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Socioeconomic Status within Social Class and Mortality: A Prospective Study in Middle-Aged British Men

S GOYA WANNAMETHEE AND A GERALD SHAPER

Wannamethee S G (Department of Primary Care and Population Sciences, Royal Free Hospital School of Medicine, Rowland Hill St, London NW3 2PF, UK) and Shaper A G. Socioeconomic status within social class and mortality: A prospective study in middle-aged British men. *International Journal of Epidemiology* 1997; **26:** 532–541.

Objective. It has been suggested that mortality differences between groups in society may be greater than are indicated by social class based on occupation. We have examined the relationship between social class and mortality using home and car ownership as additional indices of socioeconomic status within social class.
Design. A prospective study of a cohort of men representative of the social class distribution of middle-aged men in Great Britain.
Setting. One general practice in each of 24 towns in England, Wales and Scotland.
Subjects. Five years after the initial screening of 7735 men aged 40–59 years, 7262 men (94% of the original cohort) provided information on housing tenure and car ownership by completing a postal questionnaire.
Main Outcome Measure. Deaths from all causes, cardiovascular, cancer and other non-cardiovascular causes during an average follow-up of 9.8 years (range 8.5–11.0 years) after the postal questionnaire.
Results. During the follow-up period there were 946 deaths from all causes among the 7262 men. The lowest mortality rates for all causes, cardiovascular, cancer and other non-cardiovascular causes were seen in non-manual social classes I and II. Manual social classes III and IV+V showed a significant 40% increase in risk of death compared to social classes I+II, even after adjustment for a wide range of risk factors (relative risk [RR] = 1.4, 95% confidence interval [CI] : 1.2–1.7 and RR = 1.4, 95% CI : 1.1–1.7 respectively). Within all social class groups, those owning both home and car showed lower rates than those who owned neither, even after adjustment for a wide range of risk factors and employment status. Compared with social classes I+II owning both home and car, all those not owning home and/or car, in each social group, showed a significant approximately twofold increase in risk of death. Adjusted RR for non-manual I+II = 2.1 (95% CI : 1.5–2.9), non-manual III RR = 2.0 (95% CI : 1.3–2.9), manual III RR = 1.8 (95% CI : 1.4–2.4) and manual IV+V RR = 1.8 (95% CI : 1.3–2.5). Similar relationships were seen in all major geographical regions of Great Britain.
Conclusion. Mortality differences within society are greater than indicated by social class based on occupation alone. Irrespective of social class, men with greater material assets have lower rates of mortality from all causes than men less well endowed, independent of a wide range of lifestyle and biological factors. These findings suggest that mortality differences within our society are closely related to relative wealth.
Keywords: prospective study, socioeconomic status, social class, mortality

Differences in mortality by social class are well documented in Great Britain and the developed world[1] and examination of socioeconomic differences in mortality in Britain has traditionally concentrated on the Registrar General's social class classification based on occupational status.[2,3] However, this has been criticized as an inadequate measure of socioeconomic status[4] as the magnitude of the differential in mortality varies according to which index of socioeconomic status is used.[5–7] It has been shown that asset-based measures e.g. income, housing tenure and car ownership, are closely associated with mortality and that the use of these factors in combination with social class provides further discrimination in mortality.[5,6] In the Office of Population Censuses and Surveys (OPCS) Longitudinal Study, the combination of social class with car and home ownership produced groups with considerably wider mortality differentials than are seen with social class alone.[5] However, the influence of lifestyle factors on these differences was not examined. In the Whitehall study, a prospective study of male civil servants working in London, employment grade and car ownership combined contributed significantly to the magnitude of difference in mortality risk and these large differences were not accounted for by differences in the prevalence of risk factors.[6] The

Department of Primary Care and Population Sciences, Royal Free Hospital School of Medicine, Rowland Hill St, London NW3 2PF, UK.

men in the Whitehall study were almost entirely from non-manual social class groups and excluded skilled manual workers who comprise 45% of middle-aged British males. Data from the British Regional Heart Study (BRHS) allow a prospective examination of the relationship between social class and other measures of socioeconomic status (car ownership and housing tenure) and all cause mortality in a sample of middle-aged men drawn from general practices in each of 24 towns throughout Great Britain and representative of the social class distribution of middle-aged men in Great Britain. The contribution of lifestyle factors to these mortality differences is also examined.

SUBJECTS AND METHODS

The British Regional Heart Study (BRHS) is a prospective study of cardiovascular disease involving 7735 men aged 40–59 years selected from the age-sex registers of one group general practice in each of 24 towns in England, Wales and Scotland. In each town a general practice with a social class distribution representative of that in the town was selected. The criteria for selecting the town, the general practice and the subjects as well as the methods of data collection have previously been reported.[8] Research nurses administered to each man a standard questionnaire which included questions on smoking habits, alcohol intake and medical history. Several physical measurements were made, and blood samples (non-fasting) were taken for measurement of biochemical and haematological variables.[9] Classification methods for smoking status, alcohol intake, body mass index, occupation (social class) and physical activity have been reported.[8,10,11] The London School of Hygiene sphygmomanometer was used to measure blood pressure twice in succession with the subjects seated and the arm supported on a cushion. The mean of the two readings were used and all readings have been adjusted for observer variation in each town.[12]

Fifth Year Questionnaire (Q5)

Five years after the initial examination (1983–1985), a postal questionnaire (Q5) similar to the one administered at screening, was sent to all surviving men and detailed information obtained on medical history, changes in smoking and drinking behaviour, weight and in other risk factors. The men were also asked about car and home ownership. Since information on car and home ownership was available only at Q5, this report is concerned with 98% of available survivors with information on social class who completed the fifth year questionnaire (n = 7262).

Lifestyle Factors

Smoking. From the combined information at screening and 5 years later the men were classified as those who had never smoked cigarettes, ex-cigarette smokers at both Q1 and Q5, ex-cigarette smokers at Q5 only and three groups of current cigarette smokers at Q5 (1–19, 20 and >21/day).

Alcohol intake. The men were classified into five groups based on estimated weekly alcohol intake at Q5; none, occasional, light, moderate and heavy.[11] Heavy drinking is defined as drinking >6 units (1 UK unit = 8–10 g alcohol) daily or on most days in the week.

Body mass index (BMI). At Q5 the men were asked to state their weight and BMI (weight/height^2) was calculated (kg/m^2) for each man based on their reported weight and on measured height at initial screening.

Physical activity. At initial screening the men were asked to indicate their usual pattern of physical activity, which included regular walking or cycling, recreational activity and sporting activity. A physical activity score was derived for each man based on frequency and type of activity and the men were grouped into six broad categories based on their total score.[10]

Information on physical activity was not available at Q5 and adjustment for physical activity is based on physical activity data at screening.

Social Class

The longest-held occupation of each man was recorded at screening and grouped into one of the six social classes defined by the Registrar General's occupational classification: I professional (579 men; 8%), II managerial (1661 men; 22.9%), III non-manual/clerical (682 men; 9.4%), III manual (3110 men; 42.8%), IV semi-skilled manual (719 men; 9.9%) and V unskilled manual (296 men; 4.1%). Those whose longest held occupation was in the Armed Forces (215 men; 3.0%) form a separate group. Social class data were not available in 13 men. The percentage of manual workers (56.8%) accorded well with the proportion of manual workers among all male adults in the 24 towns (56%) and that of manual workers in the national population of males aged 45–64 (58%).[13] It has been assumed that the vast majority of these middle-aged men will have remained in their social class group through to Q5.

Socioeconomic Status

Accommodation. At Q5, the men were asked to describe their accommodation as (i) owner (ii) renting privately (iii) renting from council and (iv) other.

Car owner. At Q5, the men were asked how many cars were available in their household (i) none (ii) one (iii) two or more. Car availability is referred to as 'car ownership'. In all, 72 men did not provide complete information on car ownership and accommodation.

Employment Status

At Q5 the men were asked to describe their employment status: employed full time, employed part time, unemployed, disabled and retired.

Prevalence of Disease at Q5

At Q5 the men were asked to recall whether they had ever been told by a doctor that they had any of the 12 major specified conditions listed on the questionnaire; ischaemic heart disease (angina, heart attack, coronary thrombosis or myocardial infarction), 'other heart trouble', high blood pressure, stroke, gout, diabetes, gall bladder disease, thyroid disease, arthritis, bronchitis, asthma and peptic ulcer. The men were also asked details of any regular medical treatment and to describe their present health status as: excellent, good, fair or poor.

Follow-Up

All men were followed up for all cause mortality and cardiovascular morbidity.[14] Information on death was collected through the established 'tagging' procedures provided by the NHS registers in Southport (for England and Wales) and Edinburgh (for Scotland). Classification into deaths from cardiovascular and non-cardiovascular causes was based on the International Classification of Diseases 9th Revision codings on the death certificates. All deaths occurring in the period up to December 1993 are included in the study. As this report is concerned only with the men who completed Q5, mortality data on follow-up since the Q5 are presented for an average follow-up of 9.8 years (range 8.5–11.0 years) and follow-up has been achieved for 99% of the cohort.

Statistical Methods

Cox's proportional hazards model was used to assess the relation between socioeconomic status and mortality adjusting for the other risk factors.[15] The estimated hazard ratios (relative risks [RR]) for the socioeconomic variable adjusted for the other risk factors was obtained fitting these variables as categorical variables. Adjustments for risk factors were based on risk factors measured at Q5 except for height, systolic blood pressure, cholesterol and physical activity which were based on measurements at screening. In the adjustment smoking (six levels), physical activity (six levels), alcohol intake (five levels) and employment status (five levels) were fitted as categorical variables; age, BMI, systolic blood pressure, blood cholesterol and height were fitted continuously.

RESULTS

During the mean follow-up period of 9.8 years (range 8.5–11 years) there were 946 deaths from all causes among the 7262 men. Of these, 480 (50.7%) were due to cardiovascular causes, 333 (35.2%) to cancers and 133 (14.1%) to other non-cardiovascular causes. Figure 1 shows the mortality rates/1000 person-years by the six social class groups and the Armed Forces. Manual social classes (III, IV and V) had higher mortality rates than all non-manual social classes with the lowest rates seen in social classes I and II. The mortality rate in the small group of men whose longest-held occupation was in the Armed Forces was closer to that observed in the manual social classes. The higher mortality rate in manual workers was seen for cardiovascular causes, cancers and other non-cardiovascular causes. Since social classes I and II showed similar mortality rates and for the purpose of achieving adequate numbers in the baseline group they have been combined in subsequent analyses. Similarly, social classes IV and V have been combined and four social class categories are presented. The small group of men whose longest-held occupation had been in the Armed Forces was excluded from subsequent results.

Adjusting for Risk Factors

Social class is strongly associated with cigarette smoking and has been shown to be associated with many of the other risk factors for mortality in particular body mass index, physical activity, alcohol intake, height, cholesterol and systolic blood pressure.[13] To assess the extent to which social class differences in mortality may be explained by smoking and these other established risk factors we adjusted for potential confounders in three cumulative stages: (A) age, (B) smoking and (C) BMI, physical activity, alcohol intake, height, cholesterol and systolic blood pressure. Table 1 shows these adjusted RR for all causes of death, cardiovascular causes, cancer and other non-cardiovascular causes for the four social class categories, with the combined social class groups I and II as the reference group. Adjustment for smoking reduced the increased risks seen in all social classes but there still remained a significant 50% increase in all cause mortality in both the manual social class categories (IIIM and IV+V). There was a significant 60% increase in cardiovascular mortality in manual social classes compared to social classes I and II and over a twofold increase in other non-cardiovascular

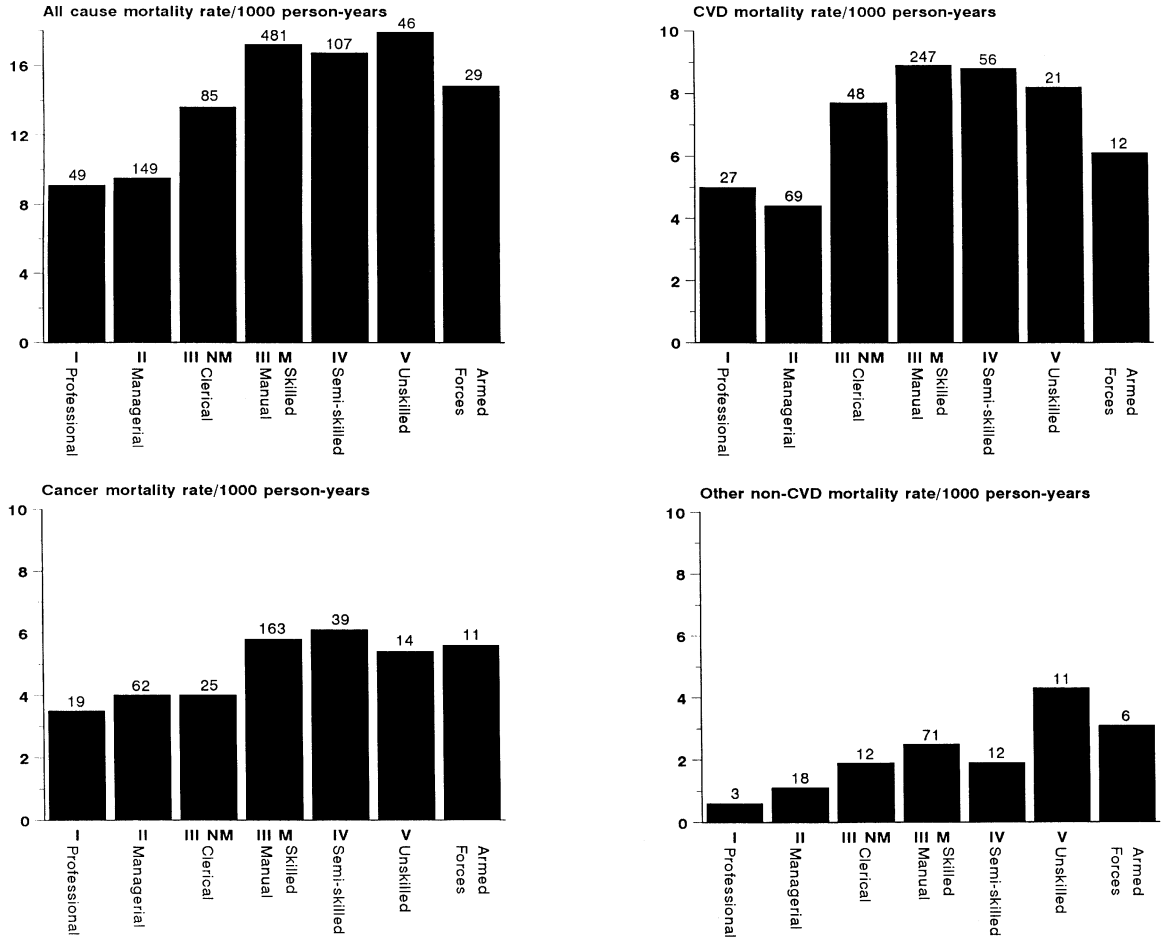

FIGURE 1 *Mortality rates/1000 person-years for all causes, cardiovascular, cancer and other non-cardiovascular causes by social class groups. No. of deaths indicated on Figure*

causes. After adjustment for smoking the increased mortality from cancer in manual workers was attenuated but still remained increased (marginally significant) in social class manual III. Even after further adjustment for the other risk factors the increase in all cause, cardiovascular and cancer mortality remained. The increased risk of other non-cardiovascular causes was further reduced but still remained significantly increased in the large social class III manual.

Social Class and Other Indices of Socioeconomic Status

We have examined the relationship between car ownership and housing tenure at Q5 with social class. The men were divided into four groups based on ownership of car and accommodation: (i) car and home owner (ii) home owner only (iii) car owner only and (iv) neither. Table 2 shows the proportion of men in these four groups by social class status. Social class was strongly associated with car and home ownership. Of men in social classes I+II, 88% were car and home owners at Q5 compared to 38.3% in social classes IV+V. Only 1.9% of men in social classes I+II owned neither compared to 27.3% in social classes IV+V.

Car and Home Ownership and Mortality

We have examined the relationship between mortality and the composite measure of car and home ownership, initially without stratification for social class based on occupation (Table 3). Mortality from all causes increased with decreasing material assets. These relationships were seen even after adjustment for social class and other

TABLE 1 *Relative risk (95% confidence limits) of mortality by social class adjusted in three cumulative stages: (A) age (B) age and smoking (C) in addition for BMI, physical activity, alcohol intake, height, cholesterol and systolic blood pressure. Armed Forces (n = 215) not presented*

	Adjusted for		
	A	B	C
Total			
I+II	1.0	1.0	1.0
IIINM	1.4 (1.1–1.7)	1.3 (1.0–1.7)	1.2 (0.9–1.6)
IIIM	1.8 (1.5–2.0)	1.5 (1.3–1.8)	1.4 (1.2–1.7)
IV+V	1.8 (1.4–2.1)	1.5 (1.2–1.8)	1.4 (1.1–1.7)
Cardiovascular disease			
I+II	1.0	1.0	1.0
IIINM	1.6 (1.1–2.2)	1.5 (1.1–2.1)	1.4 (1.0–2.0)
IIIM	1.9 (1.5–2.4)	1.6 (1.3–2.0)	1.4 (1.1–1.8)
IV+V	1.8 (1.3–2.4)	1.5 (1.1–2.0)	1.4 (1.0–1.9)
Cancer			
I+II	1.0	1.0	1.0
IIINM	1.0 (0.6–1.6)	0.9 (0.6–1.5)	0.9 (0.6–1.5)
IIIM	1.5 (1.1–1.9)	1.3 (1.0–1.6)	1.4 (1.0–1.8)
IV+V	1.5 (1.0–2.0)	1.3 (0.9–1.8)	1.3 (0.9–1.9)
Other			
I+II	1.0	1.0	1.0
IIINM	1.8 (0.9–3.7)	1.7 (0.8–3.5)	1.6 (0.8–3.5)
IIIM	2.4 (1.5–3.8)	2.1 (1.3–3.5)	1.8 (1.0–3.0)
IV+V	2.5 (1.4–4.5)	2.1 (1.2–3.8)	1.5 (0.9–3.2)

TABLE 2 *Social class and car and home ownership. Some 72 men did not provide information on car and home ownership. Armed Forces (n = 215) excluded from analysis*

	Car and home owner	Home owner only	Car owner only	Neither
I+II	88.0 (1972)	3.2 (71)	6.9 (154)	1.9 (43)
IIINM	77.0 (525)	7.2 (49)	10.0 (68)	5.9 (40)
IIIM	56.8 (1765)	9.4 (291)	19.5 (605)	14.4 (449)
IV+V	38.3 (389)	14.8 (150)	19.6 (199)	27.3 (277)

potential confounders. Owners of both car and home showed significantly lower mortality rates for cardiovascular, cancer and other non-cardiovascular causes than those who owned neither home nor car.

Social Class, Other Indices of Socioeconomic Status and Mortality

It has been shown that composite measures of socioeconomic status predict the relationship between socioeconomic status and health better than social class alone.[5,6] To assess the use of home/car ownership in differentiating mortality rates within social class groups, each social class category was divided into three groups: i) both car and home owner (ii) either car or home owner (iii) neither. Since most people in social classes I+II non-manual and III non-manual were home owners, (ii) and (iii) were combined in these social class categories and 10 groups were used (Table 4). Men in social classes I+II who were both car and home owners were used as the reference group.

Within all social class groups, those who were both car and home owners showed the lowest mortality rates and RR even after full adjustment for a wide range of risk factors (Figure 2, Table 4). Men who were not both

TABLE 3 *Car and home ownership and mortality rates/1000 person-years and adjusted[a] relative risk (RR) of mortality for all causes, cardiovascular, cancer and other causes*

	Car and home owner (4781)	Home owner only (566)	Car owner only (1058)	Neither (785)
Total				
Rate/1000 person-years	10.5	19.7	20.9	24.8
Adjusted RR[a]	1.0	1.3 (1.0–1.6)	1.4 (1.1–1.8)	1.5 (1.2–1.8)
Cardiovascular disease				
Rate/1000 person-years	5.5	7.8	11.5	11.8
Adjusted RR[a]	1.0	1.0 (0.7–1.4)	1.4 (1.1–1.7)	1.4 (1.1–1.8)
Cancer				
Rate/1000 person-years	3.9	7.6	6.9	8.2
Adjusted RR[a]	1.0	1.5 (1.0–2.2)	1.5 (1.1–2.0)	1.6 (1.1–2.2)
Other				
Rate/1000 person-years	1.1	4.4	2.5	4.8
Adjusted RR[a]	1.0	2.8 (1.7–4.7)	1.4 (0.8–2.4)	2.3 (1.4–3.8)

72 men did not provide information on car or home ownership.
[a] Adjusted for age, smoking, BMI, physical activity, alcohol intake, height, cholesterol, systolic blood pressure and social class.

TABLE 4 *Social class and adjusted relative risk of all cause mortality, cardiovascular, cancer and other non-cardiovascular mortality by car and home ownership. Armed Forces not presented*

Social class	N	Total (928)		Cardiovascular disease (472)		Cancer (329)		'Other' (127)	
		A	B	A	B	A	B	A	B
Professional/managerial (I+II)									
1 C+H	1972	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2 C/H or none	258	2.3	2.1 (1.5–3.0)	1.8	1.6 (1.0–2.7)	2.4	2.3 (1.3–4.0)	4.4	4.2 (1.7–10.4)
Clerical (IIINM)									
3 C+H	525	1.3	1.2 (0.9–1.6)	1.5	1.3 (0.9–2.1)	1.0	0.9 (0.5–1.6)	1.7	1.6 (0.6–4.3)
4 C/H or none	154	2.5	2.1 (1.5–3.1)	2.8	2.0 (1.2–3.5)	1.8	1.8 (0.9–3.6)	4.4	3.5 (1.2–10.2)
Skilled manual (IIIM)									
5 C+H	1765	1.7	1.5 (1.2–1.9)	1.8	1.5 (1.1–2.0)	1.5	1.5 (1.0–2.1)	2.5	2.3 (1.2–4.7)
6 C/H	888	2.3	1.8 (1.4–2.2)	2.4	1.7 (1.2–2.3)	1.8	1.7 (1.1–2.5)	3.7	2.8 (1.4–5.9)
7 None	425	2.6	2.0 (1.5–2.6)	2.4	1.7 (1.2–2.6)	2.2	2.0 (1.2–3.1)	5.4	3.4 (1.5–7.6)
Semi/unskilled manual (IV+V)									
8 C+H	389	1.5	1.3 (0.9–1.8)	1.8	1.5 (1.0–2.4)	1.4	1.3 (0.7–2.3)	0	0
9 C/H	343	2.0	1.6 (1.2–2.2)	1.8	1.4 (0.8–2.1)	1.8	1.7 (1.0–2.8)	4.2	2.6 (1.0–6.4)
10 None	257	2.6	2.0 (1.4–2.8)	2.6	1.9 (1.2–3.1)	1.9	1.8 (1.0–3.2)	5.9	3.7 (1.5–9.0)

C+H = Ownership of both home and car; C/H = either home or car owner; None = neither.
A = age-adjusted.
B = adjusted for age, smoking, BMI, physical activity, alcohol intake, height, cholesterol, systolic blood pressure.

home and car owners showed higher mortality rates and RR irrespective of social class and it was noteworthy that men in social classes I and II who did not own both home and car showed higher RR than manual workers who were both home and car owners. Among men who were both car and home owners, there were still significant differences in mortality between manual social class III and non-manual social classes I and II. These patterns were seen for cardiovascular, cancer and other non-cardiovascular causes (Figure 2, Table 4).

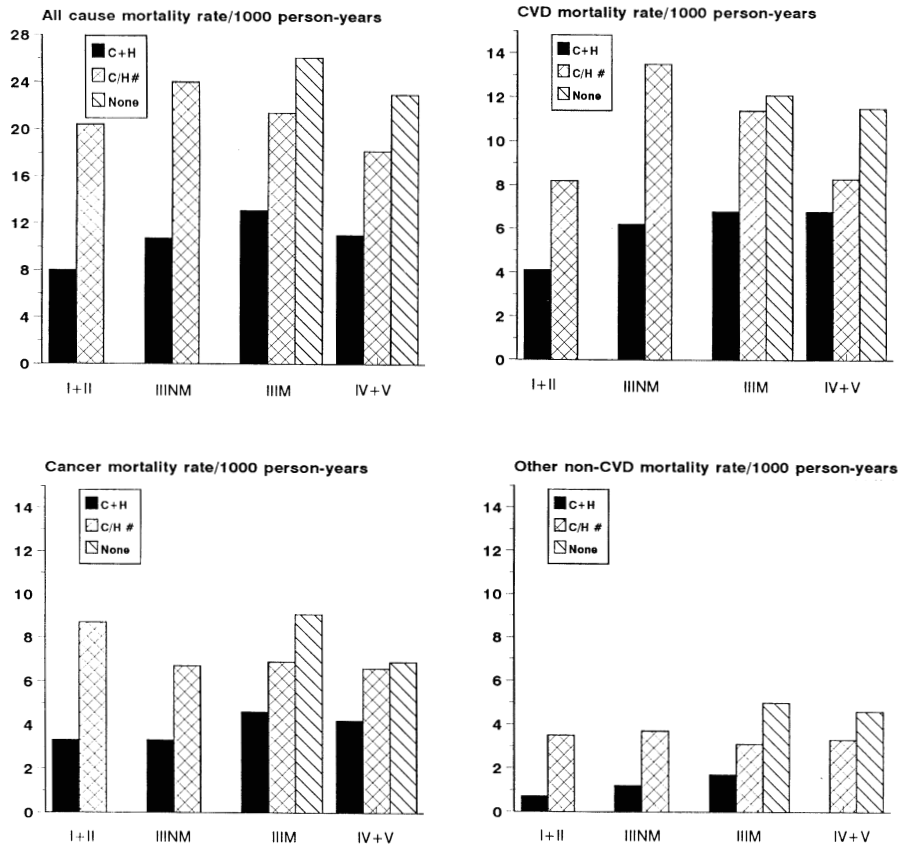

FIGURE 2 *Mortality rates/1000 person-years for all cause, cardiovascular, cancer and other non-cardiovascular causes by home and car ownership within social class groups*

C+H = both car and home owner; C/H = car or home owner except (#) in social classes I+II and IIINM this category includes those who were neither car nor home owner; none = neither car nor home owner.

Employment Status

Five years after initial screening (Q5) 76% of the men were still in full or part time employment. Eleven per cent had retired, 3% were registered disabled and 10% of the men reported being unemployed. As expected, car and home ownership is strongly associated with unemployment status (Table 5). Unemployment status tended to increase with decreasing material assets. However, further adjustment for employment status at Q5 made only minor differences to the RR seen. The adjusted RR (95% CI) for all cause mortality for the 10 socioeconomic groups in Table 4 were 1.0, 2.1 (1.5–2.9), 1.2 (0.8–1.6), 2.0 (1.3–2.9), 1.6 (1.3–1.9), 1.7 (1.4–2.2), 1.8 (1.4–2.4), 1.3 (0.9–1.8), 1.5 (1.1–2.1) and 1.8 (1.3–2.5) respectively.

Socioeconomic Status and Health Status at Q5

Table 5 also shows the burden of ill-health by the 10 socioeconomic groups as measured by recall of doctor-diagnosed disorders at Q5, regular medication and perceived poor/fair health. Self perception of poor/fair health has been shown to be a good measure of current physical health status and is strongly associated with risk of death.[16] All of these indicators of the burden of disease increased with decreasing material assets and followed a similar pattern to the overall mortality rate.

Geography and Social Class

Since the South of Great Britain tends to have a lower proportion of manual workers and has been shown to have lower mortality rates than the North,[17] we have

TABLE 5 *Socioeconomic status and unemployment status, prevalence of doctor-diagnosed disorder, regular medication and poor/fair perceived health status at Q5. Armed Forces excluded from analysis*

	% Unemployed	% Poor/fair health	% ⩾2 doctor diagnoses (of the 12 listed diagnoses)	% Regular medication
I+II				
Both car and home owner	3.1	11.2	13.7	27.0
Car/home owner or neither	11.2	25.0	17.5	33.6
III Non-manual				
Both car and home owner	3.6	16.4	19.5	30.7
Car/home owner or neither	16.6	29.3	22.9	38.9
III Manual				
Both car and home owner	7.7	21.7	15.5	27.6
Car/home owner	14.7	30.0	21.2	36.7
Neither	26.3	45.4	26.3	43.4
IV+V				
Both car and home owner	8.5	22.1	14.1	29.6
Car/home owner	16.3	35.5	28.1	39.5
Neither	25.6	52.7	26.7	44.4

further adjusted for zone of residence at initial examination; South (n = 2165 men), Midland and Wales (n = 1124 men), North (n = 3017 men) and Scotland (n = 884 men). Adjustment for zone of residence made little difference to the relationships seen in Table 4. The relationship between socioeconomic status and all cause mortality was also examined separately by zone of residence. The relationship between the socioeconomic groups was seen in all regions (data not shown).

DISCUSSION

The Registrar General's classification of social class has traditionally been used to describe 'inequalities' of health in Great Britain. Alternative measures of socioeconomic status such as housing tenure and access to cars have been shown to be associated with mortality, and the use of these measures in conjunction with social class has shown wider differences in mortality in both men and women than using social class alone.[5,6,18] Of the two previous British studies which have examined prospectively the use of composite measures of socioeconomic indices in relationship to mortality, The OPCS Longitudinal Study provides no data on the contribution of lifestyle or biological factors to these differences and the London-based Whitehall Study was confined to non-manual social classes.

In this cohort of middle-aged men representative of the social class distribution of middle-aged men in Great Britain, there was a nearly twofold difference in age-adjusted all cause mortality between social classes I and II combined and social classes IV and V combined. Although smoking and lifestyle factors contributed to some of this difference, there still remained a 40% increase in all cause mortality after adjustment for these factors. Similar magnitudes of differences in mortality were observed when car and home ownership were used together as indicators of socioeconomic status. Although social class is strongly associated with car and home ownership, it was observed that within all social classes car and home ownership contributed significantly to differences in mortality within these broad social class categories. The mortality difference was seen even in the higher social classes. There was nearly a threefold difference in age-adjusted all cause mortality between home and car owners in social classes I+II and those who had neither in social classes IV+V compared with a nearly twofold increase using social class alone. Even after adjustment for risk factors and employment status there remained a nearly twofold increase in risk of all cause mortality between the extreme groups compared to a 40% increase between the low and high social class groups based on the Registrar General's classification of social class. These relationships were seen in all major geographical regions of Great Britain. Our findings complement those of the Longitudinal Study and the Whitehall Study which showed wider mortality differentials when composite measures of socioeconomic factors were used.[5,6] We also observed that men who were neither car nor home owners had similar RR of mortality irrespective of social class. This suggests that material well-being is a factor in determining differences in mortality observed between social classes.

Causes of Mortality

The wide differences in mortality between socioeconomic groups within the social class categories was seen for cardiovascular, cancer and other non-cardiovascular causes. Most studies have focused on cardiovascular disease and a consistent inverse relationship has been observed between socioeconomic factors and cardiovascular mortality independent of smoking and lifestyle factors and irrespective of the socioeconomic measures used.[1,19] Although low socioeconomic status has been associated with increased cancer mortality in Britain and elsewhere[20–22] fewer studies have examined the influence of smoking on the cancer mortality differential by socioeconomic status although the evidence suggests that social class differences exist independently of smoking pattterns.[21,22] In the present study, cancer mortality differences between the Registrar General's social class groups were small although manual social class III showed significantly increased risk of cancer compared to social classes I+II even after adjustment. However, when finer socioeconomic groupings incorporating house and car ownership were used, wider differences were observed which were independent of smoking status and other confounding factors.

Mechanism

Two main approaches have been discussed in a review of the explanations offered for socioeconomic differentials in mortality in Great Britain and elsewhere.[1] One is the 'search for the missing risk factor', an enterprise for which the authors show little optimism, and the other is the theory of 'heightened general susceptibility'. The authors present data on the socioeconomic distribution of cancers of particular sites in the Whitehall Study of civil servants, and consider that the findings give little support for the theory of general susceptibility. However, it seems that this approach with some modification should continue to be entertained as a possible mechanism in the creation of increased risk of mortality associated with relative lack of wealth. While it is highly unlikely that any specific risk factor, biological, cultural or psychological, will emerge that will adequately account for the unexplained social variation, it is possible that the combined effect of many factors already measured, but with imprecision and/or infrequency, may explain more adequately the social variation in mortality. We measure many factors with considerable imprecision, and very often at times only distantly related to the outcomes. The Whitehall Study cancer data do not necessarily fail to support the heightened general susceptibility hypothesis, for while the site of cancer may be aetiologically specific, the development of cancer whatever the site, may depend upon a more general susceptibility. In the present study, the increased risk of mortality seen in groups with lower socioeconomic status within each social class category, is present for cardiovascular disease, cancers and for other non-cardiovascular causes. It would seem highly likely that some heightened general susceptibility to disease must be present, and, using Occam's razor, it is more likely that such increased susceptibility is related to the combined effects of a number of risk factors—environmental, dietary, genetic and psychological—rather than to some new yet-to-be-uncovered factor X.

CONCLUSION

The mortality differences between socioeconomic groups are far greater than indicated by social class alone. Irrespective of social class based on occupation, men who have greater material assets, as manifest by combined home ownership and access to a car, have considerably lower rates of mortality from all causes than men who are less well endowed. These findings appear to be independent of the wide range of lifestyle and biological factors measured in this study. These data support the contention that the mortality differences observed between social class groups in Great Britain are closely related to relative wealth.

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