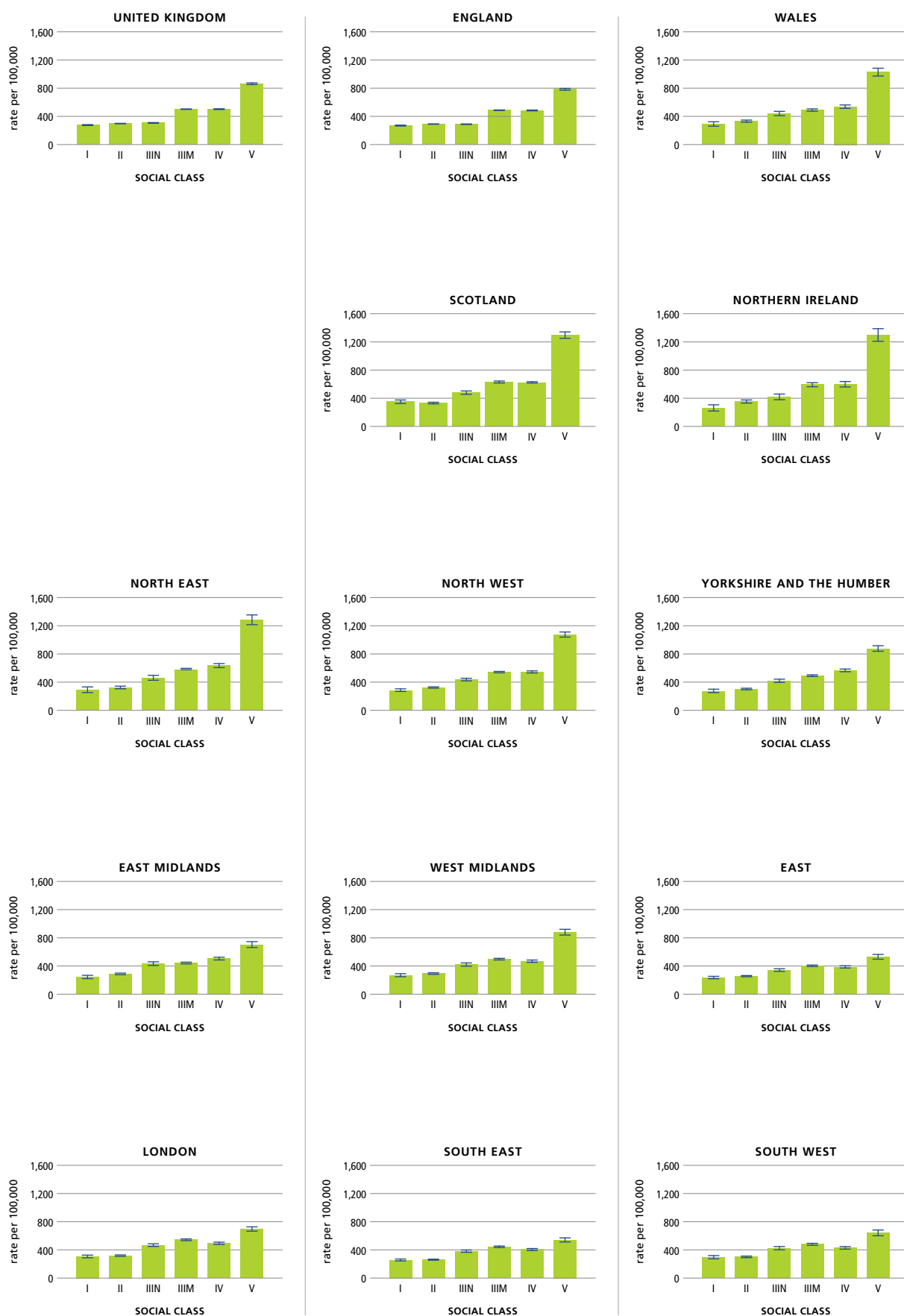
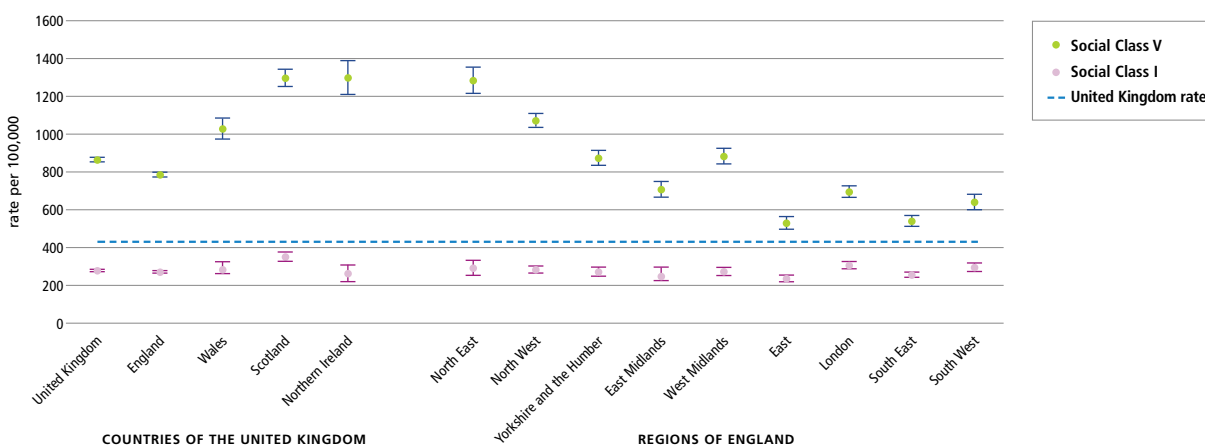


Figure 12.2

Age-standardised all-cause mortality rates for Social Classes I and V by country and region, males aged 20-64 United Kingdom 1991-1993



All cause mortality

Figure 12.1 shows that, consistent with other studies, mortality increased with decreasing Social Class. The graphs indicate that there was a clear social gradient in mortality. The highest mortality rates occurred in Social Class V, and in the United Kingdom as a whole these rates were three times higher than mortality in Social Class I. This general pattern existed in each country of the United Kingdom and region of England. However the relative difference between Social Classes did vary by region. Generally the largest relative difference between Social Classes was seen in the northern regions of England, Wales, Scotland and Northern Ireland. For example, in Northern Ireland mortality rates for Social Class V were five times those for Social Class I. In contrast, the southern regions of England had the most favourable mortality rates within the United Kingdom. Specifically the East of England had the best mortality experience for each Social Class and smaller differences between Social Classes. The smallest ratio between Social Class I and Social Class V was found in the South East, where the difference was two-fold.

Figure 12.2 shows age-standardised mortality rates for all causes of death, for Social Classes I and V for countries and regions of the United Kingdom. Comparison between the two graphs indicates that there was less geographic variation among men in Social Class I than in Social Class V. While mortality in Social Class I was largely uniform throughout the regions and countries of the United Kingdom, there were significant regional differences in Social Class V mortality. Scotland and the East of England experienced the highest and lowest rates respectively for both Social Classes I and V. However, while Social Class V mortality was 2.5 times greater in Scotland than in the East of England, the comparable ratio for Social Class I was just 1.5. For Social Class V, the southern areas of England and the East Midlands had significantly lower mortality rates than the United Kingdom as a whole while rates were significantly higher in the North East, Scotland and Northern Ireland. The regions in which Social Class V mortality was highest were not necessarily those with the highest mortality for Social Class I. For example, Social Class I mortality in London exceeded that of Northern Ireland while the reverse was true for Social Class V.

Figure 12.3

Age-standardised mortality rates for ischaemic heart disease by Social Class, country and region, males aged 20-64 United Kingdom 1991-1993

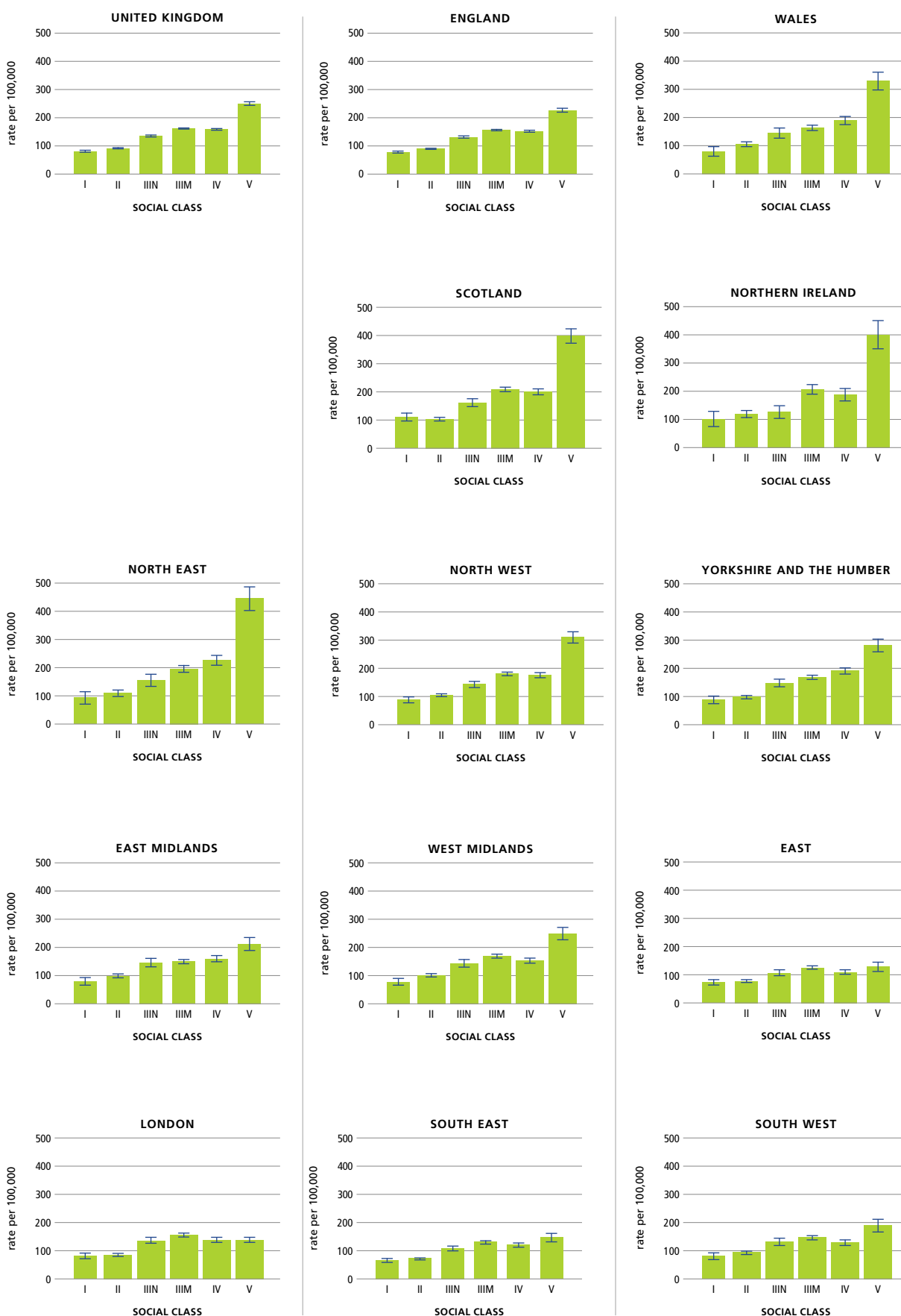
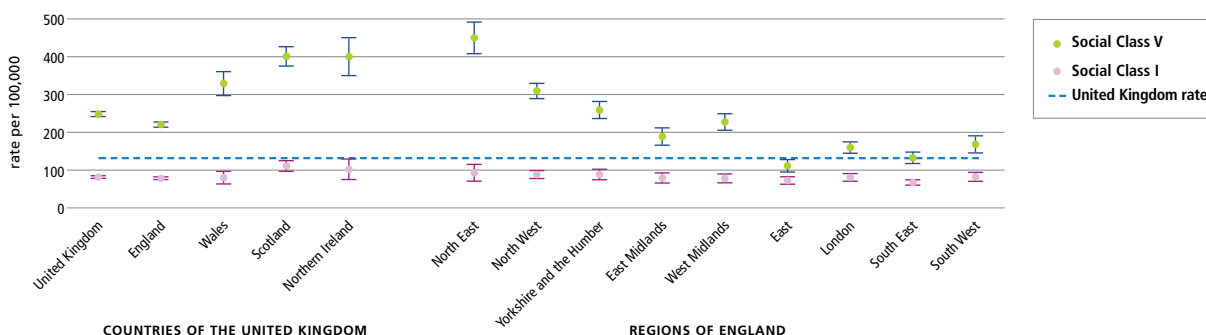


Figure 12.4

Age-standardised mortality rates for ischaemic heart disease for Social Classes I and V by country and region, males aged 20-64 United Kingdom 1991-1993



Ischaemic heart disease

Figure 12.3 shows that in the United Kingdom as a whole during the period 1991 to 1993, men in Social Class V were 3.1 times more likely to die from ischaemic heart disease than those in Social Class I. However there was a geographic difference in this social gradient. As for all-causes, the Social Class gradient was flatter in England than in Wales, Scotland and Northern Ireland. Within England, gradients in the southern regions were flatter than those in the north. Specifically, the greatest difference between classes was in Northern Ireland, where mortality in Social Class V was 4 times greater than in Social Class I. In contrast, the area with the smallest difference was the South West region, where the ratio of mortality rates between Social Classes I and V was 2.3.

The pattern of mortality rates for ischaemic heart disease by region within Social Classes I and V was very similar to that seen for all causes (Figure 12.4). For Social Class I mortality rates in each country and region were generally similar to those of the United Kingdom, with the exception of Scotland and Northern Ireland which had higher rates. In Social Class V the southern regions of England had more favourable mortality rates than the United Kingdom as a whole, while the North East region, Wales, Scotland and Northern Ireland had less favourable rates.

Figure 12.5

Age-standardised mortality rates for stroke by Social Class, country and region, males aged 20-64
United Kingdom 1991-1993

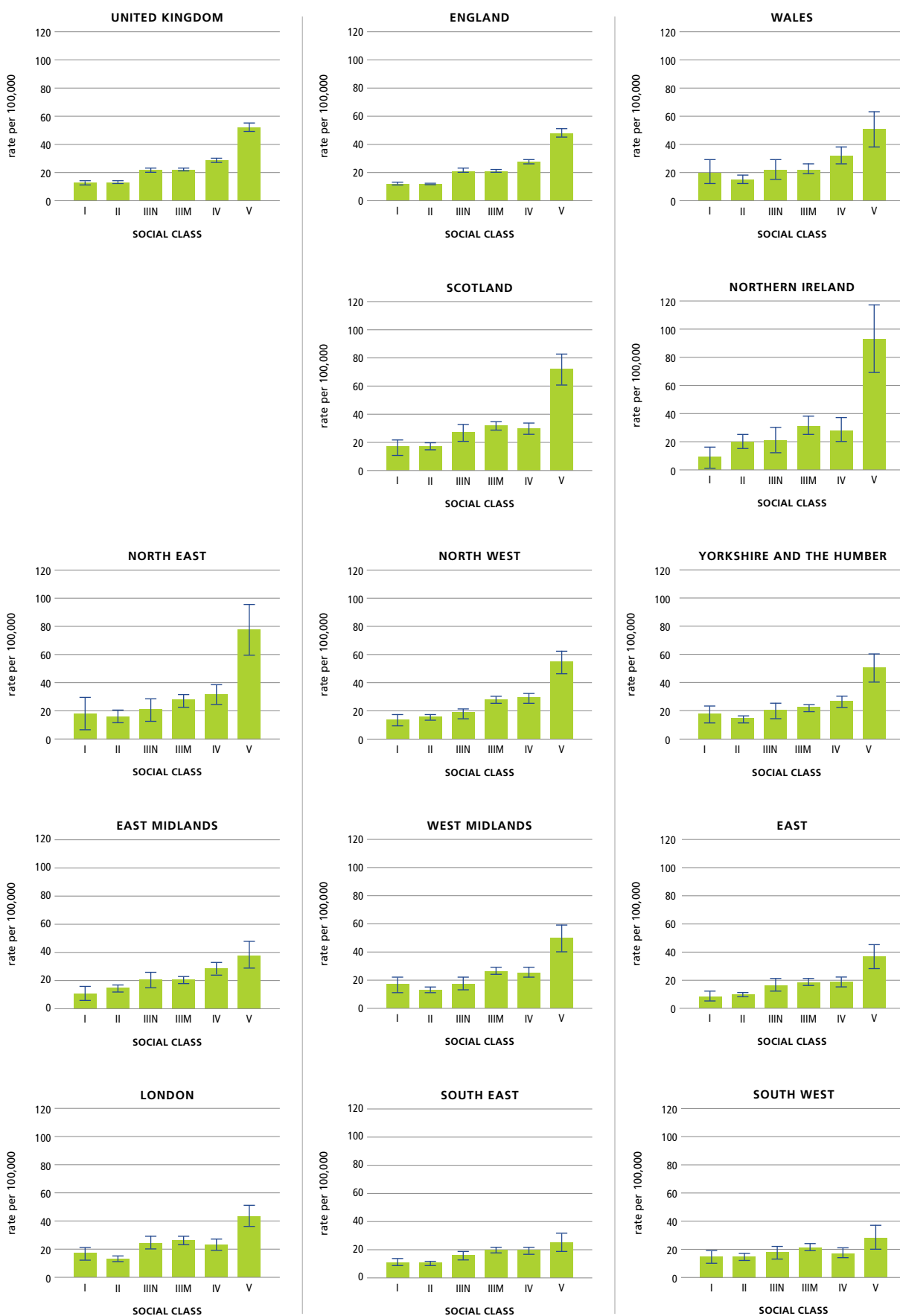
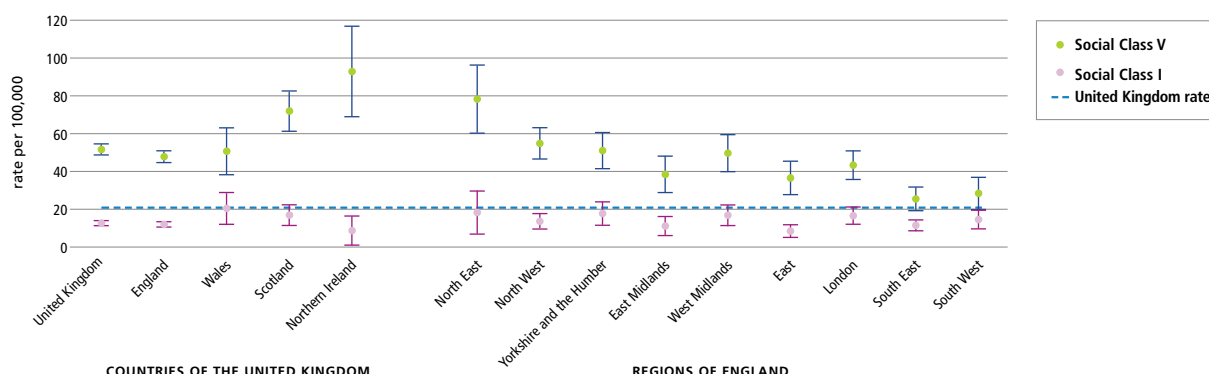


Figure 12.6

Age-standardised mortality rates for stroke for Social Classes I and V by country and region, males aged 20-64 United Kingdom 1991-1993



Stroke

Regional differences in Social Class mortality gradients were also evident in deaths from stroke, as Figure 12.5 shows. The difference between classes was greater in the northern regions of England, Scotland and Northern Ireland than in the southern regions of England. The Social Class gradient was steepest in Northern Ireland, where the difference between Social Class V and Social Class I was 10.6. This large difference was due to the combination of a particularly high rate for Social Class V and a slightly lower than average Social Class I rate. In the East of England, there were large disparities between Social Classes I and V (ratio of 4.3), despite mortality rates in every Social Class being lower than the national average. This was particularly interesting because a mortality gradient was not evident for all causes of death and for ischaemic heart disease in this region. The areas with the smallest class differences in stroke mortality were the South West and the South East.

Figure 12.6 summarises regional variation in class-specific stroke mortality. In Social Class I there was more geographic variation than for all causes of death. Although this variability was in part due to the smaller number of deaths available for analysis, mortality from stroke was significantly lower in the East of England than in the rest of the United Kingdom in Social Class I. The areas with the highest and lowest Social Class V mortality were Northern Ireland and the South East of England, respectively, with a ratio of 3.6 between the rates for the two areas.

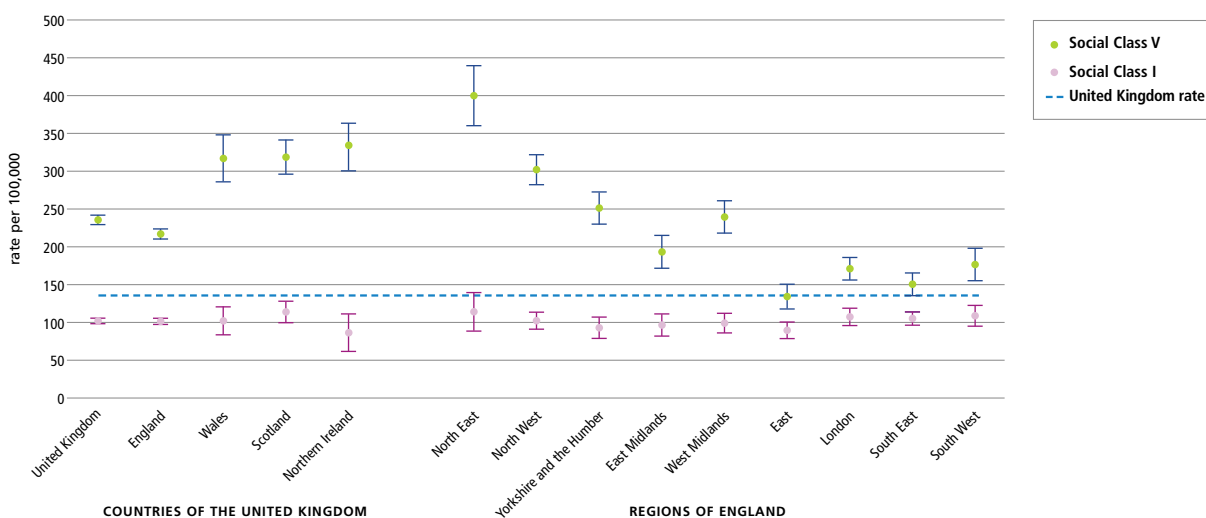
Figure 12.7

Age-standardised mortality rates for all cancers by Social Class, country and region, males aged 20-64
 United Kingdom 1991-1993



Figure 12.8

Age-standardised mortality rates for all cancers for Social Classes I and V by country and region, males aged 20-64 United Kingdom 1991-1993



All cancers

In general there was a clear social gradient for cancers, with high mortality in Social Class V and low mortality in Social Classes I and II (Figure 12.7). For the United Kingdom as a whole, mortality in Social Class V was twice that in Social Class I. However, this ratio varied by country and region. A gradient was less apparent in the South East, South West, East of England and London where the ratio between Social Classes V and I was closer to 1.5. The North East showed the greatest relative mortality differences between Social Class V and other Social Classes (three and a half times greater than Social Class I and almost twice that of Social Class IV). A similar, but not as marked pattern, was present in the North West and Northern Ireland.

As for all cause mortality, regional differences were most apparent for Social Class V (Figure 12.8). Cancer mortality in Social Class V was greatest in the North East, Scotland, Northern Ireland and Wales. The rate in the North East was 1.7 times that for Social Class V in the United Kingdom as a whole. Within Social Class I there was very little difference in rates between countries and regions.

Figure 12.9

Age-standardised mortality rates for lung cancer by Social Class, country and region, males aged 20-64
United Kingdom 1991-1993

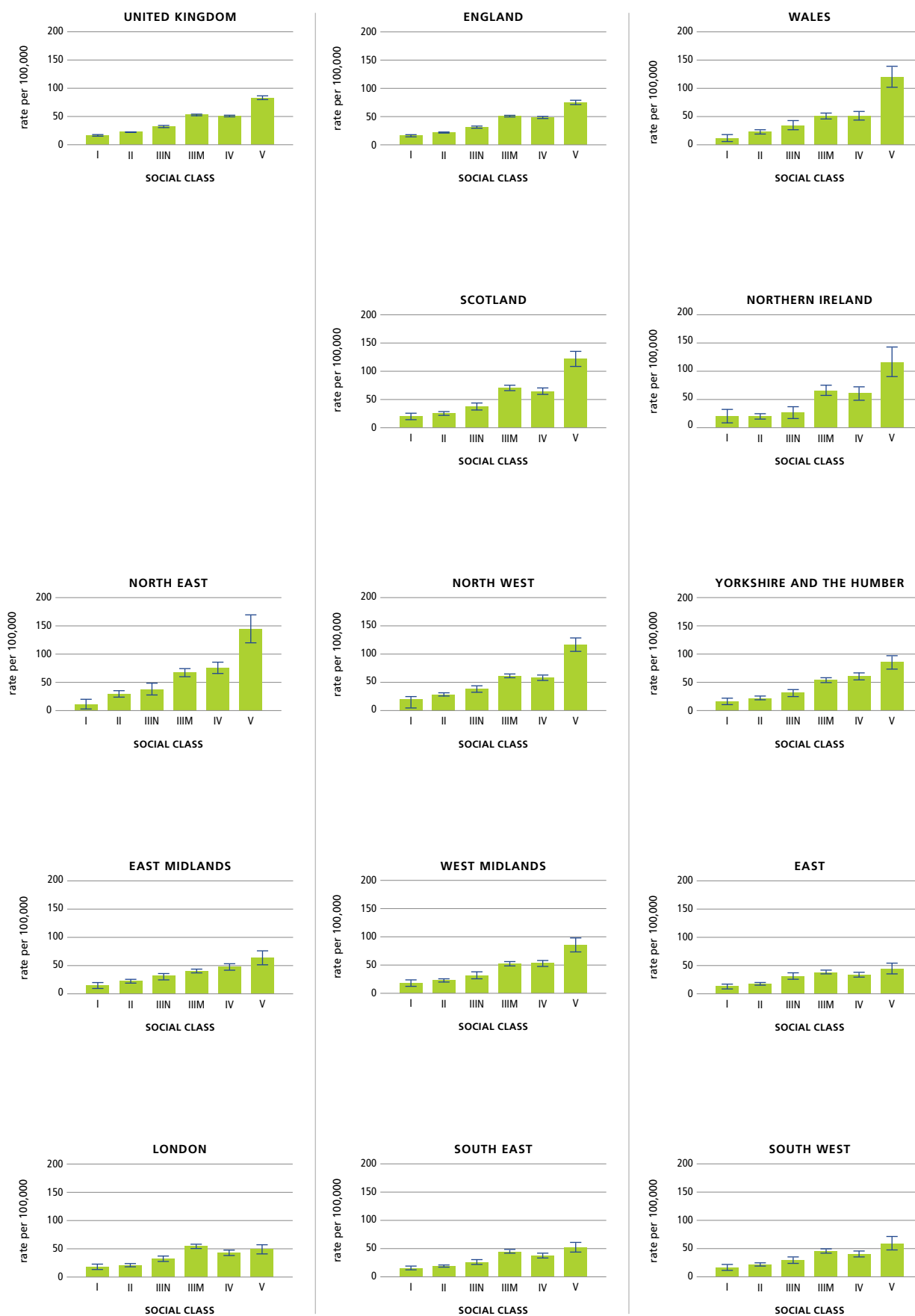
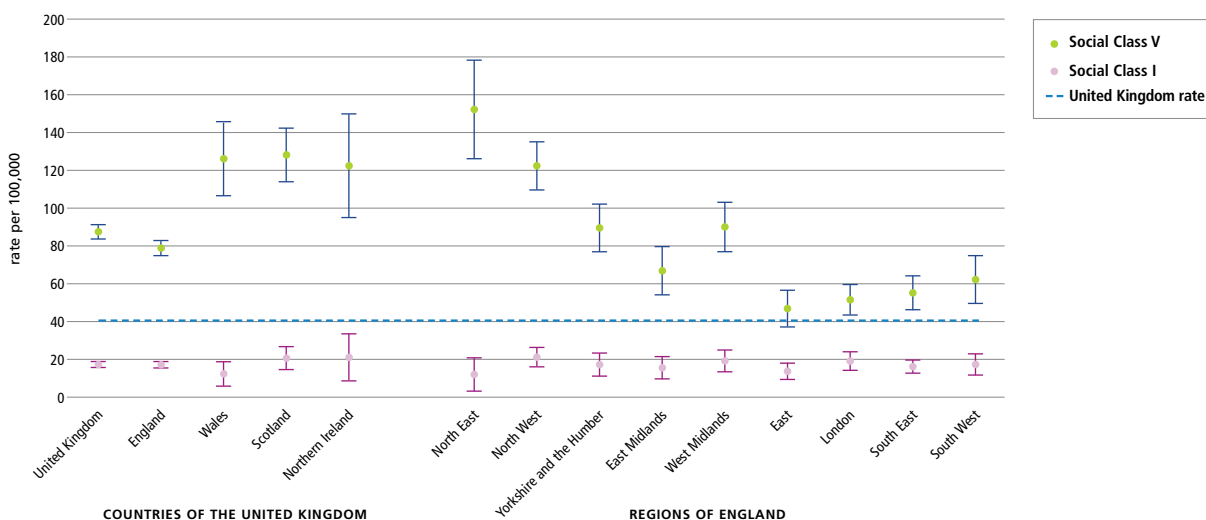


Figure 12.10

Age-standardised mortality rates for lung cancer for Social Classes I and V, lung cancer by country and region, males aged 20-64 United Kingdom 1991-1993



Lung cancer

The Social Class gradient in mortality from lung cancer was steeper than for all cancers combined (Figure 12.9). For the United Kingdom as a whole, mortality rates were five times greater for Social Class V than for Social Class I. The greatest geographic differences were once again within Social Class V. Mortality in this class was approximately twice as high as that in Social Class IV in the North East, North West, Wales, Scotland and Northern Ireland. In contrast the difference between this class and others was least in southern England.

Figure 12.10 summarises this sharp geographic gradient in Social Class V lung cancer mortality, with the lowest rate in the East of England and the highest in the North East. It also shows that for Social Class I there was little significant difference in rates between the regions and countries of the United Kingdom.

Figure 12.11

Age-standardised mortality rates for accidents by Social Class, country and region, males aged 20-64
United Kingdom 1991-1993

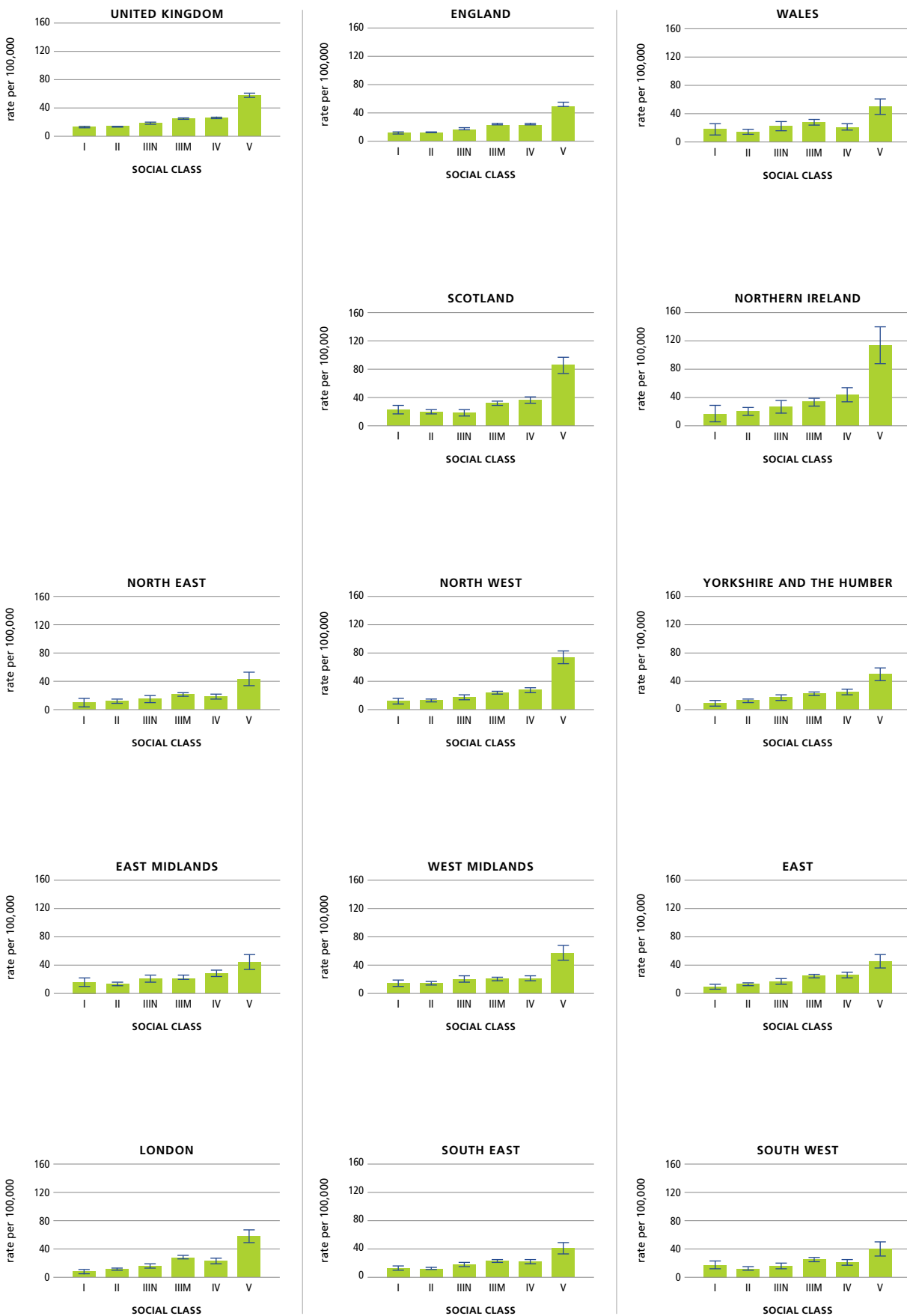
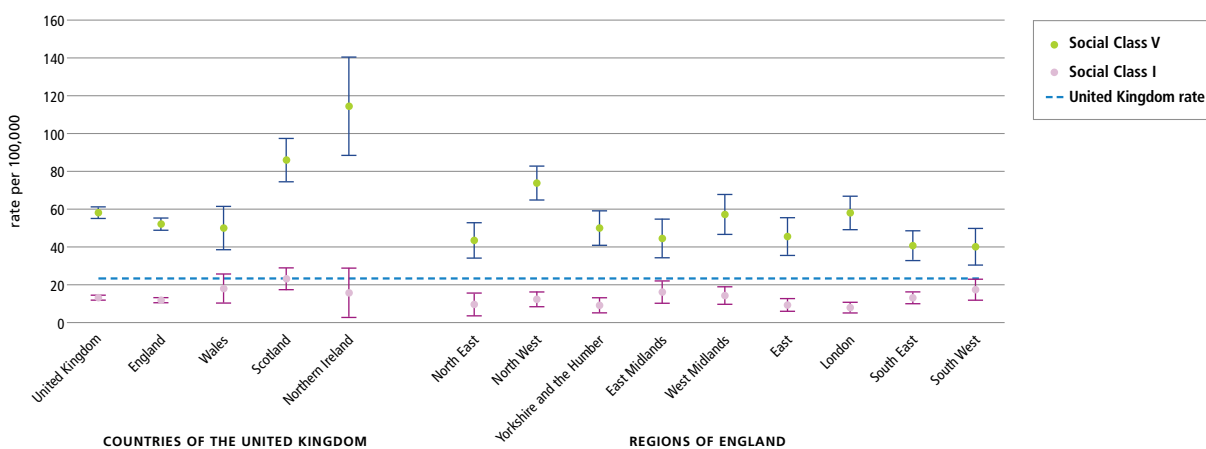


Figure 12.12

Age-standardised mortality rates for accidents for Social Classes I and V by country and region, males aged 20-64 United Kingdom 1991-1993



Accidents

There was a Social Class gradient in accident mortality for the United Kingdom as a whole, with Social Class V rates 4.4 times those in Social Class I (Figure 12.11). There were substantial differences between these classes in every region and country. The gradient between Social Classes I and IV was however noticeably less in every area. In Northern Ireland mortality from accidents was higher than the rest of the United Kingdom for all Social Classes and the seven-fold difference between Social Classes I and V in this area was greater than elsewhere.

Regional differences in accident mortality were evident in both Social Classes I and V (Figure 12.12). Mortality in Social Class I was highest in Scotland (1.8 times the United Kingdom rate for this class) and lowest in London. Rates for Social Class V were greatest in Northern Ireland (twice as great as the United Kingdom figure for this class) and least in the South West. Noticeably, accident mortality was low in both these Social Classes in the North East region, in contrast to findings for other causes.

Figure 12.13

Age-standardised mortality rates for suicide by Social Class, country and region, males aged 20-64
United Kingdom 1991-1993

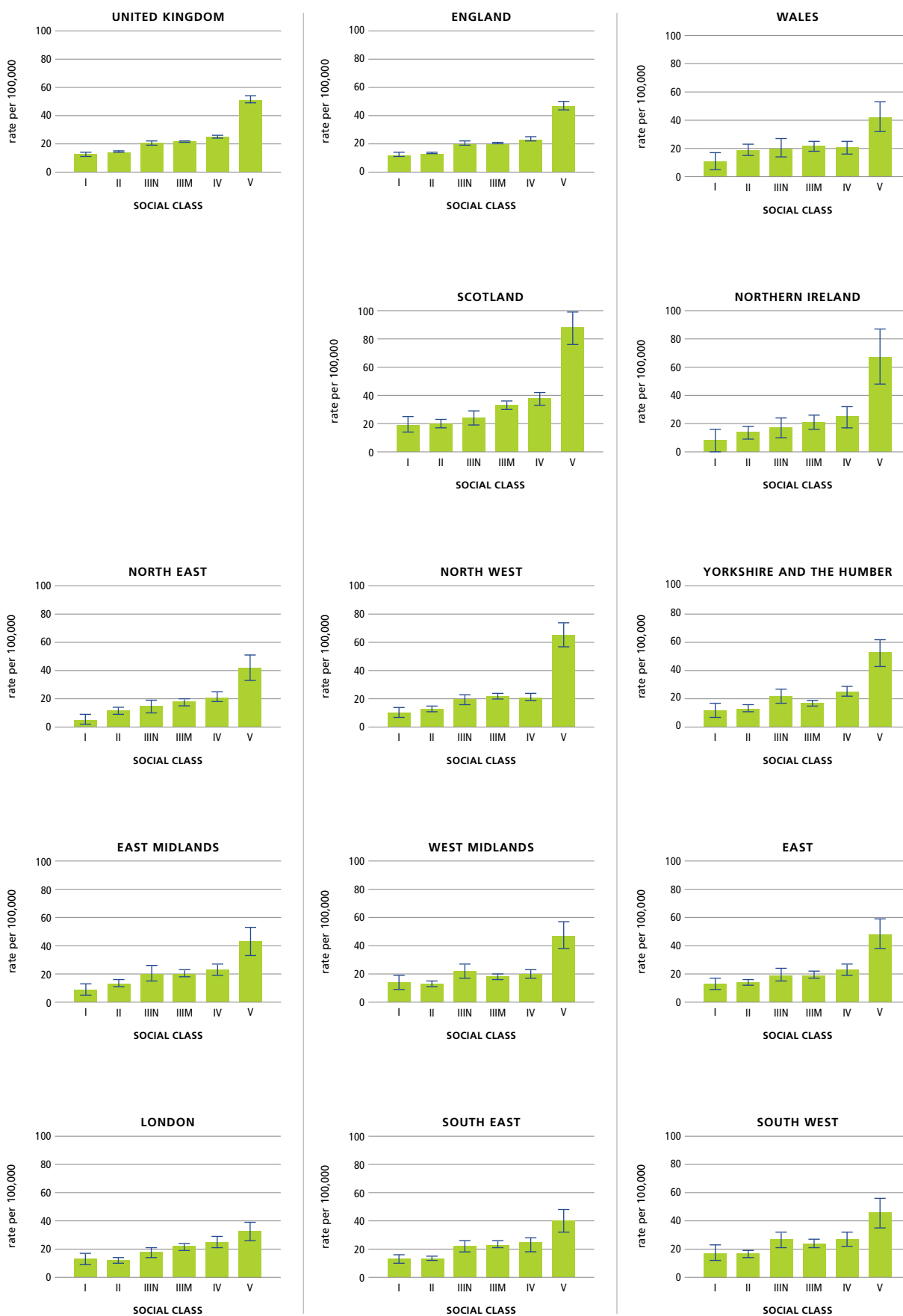
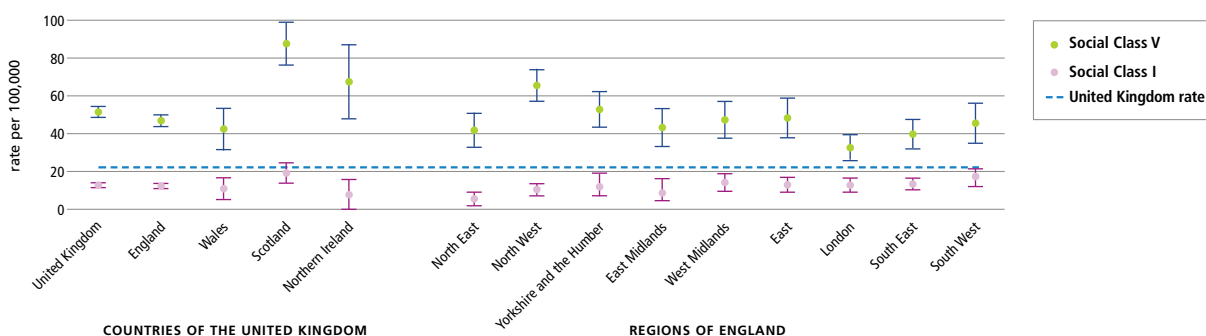


Figure 12.14

Age-standardised mortality rates for suicide for Social Classes I and V by country and region, males aged 20-64 United Kingdom 1991-1993



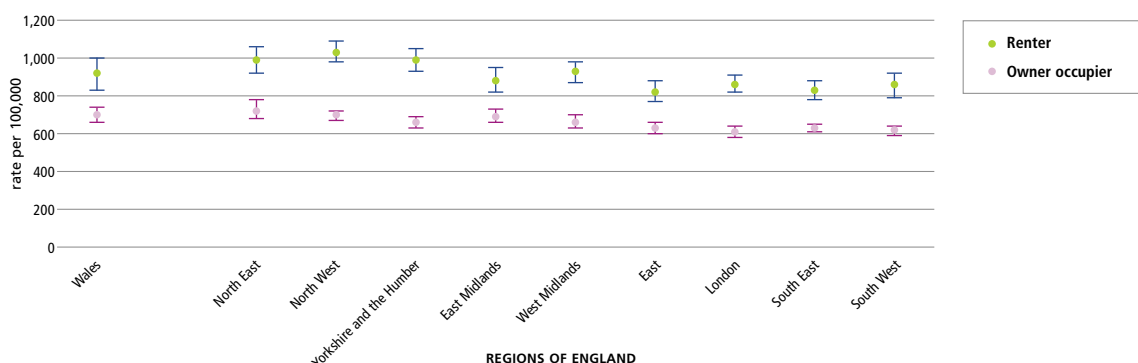
Suicide

There was a clear social gradient in suicide mortality between Social Classes (Figure 12.13), with a four-fold difference in mortality between Social Classes I and V for the United Kingdom as a whole. However, this was mainly associated with excess mortality in Social Class V, as the gradient was less apparent when the experiences of Social Class V were excluded. Scotland had the worst level of suicide mortality, with higher rates in each Social Class than all other countries and regions (with the sole exception of Social Class I in the South West).

Figure 12.14 highlights considerable geographic variation in suicide mortality for both Social Classes I and V. For Social Class I, suicide mortality rates in Scotland were 3.5 times those in the North East (the region with the lowest mortality in this class). For Social Class V, rates in Scotland were 2.7 times higher than in London (where rates for this class were significantly below most other areas in the United Kingdom).

Figure 12.15

**Age-standardised mortality rates for all causes of death by housing tenure, males all ages
England and Wales 1991-1997**



12.3 Mortality for the regions of England and for Wales by alternative social classifications

Methods and data

This analysis is based on data from the ONS Longitudinal Study, which is described in more detail in Appendix A. The study is based on a sample of approximately one per cent of the population of England and Wales. It includes records from each Census since 1971 and deaths in the inter-censal periods. This analysis is based on 1991 Census data and deaths between 1991 and 1997. Mortality rates are presented using directly standardised rates as in the rest of this chapter (see Section 12.2 for more details of methods and data). However, the method used in this section is slightly different to all the other sections. In previous sections the population used as the standard was the European Standard Population. In this section the Longitudinal Study population is used as the standard.

Housing tenure

Figures 12.15 and 12.16 show age-standardised mortality rates by housing tenure, for the regions of England and for Wales between 1991 and 1997. Both males and females living in owner-occupied housing experienced lower mortality in every region than those living in either local authority or privately rented housing. Within tenure categories there was evidence of a north-south divide in mortality rates. Mortality rates generally increased from the southern regions of England (East of England, London, South East and South West) to the Midlands and north. In particular, for both sexes and both tenure categories, mortality was significantly higher in the North East and North West than in each of the southern regions.

Car access

Figures 12.17 and 12.18 show age standardised mortality rates by car access for the regions of England and for Wales between 1991 and 1997. Both males and females with access to a car experienced lower mortality in every region than those without access to a car. Within car access categories there was evidence of a similar north-south divide in mortality rates to that for housing tenure, although not quite as consistent. While both

sexes in the North East and North West had higher mortality than all southern regions for both car access categories, these differences were not statistically significant for males with no car access in the East of England and South West and for females with car access in London.

12.4 Discussion

In 1991 to 1993 there were clear socio-economic gradients in all-cause mortality for all countries of the United Kingdom and regions of England although the differences between Social Classes varied geographically. Generally differences in all cause mortality between Social Classes in the northern regions of England were larger than those in the southern regions. In addition larger differences were seen in Northern Ireland, Scotland and Wales than in England. This was true for mortality for each of the causes examined, but was less evident for accidents and suicide.

This chapter also demonstrates differences in the amount of geographic variation in mortality rates within Social Classes. Geographic variation was particularly great in Social Class V. For most causes of death, Social Class V mortality rates in the southern regions of England were considerably lower than in the northern regions of England, Northern Ireland, Scotland and Wales. In contrast there was little geographic variation in mortality rates for those in Social Class I.

An analysis of variance was conducted to examine how much of the variation in mortality rates by Social Class presented in this chapter was accounted for by the country and region of location (country/region) and how much was accounted for by Social Class. The results indicate that both country/region and Social Class contributed to the variation in mortality and in most cases approximately 80 per cent of the variation was explained by these two factors. The analysis also showed that Social Class was more highly correlated with mortality than country/region for all causes of death examined.

Figure 12.16

Age-standardised mortality rates for all causes of death by housing tenure, females all ages
England and Wales 1991-1997

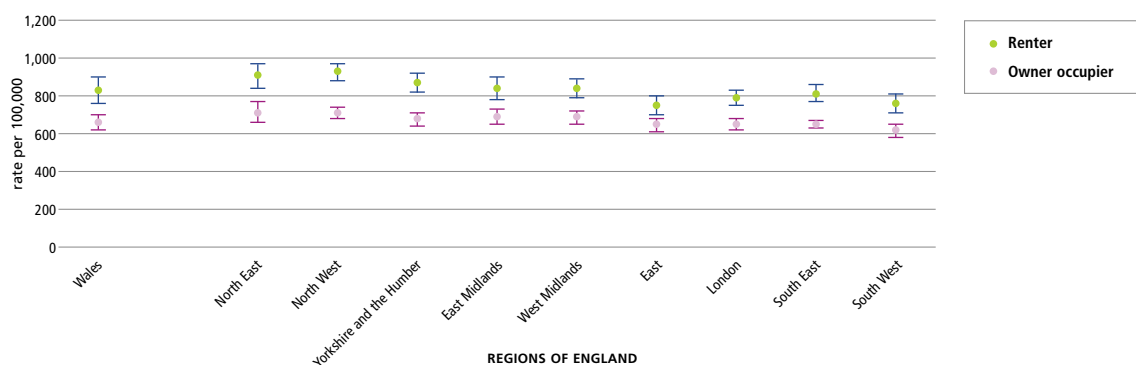


Figure 12.17

Age-standardised mortality rates for all causes of death by car access, males all ages
England and Wales 1991-1997

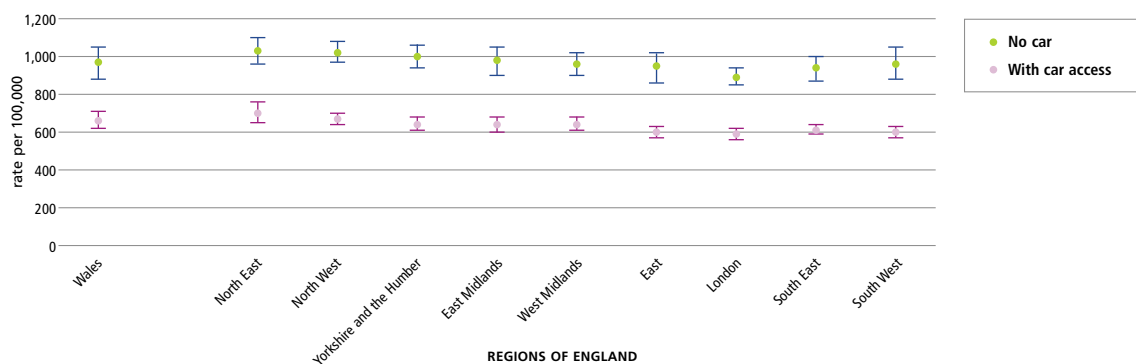
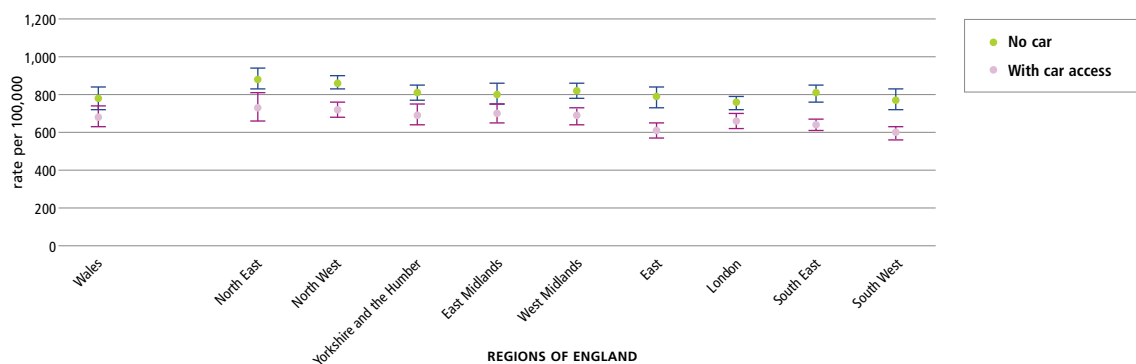


Figure 12.18

Age-standardised mortality rates for all causes of death by car access, females all ages
England and Wales 1991-1997



Analysis of mortality by housing tenure and car access confirms findings from other studies that those in owner occupied accommodation had lower mortality than those in rented accommodation and those with access to a car had lower mortality than those without. This was found to hold in each region of England and in Wales. Within car access and housing tenure categories, those living in the north of England had higher mortality than those living in the south.

What can we deduce from this strong and persistent relationship between geographic and socio-economic variation in mortality? In particular, the contrast between the very much higher mortality of the most deprived groups (such as Social Class V) in the northern regions of England, Wales, Scotland and Northern Ireland and the limited geographic variation among the most advantaged. Several generic models have been suggested which may help in explaining these patterns.

From their examination of the evidence, Shaw and colleagues¹⁴ argue that “social circumstances across the entire life-course – from birth through to late adulthood – influence people’s health and well-being. The characteristics of the areas in which people live, as well as their individual characteristics, influence their health. . . . Health inequalities are produced by the clustering of disadvantage – in opportunity, material circumstances and behaviours related to health – across people’s lives. Health-related behaviours – such as smoking and diet – are strongly influenced by the social environment in which people live.”

On the other hand, Brunner and Marmot¹⁵ hypothesise that the social determinants of health may be psychosocial, based on chronic stress associated with “the organisation of work, degree of social isolation, and sense of control over life.” A key element of this are the gradients in health observed in the Whitehall Study, as well as in studies based on Social Class. These, they argue, indicate that “position in the hierarchy (rather than absolute deprivation) is important. This suggests some concept of relative rather than absolute deprivation.”

Wilkinson¹⁶ then argues that “greater income inequality is one of the major influences on the proportion of the population who find themselves in situations that deny them a sense of dignity, situations that increase the insecurity they feel about their personal worth and competence, and that carry connotations of inferiority in which few can feel respected, valued and confident.”

In contrast to views which might emphasise the importance of area, in looking at the contribution of small areas and personal disadvantage in the LS, Sloggett and Joshi¹⁷ concluded that “higher death rates in areas identified as deprived by use of Census variables occur because a disproportionate number of socially disadvantaged people live there.”

Dahlgren and Whitehead¹⁸ have proposed a generic model of health that represents the various determinants of health as layers of influence, one over another. This emphasises that individuals are endowed with age, sex and constitutional factors which influence their health potential, but which are fixed. Surrounding the individuals are layers of influence that, in theory, could be modified. These range from personal

behaviour and way of life, to social and community influences in interactions with friends, family and neighbours, to wider influences on a person’s ability to maintain health, such as living and working conditions and access to essential goods and services, and finally to the overall economic, cultural and environmental conditions prevailing in a society.

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