

Social inequalities in male mortality for selected causes of death by the National Statistics Socio-economic Classification, England and Wales, 2001–03

Chris White, Grace Edgar and
Veronique Siegler
Office for National Statistics

This article reports social inequalities in mortality in selected causes of death for men aged 25–64 years in England and Wales in 2001–03. It is the first compilation of mortality statistics in causes of death by the final version of the National Statistics Socio-economic Classification, which was introduced into death registrations in 2001. These results follow-up the all cause analyses reported previously using similar methods, and provide insights into the impacts of different social and occupational circumstances on selected causes of death.

Introduction

This article describes social inequalities in mortality for men aged 25–64 by selected causes of death in England and Wales in the period 2001–03. It is based on methods reported in a previous article, which refined the analysis of all-cause male mortality using unlinked records with complementary analyses of linked records.¹

This analysis establishes a benchmark to measure inequalities in mortality for selected causes of death by the National Statistics Socio-economic Classification (NS-SEC), and provides insight into the contribution of these causes to the all-cause mortality pattern.

This current analysis focuses on differences between the NS-SEC classes in 2001–03, rather than changes over time in cause-specific patterns of mortality. Comparisons with previous time periods are difficult because both the social classification and the classification of causes of death changed in 2001, the former from the Registrar General's Social Class (RGSC) to NS-SEC, and the latter from the Ninth Revision of the International Classification of Diseases (ICD–9) to the Tenth Revision (ICD–10). A future article will examine change in the distribution of causes of death by socio-economic position since 1991–93, using findings from the bridge coding study conducted by the Office for National Statistics (ONS) to take account of changes between ICD–9 and ICD–10.²

Background

Historically, the measurement of social differences in the relative life chances of sections of the population in the United Kingdom has relied on the RGSC, based on occupation and employment status. Significant

variations in cause-specific mortality by RGSC were found consistently in the health inequalities literature during the 20th century, particularly among men of working age.^{3, 4, 5, 6, 7, 8, 9, 10}

Since the influential report on inequalities in health by Sir Douglas Black in 1980¹¹ several analyses have examined trends in differences in mortality by RGSC. Their findings point to reductions in mortality risk across all social classes in most causes of death, but the rate of decrease was sharper among professionals and managers.^{3, 9, 10} The disparity in the rate of improvement in mortality risk over time prompted a second independent inquiry into inequalities in health,¹² chaired by Sir Donald Acheson in 1997. This provided the basis for the introduction of the Government’s health inequality strategy.^{13, 14, 15, 16}

The RGSC provided a relatively consistent basis for reporting mortality by socio-economic position, but has now been replaced by the NS-SEC. The implication of this change for mortality analyses has been reported in a previous article:¹ a noteworthy difference between these classifications is that the RGSC is an assumed hierarchy of occupational skill and social standing, whereas NS-SEC is an explicit measure of employment relations characteristics that aims to minimise within-class and maximise between-class heterogeneity.¹⁷ The capture of qualitative differences in employment relations inherent in the NS-SEC schema does not provide a hierarchy of classes, but establishes distinct occupational groupings, which may provide greater scope for explaining statistical relationships.

Analyses of male cause-specific mortality in England and Wales in 1991–93 by an interim version of NS-SEC, derived from the Standard Occupational Classification 1990 and employment status, and RGSC has been reported previously.¹⁸ While the mortality divide between the most advantaged and most disadvantaged classes in each classification was similar, an important difference was the more irregular mortality pattern found in the intervening NS-SEC classes, compared with the more consistent gradient observed using RGSC. Specifically, the Small employers, own account workers class had lower mortality rates than the Intermediate class from ischaemic heart disease (IHD), cerebrovascular diseases and selected external causes.

The causes of death selected for examination in this article was informed by the recent literature on health inequalities by socio-economic position: inequalities in mortality from ischaemic heart disease, cerebrovascular diseases, all malignant neoplasms, accidents and suicide were reported (by an earlier version of NS-SEC) in the period 1991–93;¹⁸ previous analyses using the ONS Longitudinal Study also showed gradients by RGSC in deaths from respiratory diseases.¹⁰ Digestive diseases were included as a result of the increase in deaths from these diseases between 1991–93 and 2001–03¹⁹ and accidental falls were included because of the specific risks of these events in certain occupations.

Methods

The National Statistics Socio-economic Classification

The theoretical and conceptual basis for the NS-SEC is based on employment relations operating in modern developed economies.²⁰ Occupations are differentiated in terms of reward mechanisms, career prospects, autonomy and security. In this analysis, NS-SEC is derived from occupation coded to the Standard Occupational Classification 2000²¹ and employment status, both collected at registration of the deceased.¹ Box One shows the NS-SEC analytic class breakdowns used in this analysis, and provide examples of the occupations included in each class.

In the past, analyses of mortality by RGSC have grouped social classes into a ‘non-manual’ and ‘manual’ split: this distinction is of less importance in modern developed economies. Although the condensed version of NS-SEC, shown in Box One, labels the third class ‘routine and manual occupations’, this label should not be interpreted as linked to the characteristics of occupational skill and social standing underlying the RGSC manual group, which contained the RGSC Skilled Manual (IIIM), Partly Skilled (IV) and Unskilled (V) classes. Another caveat of the Routine and Manual class label in the condensed version of NS-SEC is the non-routine nature of Lower supervisory and technical occupations which this class includes: the grouping of these occupations with Semi-routine and Routine occupations is, however, justified on the grounds of similarity in the employment relations characteristics of these occupations.

Box one

National Statistics Socio-economic Classification (NS-SEC) – analytic classes

Condensed analytic class	Analytic class	Examples of occupations included
1 Managerial and professional occupations	1 Higher managerial and professional occupations	
	1.1 Large employers, higher managers	Senior officials in national and local government; directors and chief executives of major organisations; officers in the armed forces
	1.2 Higher professionals	Civil engineers, medical practitioners, physicists, geologists, IT strategy and planning professionals, legal professionals, architects
2 Intermediate occupations	2 Lower managerial, professional	Teachers in primary and secondary schools, quantity surveyors, public service administrative professionals, social workers, nurses, IT technicians
	3 Intermediate	NCOs and other ranks in the Armed Forces, graphic designers, medical and dental technicians, Civil Service administrative officers and local government clerical officers, counter clerks, school and company secretaries
3 Routine and manual	4 Small employers and own account workers	Hairdressing and beauty salon proprietors, shopkeepers, dispensing opticians in private practice, farmers, self-employed taxi drivers
	5 Lower supervisory and technical occupations	Bakers and flour confectioners, screen-printers, plumbers, electricians and motor mechanics employed by others, gardeners, rail transport operatives, supervisors of van, bus and coach drivers, labourers, scaffolders
	6 Semi-routine occupations	Pest control officers, clothing cutters, traffic wardens, scaffolders, assemblers of vehicles, farm workers, veterinary nurses and assistants, shelf fillers
	7 Routine occupations	Hairdressing employees, floral arrangers, roundsmen and women, sewing machinists, van, bus and coach drivers, labourers, hotel porters, bar staff, cleaners and domestics, road sweepers, car park attendants

The three class version of NS-SEC provides scope to divide the population into advantaged and disadvantaged groups in a similar way to the previous Manual:Non-manual comparisons, and offers a structure with which to examine inequalities in mortality by socio-economic position using broad occupational groupings.

The assignment of NS-SEC at death registration depends on the occupation and employment status of the deceased reported by the person registering the death. This process relies on second-hand knowledge and may be less accurate than the reporting of occupational details that occurred at census. For example, where precise information on the employment status of the deceased is not available, the default category of 'employee' is used, which can affect the assignment of the NS-SEC analytic class. An investigation into the consistency of assignment of employment status at census and death registration uncovered a discrepancy in NS-SEC allocations between census and death registration brought about by this convention in the recording of employment status.¹

Analyses of the relationship between assignment of socio-economic position at census and at death registration have been reported previously using ONS Longitudinal Study records.^{1, 6, 7, 10} An examination of records relevant to this analysis showed that 53 per cent of those in occupied NS-SEC analytic classes were allocated to the same class at death as was reported in the 2001 census (ranging from 41 per cent in the Large employers and higher managers to 65 per cent in the Routine analytic class), while 20 per cent were reported at death in a 'higher' class than at census, and 27 per cent in a 'lower' class. Consequently, inferences about the influence of NS-SEC, and the employment relations underlying the classification, are therefore imperfect, and should be regarded as indicative of an employment relations effect rather than conclusive.

The information collected at death registration does not allow reliable identification of men who had Never worked or were Long-term unemployed, or differentiation between those categories and men who could not be allocated to an NS-SEC class for another reason.²² Figures reported here are therefore restricted to occupied NS-SEC analytic classes only. However, the England and Wales mortality rate against which NS-SEC classes are compared includes all deaths to men of this age in 2001–03.

Information on the rationale and application of the NS-SEC is available on the Office for National Statistics website.²³

International classification of Diseases 10th Revision

Cause of death in England and Wales has been coded to the Tenth revision of the International Classification of Diseases (ICD–10) since 2001,²⁴ replacing the Ninth revision used between 1979 and 2000. The principal differences between the two revisions and the implications for mortality statistics has been reported elsewhere.^{25, 26} These differences prevent comprehensive comparison with earlier time periods.

In this analysis, suicide is defined as deaths where the coroner has given a verdict of suicide or where an open verdict was reached in a death from injury and poisoning. It is thought that most of these open verdicts are cases where the harm was self-inflicted but there was insufficient evidence to prove that the deceased deliberately intended to kill themselves. In ICD–10 the codes used to select suicides were X60–X84 (Intentional self-harm) and Y10–Y34 (Injury undetermined whether accidentally or purposely inflicted, excluding Y33.9 where the coroner's verdict was pending).

The causes of death included and their ICD–10 codes are shown in Box Two.

Box two

Causes of death included in the analysis

Cause of death	ICD-10 code
All circulatory diseases	I00–I99
Ischaemic heart disease	I20–I25
Cerebrovascular diseases	I60–I69
All malignant neoplasms	C00–C97
Colon, rectum, rectosigmoid junction and anus	C18–C21
Trachea, bronchus and lung	C33–C34
All respiratory diseases	J00–J99
Pneumonia	J12–J18
Chronic lower respiratory diseases	J40–J47
All digestive diseases	K00–K93
Gastric and duodenal ulcer	K25–K27
All liver diseases	K70–K77
External causes of morbidity and mortality	V01–Y89
Accidents	V01–X59
Transport accidents	V01–V99, Y85
Falls	W00–W19
Suicide and events of undetermined intent	X60–X84, Y10–Y34 ¹

¹ Excludes Y33.9 where the coroner's verdict was pending.

Sources of data

Four sources of data were used to calculate age-specific and age-standardised rates of mortality by the National Statistics Socio-economic Classification reported in this article. Firstly, the routine collection of age at death, sex, occupation, employment status and cause of death from death occurrences²⁷ provided information on the number of deaths occurring in each age-group for each NS-SEC class for the period 2001–03. Secondly, the decennial census of population in the United Kingdom in 2001 collected information on age, sex, occupation and employment status, providing information to derive the NS-SEC specific population at risk of death for 2001–03. Thirdly, the mid-year population estimates for 2001, 2002 and 2003 were used to centre the population at risk with the death records examined and allow for revisions to the 2001 census populations, which have subsequently been published by ONS: the proportions of the male population in each NS-SEC class and five-year age group found at census were extrapolated to the revised mid-year population estimates. Fourthly, the ONS Longitudinal Study enabled the population at risk to be further optimised to reduce the effect of known biases, and to adjust for discrepancies in class allocations at death registration found previously.¹

Analysis period and study population

This analysis examines mortality in the years 2001–03 to provide consistency with population denominators derived from the decennial census of population in 2001. Three years of death occurrences data are pooled to ensure a sufficient number of deaths are available to undertake detailed NS-SEC comparisons by age-group and cause of death.

Death registrations collect information on the occupation and employment status of the deceased between the ages 16 and 74. However, the completeness of this data deteriorates noticeably after the male state retirement age of 64, reducing its reliability for analysis. The higher proportion of men delaying entry into the labour market on grounds of further study beyond the age of 16 also reduces the proportion of men aged 16–22 that can be allocated an occupied NS-SEC class. Consequently, this analysis is restricted to men aged 25–64, ensuring the highest proportion can be designated to the NS-SEC.

Table 1 Number of deaths by cause and percentage classified to occupied NS-SEC classes, men aged 25–64, 2001–03

England and Wales				
Cause of death	ICD-10 codes	Number of deaths	Per cent of all deaths	Per cent classified to occupied NS-SEC
All causes	A00–R99, V00–Y89	150,201	100	89
All circulatory diseases	I00–I99	48,005	32	92
Ischaemic heart disease	I20–I25	32,250	22	93
Cerebrovascular diseases	I60–I69	6,684	5	92
All malignant neoplasms	C00–C97	49,002	33	96
Malignant neoplasm of colon, rectum, rectosigmoid junction and anus	C18–C21	5,161	3	97
Malignant neoplasm of trachea, bronchus and lung	C33–C34	12,029	8	97
All respiratory diseases	J00–J99	8,902	6	85
Pneumonia	J12–J18	2,817	2	79
Chronic lower respiratory diseases	J40–J47	4,308	3	89
All digestive diseases	K00–K93	12,032	8	85
Gastric and duodenal ulcer	K25–K27	965	1	85
All liver diseases	K70–K77	8,382	6	86
External causes (injuries and poisoning)	V01–Y98	16,998	11	80
All accidents	V01–X59	7,929	5	81
Transport accidents	V01–V99, Y85	3,698	3	89
Falls	W00–W19	1,221	1	81
Suicide and events of undetermined intent	X60–X84, Y10–Y34 ¹	7,842	5	80

1 Excludes Y33.9 where coroner’s verdict was pending.

Source: Death registrations 2001–03

Of the 150,201 deaths of men aged 25–64 over the years 2001–03, 133,712 (97 per cent) have been included in the cause-specific analysis presented here.

Outcome measures

To compare the mortality experience of NS-SEC analytic classes, directly age-standardised mortality rates for all men aged 25–64 standardised to the European standard population were calculated.²⁸ Age-standardised rates are a summary measure allowing populations with different age structures to be reliably compared. The age-standardised rates of death presented for England and Wales encompass all deaths occurring to men of this age whether or not they were designated an occupied NS-SEC class.

Results

The number of deaths examined in this analysis by underlying cause is presented in Table 1, along with the proportions classified to an occupied NS-SEC class.

Circulatory diseases

Circulatory diseases represent an important cause of death in men aged 25–64 in England and Wales. In this study 32 per cent (48,005) of all deaths that occurred to men in 2001–03 were attributed to this disease group. Within circulatory causes of death, ischaemic heart disease (IHD) comprised 67 per cent and cerebrovascular disease (stroke) 14 per cent. The age-standardised mortality rates per million by NS-SEC analytic classes from all circulatory diseases, IHD, and cerebrovascular disease appear in Table 2.

The age standardised mortality rate from all circulatory causes among men working in Higher managerial and professional occupations was approximately 50 per cent of the mortality for all men of this

Table 2 Age-standardised mortality rates¹ from circulatory diseases by NS-SEC,² men aged 25–64, 2001–03

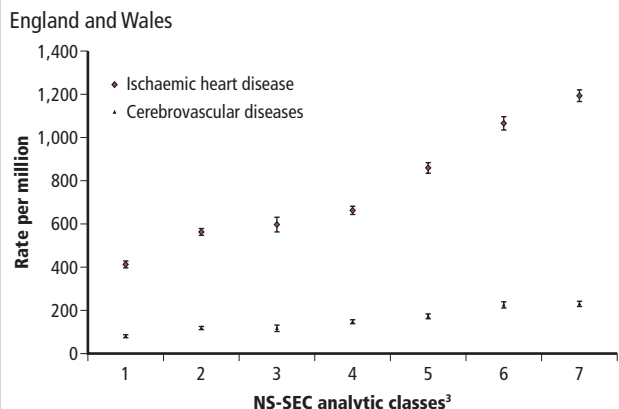
NS-SEC analytic class		Rate per million								
		All circulatory diseases			Ischaemic heart disease			Cerebrovascular diseases		
		Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval
1	Higher managerial and professional occupations	613	594	633	413	397	429	80	73	87
1.1	Large employers, higher managers	597	569	626	410	386	434	76	66	86
1.2	Higher professionals	630	604	657	417	395	438	84	74	93
2	Lower managerial, professional	837	817	856	563	547	579	118	111	125
3	Intermediate	900	859	943	597	563	631	117	102	132
4	Small employers, own account workers	1,002	979	1,026	663	644	682	147	138	157
5	Lower supervisory and technical	1,253	1,223	1,283	859	834	884	172	161	184
6	Semi-routine	1,581	1,543	1,619	1,066	1,035	1,097	225	211	239
7	Routine	1,718	1,686	1,751	1,193	1,166	1,220	230	218	242
All men in England and Wales		1,187	1,176	1,198	799	790	808	165	161	169
Ratio 7:1		2.8			2.9			2.9		
Condensed NS-SEC										
1	Managerial and professional occupations	741	727	755	499	487	510	102	97	107
2	Intermediate occupations	976	956	997	647	630	663	140	132	147
3	Routine and manual occupations	1,522	1,503	1,541	1,045	1,029	1,061	209	202	216
Ratio 3:1		2.1			2.1			2.1		

1 Directly age-standardised rate using the European standard population.

2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

Figure 1 Age-standardised mortality rate¹ from ischaemic heart disease and cerebrovascular diseases by NS-SEC,² men aged 25–64, 2001–03



- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.
- 3 Refer to Box One for label categories.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

age in England and Wales, while the rate of men working in Routine occupations was 45 per cent higher than that of England and Wales.

Differences in mortality between the seven analytic classes in Table 2 were all statistically significant, although there was no significant difference between the two sub-groups of Class I (Higher professionals and Large employers higher managers).

For deaths with an underlying cause of IHD, the socio-economic pattern was similar to that reported for all circulatory diseases (Table 2). A 2.9

times raised rate of death was observed in the Routine class compared with the Higher managerial and professional class. The adjacent class contrasts largely mirror the pattern observed from all circulatory diseases, although the rate of death in the Intermediate class was not significantly different to the rate in the Lower managerial, professional class (Figure 1).

Mortality from cerebrovascular disease was also 2.9 times higher in the Routine class than in the Higher managerial and professional class. However, there was less variation between adjacent classes compared with IHD mortality: both the Routine and Semi-routine classes and the Lower managerial, professional and Intermediate classes had similar rates (Figure 1). While mortality from IHD was significantly higher in the Lower supervisory, technical class compared with all men, there was no significant excess in this group for cerebrovascular diseases.

In the condensed version of NS-SEC, differences in mortality were also present: the Routine and manual class had more than twice the mortality of the Managerial and professional class in circulatory disease causes of death examined and higher mortality than for all men.

Malignant neoplasm

There were 49,002 deaths with an underlying cause of malignant neoplasm, representing 33 per cent of deaths to men aged 25–64. Within malignant neoplasm related causes, those of the trachea, bronchus and lung (lung cancer), and the colon, rectum, sigmoid junction and anus (colorectal cancer) represent the largest mortality burden, together accounting for 35 per cent of these deaths. The age-standardised mortality rates by NS-SEC analytic classes are reported in Table 3.

The socio-economic pattern of mortality for all malignant neoplasms was less regular than that observed from circulatory diseases: the Lower managerial, professional class had higher mortality than the Intermediate class; the Lower

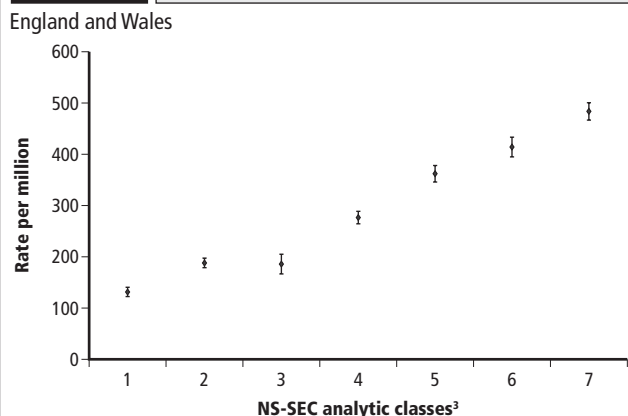
Table 3 Age-standardised mortality rates¹ from selected malignant neoplasms by NS-SEC,² men aged 25–64, 2001–03

England and Wales		Rate per million								
NS-SEC analytic class	All malignant neoplasms			Trachea, bronchus and lung			Colon, rectum, rectosigmoid junction, anus			
	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	
1 Higher managerial and professional occupations	821	798	843	131	122	141	105	97	113	
1.1 Large employers, higher managers	806	773	840	140	126	154	106	94	119	
1.2 Higher professionals	838	808	869	125	113	137	105	94	116	
2 Lower managerial, professional	990	969	1,012	188	179	197	125	117	132	
3 Intermediate	911	870	954	186	167	205	102	88	117	
4 Small employers, own account workers	1,090	1,066	1,115	277	264	289	111	103	119	
5 Lower supervisory and technical	1,402	1,371	1,434	362	346	378	145	135	156	
6 Semi-routine	1,469	1,433	1,505	414	395	433	133	123	145	
7 Routine	1,584	1,553	1,615	484	467	501	146	137	156	
All men in England and Wales	1,211	1,200	1,221	298	293	303	128	124	131	
Ratio 7:1	1.8			3.7			1.4			
Condensed NS-SEC										
1 Managerial and professional occupations	918	902	933	164	157	171	116	111	122	
2 Intermediate occupations	1,052	1,030	1,073	257	246	267	109	102	115	
3 Routine and manual occupations	1,491	1,472	1,510	425	415	435	142	136	148	
Ratio 3:1	1.6			2.6			1.2			

- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

Figure 2 Age-standardised mortality rate¹ from lung cancer by NS-SEC,² men aged 25–64, 2001–03



- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.
- 3 Refer to Box One for label categories.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

supervisory, technical class had similar mortality to the Semi-routine class. As expected, the mortality of the Routine class was 1.9 times higher than that of the Higher managerial and professional class (Table 3).

When cancer mortality by socio-economic position is compared using the condensed version of NS-SEC, a 60 per cent higher age-standardised rate is observed for Routine and manual occupations compared with Managerial and professional occupations.

The Higher managerial and professional class had the lowest mortality from lung cancer and the Routine class the highest: a 3.7 times higher rate of death was observed in the latter class compared with the former class (Table 3). If the age-specific rates of death observed in the Higher managerial and professional class were experienced by men working in Routine occupations, approximately 2,300 fewer deaths would have occurred in the Routine class.

Although the pattern in the intervening classes mirrored that for all malignant neoplasms, it is notable that there was no significant difference between the mortality rates for Intermediate and Lower managerial and professional classes (Figure 2).

The impact of lung cancer deaths on the overall malignant neoplasm ratio of death rates was substantial; the higher rate between Routine workers and men working in Higher managerial and professional occupations falls from 1.9 to 1.6 when lung cancer deaths are excluded.

Age-standardised mortality rates from colorectal cancer are similar for the Higher managerial and professional, the Intermediate and the Small employers, own account workers classes (Table 3). The pattern by socio-economic position was irregular: men working in Lower supervisory, technical and Routine occupations had higher mortality than men in classes 1 to 4, and all men of this age.

The condensed version of NS-SEC shows that men in Routine and manual occupations had significantly higher mortality than those in other condensed classes and all men.

Diseases of the respiratory system

Diseases of the respiratory system contributed 5.9 per cent (8,902) of all deaths in men aged 25–64 in 2001–03. Pneumonia accounted for 32 per cent (2,817) of these deaths, other chronic obstructive pulmonary disease for 35 per cent (3,119), bronchitis and emphysema for 6 per cent (502)

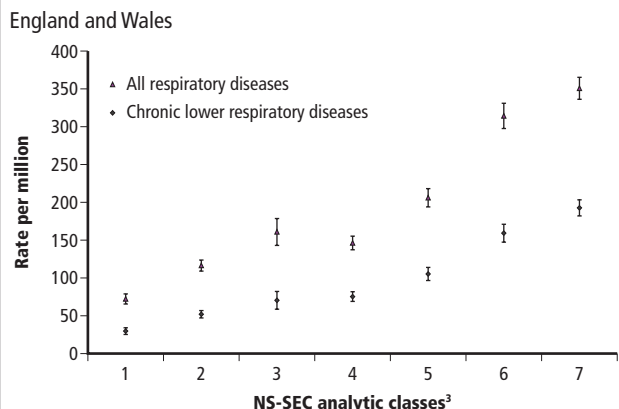
Table 4 Age-standardised mortality rates¹ from selected respiratory diseases by NS-SEC,² men aged 25–64, 2001–03

England and Wales		Rate per million								
		All respiratory diseases			Pneumonia			Chronic lower respiratory diseases		
NS-SEC analytic class		Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval
1	Higher managerial and professional occupations	72	65	79	23	19	26	30	25	34
1.1	Large employers, higher managers	68	58	78	18	13	23	30	24	37
1.2	Higher professionals	77	67	86	27	22	33	30	24	35
2	Lower managerial, professional	116	109	124	38	33	42	52	47	57
3	Intermediate	161	143	179	51	41	61	70	59	82
4	Small employers, own account workers	146	137	155	40	35	44	75	69	82
5	Lower supervisory and technical	206	194	218	61	54	67	105	97	114
6	Semi-routine	314	298	331	99	90	109	159	147	171
7	Routine	351	336	365	100	92	108	193	182	203
All men in England and Wales		219	215	224	69	67	72	106	103	109
Ratio 7:1		4.9			4.4			6.5		
Condensed NS-SEC										
1	Managerial and professional occupations	98	93	103	31	28	34	43	39	46
2	Intermediate occupations	149	141	157	42	38	46	75	69	80
3	Routine and manual occupations	292	284	301	86	82	91	155	149	161
Ratio 3:1		3.0			2.8			3.6		

- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

Figure 3 Age-standardised mortality rate¹ from all respiratory diseases and chronic lower respiratory diseases by NS-SEC,² men aged 25–64, 2001–2003



- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.
- 3 Refer to Box One for label categories.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

and asthma for 6 per cent (498). Chronic obstructive pulmonary disease, bronchitis, emphysema and asthma were analysed under the collective grouping of chronic lower respiratory diseases, which also includes bronchiectasis (189) as these diseases often occur simultaneously.

The age-standardised mortality rates per million by NS-SEC analytic classes from all respiratory diseases, pneumonia and chronic lower respiratory diseases are reported in Table 4. The ratio in rate of death between men working in Routine occupations and Higher managerial and professional men was steeper from respiratory diseases, than was the case from either circulatory diseases or malignant neoplasm causes of death.

The death rate of the Routine class was 4.9 times higher than that of the Higher managerial and professional class.

Men in Routine occupations had a 60 per cent higher mortality rate than all men of this age, while men in Higher managerial and professional occupations had a 67 per cent lower rate. Both the Routine and Semi-routine classes had higher rates of death compared with all men, and classes 1 to 4 lower rates (Table 4). The socio-economic pattern was characterised by a distinctly low rate of death in men in the Higher managerial and professional class, and high mortality in men in Semi-routine and Routine occupations (Figure 3). The intervening classes showed a general pattern of increasing mortality with less favourable employment characteristics.

The largest variation in mortality between NS-SEC classes was for chronic lower respiratory diseases. The death rate among men working in Routine occupations was 6.5 times higher than that of Higher managerial and professional men, and 1.8 times higher than all men of this age, with rates for the former class higher than expected, and for the latter class, lower than expected (Table 4). The overall pattern by NS-SEC showed an increase for most socio-economic classes analysed, with rates of death rising markedly in occupations regulated by a Labour Contract (predominantly assigned to the Semi-routine and Routine NS-SEC classes). Only the Intermediate and Small employers, own account workers departed from this regular pattern.

Socio-economic differences in pneumonia mortality were also large. Men in Routine occupations had a rate of death 4.4 times higher than men in the Higher managerial, professional class. However, the differences in mortality rates between the intervening classes (Lower managerial, professional; Intermediate; and Small employers, own account workers) were not statistically significant from one another, but were significantly higher than the rate in the Higher managerial, professional class (Table 4). The Semi-routine and Routine classes had similar rates of death.

Table 5 Age-standardised mortality rates¹ from selected digestive diseases by NS-SEC,² men aged 25–64, 2001–03

England and Wales		Rate per million								
		All digestive diseases			All liver diseases			Gastric and duodenal ulcers		
NS-SEC analytic class		Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval
1	Higher managerial and professional occupations	122	113	130	87	80	95	8	6	10
1.1	Large employers, higher managers	94	85	106	64	55	74	5	3	8
1.2	Higher professionals	146	134	160	105	95	117	10	7	15
2	Lower managerial, professional	196	187	206	143	135	151	13	11	15
3	Intermediate	234	214	257	168	151	187	18	13	25
4	Small employers, own account workers	230	219	242	161	152	171	15	13	19
5	Lower supervisory and technical	282	268	296	198	186	210	23	19	27
6	Semi-routine	396	377	415	271	255	287	34	29	40
7	Routine	429	413	446	297	283	311	40	35	45
All men in England and Wales		296	291	302	206	202	211	24	22	25
Ratio 7:1		3.5			3.4			5.0		
Condensed NS-SEC										
1	Managerial and professional occupations	164	158	171	118	112	123	11	9	12
2	Intermediate occupations	229	220	240	162	154	171	16	14	19
3	Routine and manual occupations	368	358	377	254	246	262	32	30	35
Ratio 3:1		2.2			2.2			2.9		

- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

Differences between classes in the condensed version of NS-SEC were also marked: the Routine and manual class had a death rate from all respiratory diseases three times higher than the Managerial and professional class. The comparable ratios for pneumonia and chronic lower respiratory diseases were 2.8 and 3.6 respectively.

Diseases of the digestive system

Digestive diseases accounted for 8 per cent (12,032) of all deaths to men aged 25–64 in England and Wales during 2001–03. Deaths attributed to all liver diseases accounted for 70 per cent of these deaths, while those from gastric and duodenal ulcer accounted for 8 per cent. The age-standardised mortality rates per million by NS-SEC analytic classes from all and selected digestive diseases are reported in Table 5.

The death rate from all digestive diseases was three and a half times higher for men in the Routine class than for those in the Higher managerial and professional class. Within the latter group, the death rate for those working as Large employers, higher managers was significantly lower than for those in Higher professional occupations. This contrasts with the largely similar mortality profile of these two classes from circulatory, malignant neoplasm and respiratory diseases causes of death.

Clear differences in rates of death were observed in most adjacent classes, although men in the Intermediate and Small employers, own account workers classes experienced similar rates of death (Figure 4). Routine workers had a rate of death 1.5 times higher than all men of this age (Table 5), while the Higher managerial and professional class had 58 per cent lower mortality.

The pattern of mortality from all liver diseases largely mirrors that from all digestive diseases: a 3.4 times raised death rate was observed for the Routine class compared with the Higher managerial and professional class; both the Semi-routine and Routine classes had a higher rate of death compared with other classes and all men aged 25–64 (Table 5). However, an important distinction in rates of death from all liver diseases was the absence of statistically significant differences between the Lower managerial, professional; Intermediate; and Small employers, own account workers classes.

Deaths from gastric and duodenal ulcer were relatively small in number, but there was a wide ratio in rates of death: five times higher among men working in Routine occupations compared with occupations classified to the Higher managerial and professional class (Table 5).

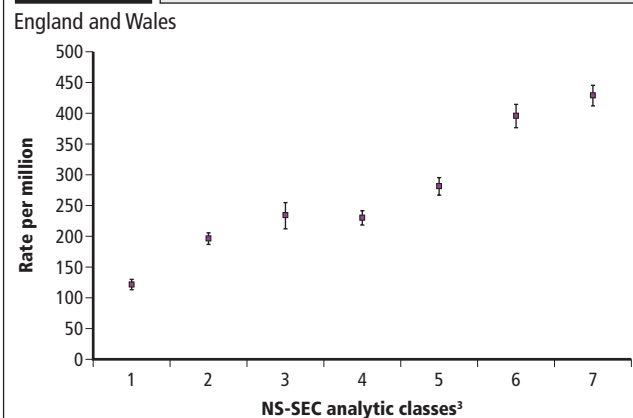
External causes of mortality

Accidents accounted for 5 per cent of deaths (7,929) to males aged 25–64 in England and Wales during 2001–03. Of these, almost half were transport-related accidents and a seventh accidental falls. Deaths classified as suicide or an event of undetermined intent numbered 7,842, representing 5 per cent of all male deaths in this age range.

The age-standardised mortality rates per million person years by NS-SEC analytic classes from selected external causes of mortality are shown in Table 6.

Mortality from accidents was 3.3 times higher for men in the Routine class compared with Higher managerial and professional men. A lower mortality rate was observed from all accidents in the Lower managerial, professional class compared with the Intermediate class, while rates for the Intermediate, Small employers, own account workers and Lower supervisory, technical classes were similar. This is an important departure from the pattern observed in deaths from circulatory, malignant neoplasm, respiratory and digestive diseases, where the

Figure 4 Age-standardised mortality rate¹ from all digestive diseases by NS-SEC,² men aged 25–64, 2001–03



- 1 Directly age-standardised rate using the European standard population.
- 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.
- 3 Refer to Box One for label categories.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

Lower supervisory, technical class had significantly higher rates than the Intermediate and Small employers, own account workers classes.

The Semi-routine and Routine classes had a rate of death from all accidents higher than all men of this age, while other classes had a lower rate. The death rate for the Routine class was 1.5 times higher than that for all men.

The pattern of age-standardised mortality from transport accidents is affected by the relatively small number of deaths occurring in the period, reducing the precision of mortality estimates (Figure 5). However, there were clear differences in death rates in the condensed NS-SEC classes.

The Semi-routine class had the highest death rate from accidental falls, 3.9 times higher than Higher managerial and professional men. The rates of death in the former class and the Routine class were higher than all men of this age. In a comparison between classes using the condensed version of NS-SEC, a more modest ratio in the rate of death between the Routine and manual class and the Managerial and professional class occurs (Table 6).

A strong socio-economic difference in mortality from suicide and events of undetermined intent was present: Routine workers were 3.6 more likely to die from these causes than men working in Higher managerial and professional occupations; within the Higher managerial and professional class, men who were Large employers, higher managers had significantly lower mortality than Higher professionals; the rate in the Intermediate class was higher than in both the Lower managerial, professional and the Lower supervisory, technical classes (Figure 6).

Men working in Higher managerial and professional occupations had mortality rates that were 60 per cent lower than the rate for all men of this age, while the Routine class experienced 45 per cent higher mortality than all men.

Overview of results

The ratios of death rates between the bottom and top NS-SEC classes, using both the expanded and condensed analytic breakdowns for each cause examined in this paper, are presented in Figure 7.

Table 6

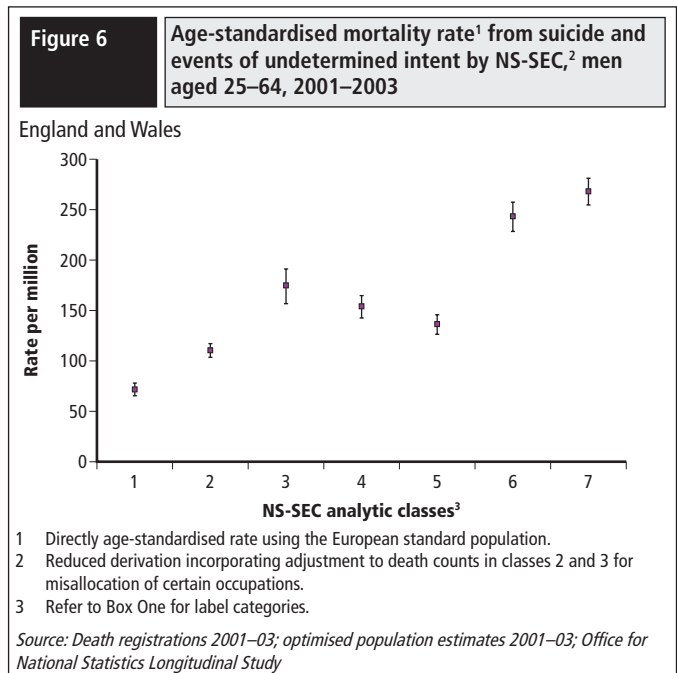
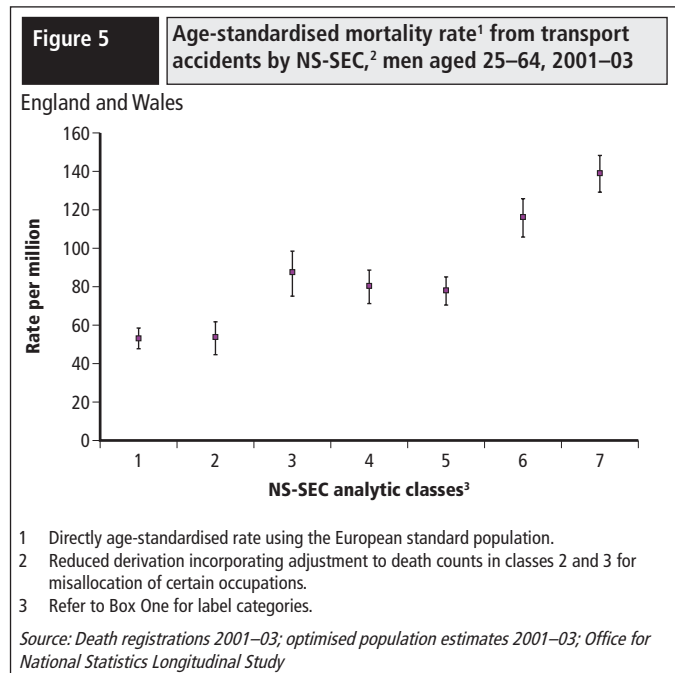
Age-standardised mortality rates¹ from selected external causes of mortality by NS-SEC,² men aged 25–64, 2001–03

England and Wales													Rate per million		
NS-SEC analytic class		Accidents			Transport accidents			Accidental falls			Suicide, events of undetermined intent				
		Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval		
1	Higher managerial and professional occupations	86	79	93	55	50	61	11	9	14	74	68	81		
1.1	Large employers, higher managers	79	69	90	54	46	63	10	7	14	47	40	55		
1.2	Higher professionals	91	82	101	55	48	63	12	9	17	94	85	105		
2	Lower managerial, professional	103	96	109	55	50	60	17	14	20	111	104	118		
3	Intermediate	153	138	170	88	77	100	21	16	29	175	158	193		
4	Small employers, own account workers	164	153	176	80	72	90	26	22	30	154	143	166		
5	Lower supervisory and technical	148	138	158	78	71	86	19	15	23	136	127	146		
6	Semi-routine	251	236	266	116	107	127	45	39	52	243	229	258		
7	Routine	285	272	299	139	130	149	43	38	48	268	255	282		
All men in England and Wales		191	187	195	89	86	92	30	28	32	188	184	192		
Ratio 7:1		3.3			2.5			3.9			3.6				

Condensed NS-SEC													
NS-SEC analytic class		Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval	Rate	Lower 95% confidence interval	Upper 95% confidence interval
1	Managerial and professional occupations	94	90	99	54	51	58	14	13	16	94	89	98
2	Intermediate occupations	154	146	164	80	74	86	24	21	28	156	146	164
3	Routine and manual occupations	206	199	213	104	99	110	29	26	31	200	193	207
Ratio 3:1		2.2			1.9			2.1			2.1		

1 Directly age-standardised rate using the European standard population.
 2 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

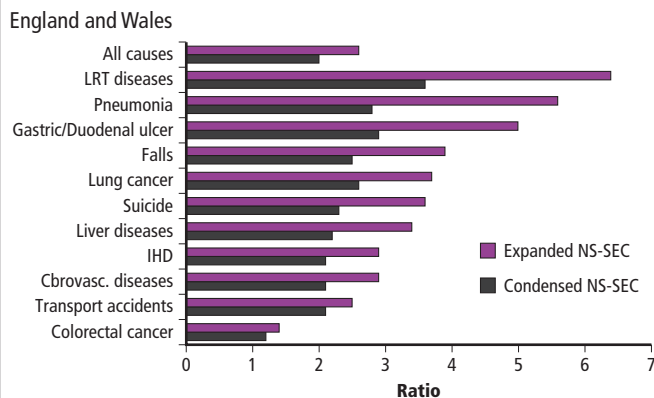


The largest ratios were present in deaths with underlying causes of chronic lower respiratory diseases, pneumonia and gastric and duodenal ulcers. These causes made a positive contribution to the all cause ratio of death rates, but represent only a small proportion (5 per cent) of all deaths. On the other hand, because approximately one in five of all deaths had an underlying cause of IHD, the IHD ratio of death rates makes the largest contribution to the all cause ratio of rates. The gradient in IHD mortality observed in 1991–93 between RGSC social classes V and I was similar to that found in this analysis, demonstrating the continued prominence of this disease’s contribution to socio-economic inequalities in mortality.

Discussion

This analysis represents the first compilation of official mortality statistics by cause of death using the new NS-SEC. It takes advantage of the methodological adjustments to the socio-economic breakdown of the population available from the most recent census of population in 2001 and death occurrences, reported previously.¹ This has enabled a detailed examination of socio-economic differences in mortality to be undertaken, in terms of the range of causes examined, the socio-economic classes compared and the precision of the estimates reported.

Figure 7 Ratio in age-standardised mortality rates by NS-SEC¹ versions and cause of death, men aged 25–64, 2001–03



1 Reduced derivation incorporating adjustment to death counts in classes 2 and 3 for misallocation of certain occupations.

Source: Death registrations 2001–03; optimised population estimates 2001–03; Office for National Statistics Longitudinal Study

Mortality from circulatory diseases

Efforts to prevent premature death from IHD and cerebrovascular diseases have featured prominently in government health policies since 1992. The *Health of the Nation* and *Our Healthier Nation* health strategies highlighted cardiovascular diseases, among others, as key areas with which to concentrate resources to tackle inequalities in health. A number of health policy initiatives were introduced with the aim of trying to improve the access of disadvantaged groups to health promoting literature, preventative medical treatment and life saving surgery.^{14, 15, 16} Mortality from IHD and cerebrovascular diseases in men aged 25–64 in the early 21st century provide a reliable indicator of the performance of these initiatives in men in different occupational and socio-economic circumstances.

This analysis found that the Routine class had a rate of death 2.9 times higher than the Higher managerial and professional class from IHD and cerebrovascular diseases. Analyses by RGSC for the period 1991–93 in men aged 20–64 also showed a mortality rate from IHD in social class V 2.9 times higher than in professionals in social class I, and 3.2 times higher in deaths with an underlying cause of cerebrovascular diseases. The gap in mortality between the most advantaged and most disadvantaged classes has remained similar in magnitude. This is despite the more disadvantaged socio-economic position of RGSC social class V occupations compared with those occupations designated to the NS-SEC Routine class, the smaller population size of the former class, and its more homogeneous makeup. No change in the magnitude of the relative gap between the most and least advantaged classes, whether measured by RGSC in 1991–93 or NS-SEC in 2001–03, is suggestive of several, potentially counter-balancing explanations brought about by the change in the occupational profile and population sizes of classes at the extremes of the social position scale between 1991–93 and 2001–03. For example, although the composition of the Routine class is relatively less disadvantaged than RGSC social class V, this is likely to be compensated for by the relatively more advantaged composition of the Higher managerial and professional class compared with RGSC social class I. The persistence of sizeable differences in rates calculated for larger (and hence more reliable) population groupings suggest a higher proportion of the England and Wales population had clearly distinct risks of death from these causes than previously observed using RGSC.

The presence of inequality in deaths with an underlying cause of IHD or cerebrovascular diseases found in this analysis has a number of potential explanations: behavioural factors such as smoking, diet and exercise; material circumstances such as income and housing quality; psycho-social hazards at work and in the home; and differential access to preventive health care. Studies examining differences in risk of death from cardiovascular disease by material circumstances, find the majority of the variation is explainable through the inverse relationship between socio-economic position and the presence of risk factors such as smoking,^{29, 30, 31} obesity,^{32, 33, 34} lack of exercise,³⁵ low social support and employment relations.^{36, 37, 38} The pattern of mortality by NS-SEC in the current analysis is consistent with the differential presence of these risk factors by socio-economic position found in previous research.

Mortality from malignant neoplasms

The difference by socioeconomic position in mortality from malignant neoplasm was smaller than that observed in other major causes investigated, and would be only 1.6 times higher in the Routine class if lung cancer deaths are excluded. Evidence from a study comparing clinical and autopsy diagnoses of cause of death by RGSC found a greater likelihood of malignant neoplasm being recorded on the death certificate in the absence of autopsy data among non-manual RGSC social classes,^{39, 40} which has the potential to understate the socio-economic mortality differential.

The higher rates of death observed in all NS-SEC classes other than the Semi-routine and Routine classes from all malignant neoplasm compared with all circulatory diseases, is an important change from the decennial analysis of 1991–93, where all circulatory diseases contributed the highest death burden in all RGSC social classes.³

Socio-economic differences in deaths from lung cancer remain wide: the commonly short time horizon between diagnosis and death suggests class differences in rates of death are unlikely to be influenced by health-related social mobility, producing a health selection effect. A more likely explanation is the strong relationship between consumption and duration of cigarette smoking and certain occupational exposures and the incidence of lung cancer.⁴¹

Lung cancer deaths in men aged 25–64 have been declining in all social groups for the past twenty-five years, predominantly brought about by a lowering in smoking prevalence during the same period.^{42, 43} The trend in deaths over time demonstrates a contraction in the ratio between RGSC social classes V and I in 1991–93 compared with the Routine class and the Higher managerial and professional class, falling from 4.8 to 3.7. However, this fall is unlikely to be attributable to a corresponding change in cigarette smoking between manual and non-manual workers during the 1990s, as General Household Survey data have demonstrated constancy of prevalence rates in this period.⁵⁹ A more likely explanation for the decline in the ratio of death rates is the influence of changes in the composition of the Routine class to include approximately 10 per cent of men who would formally have been assigned to RGSC social class IV.^{18, 44}

The Lower supervisory, technical, Semi-routine and Routine classes had higher rates of death from lung cancer than that for all men, whereas the other classes had lower rates. The raised rates of death in classes regulated by a labour contract compared with all men is likely to arise from the fact that these classes are predominantly drawn from the former manual RGSC social classes, and therefore have higher current and historical cigarette smoking prevalence.

The Lower managerial, professional and Intermediate classes had very similar rates of death, but both had lower mortality than the Small employers, own account workers. A possible mechanism for the lower mortality of the Intermediate class over the Small employers, own

account workers from lung cancer is class composition: a proportion of men in the latter class would be classified to a manual RGSC social class whereas the former class is composed exclusively of men who would be classified to a non-manual RGSC social class, causing the prevalence of current and historic cigarette smoking in the Small employers, own account workers class to be relatively higher.

Mortality from respiratory diseases

The pattern in respiratory disease mortality demonstrates marked differences between the Routine class and the Higher managerial and professional class, with rates of death 4.2 times higher from all respiratory diseases in the Routine class. More than a third of respiratory disease deaths were from chronic lower respiratory diseases, and the time lag for these diseases to manifest in conjunction with the presence of socio-economic differences at earlier working ages, suggest exposures before working age are important influences on respiratory disease mortality.

This analysis has shown mortality from respiratory disease among men of working age to be strongly associated with socio-economic position in adulthood. However, research suggests respiratory disease mortality conforms to a socially patterned cumulative risk model, starting with socio-economic related exposures in childhood. A study investigating the importance of childhood socio-economic circumstances on future mortality risk demonstrates risk of death from respiratory diseases is dependent on socio-economic circumstances in both childhood and adulthood.⁴⁵ Specifically, childhood respiratory infection has been shown to affect respiratory health later in life and exposure to adverse environmental factors in childhood such as damp housing, indoor and outdoor air pollution, passive smoke exposure and poor nutrition increase the likelihood of future respiratory disease.^{46, 47} Consequently, the ratios in death rates found in this analysis are likely to be partly explained by childhood circumstances.

The higher prevalence of cigarette smoking among men working in Semi-routine and Routine occupations is another important contributing factor in the scale of mortality differentials found in respiratory disease causes. Analysis of Health Survey for England data as recently as 2003 reported statistically significant raised prevalence of cigarette smoking in households where the household reference person worked in a Semi-routine or Routine occupation compared with Managerial and Professional households.⁴⁷

Mortality from digestive disorders

A 3.4 times higher rate of death was observed among Routine workers and men working in Higher managerial and professional occupations in this analysis. A similar gradient was observed between RGSC social class V and Professional men in 1991–93. The relationship between alcohol consumption and liver disease is well founded,^{48, 49, 50} although analyses of General Household Survey data over many years have shown no significant difference in weekly alcohol consumption by socio-economic position. The most recent analyses of 2002 data showed no variation in the amount drunk by the socio-economic position of the household reference person.⁵¹ However, earlier research by RGSC has shown that the prevalence of alcohol dependence increases with lower social class, so the proportion of men identified as problem drinkers was found to be highest in Unskilled manual workers (11 per cent) and lowest among Professionals (6 per cent).^{52, 53} This may partly explain socio-economic variations in mortality from all liver diseases specifically and digestive diseases generally by NS-SEC.

The main cause of ulceration to the stomach and upper intestinal tract is infection with helicobacter pylori, accounting for approximately 90 per cent of cases of peptic ulcer. Other contributing factors are damage to the lining of the stomach and duodenum from aspirin ingestion and other

analgesia, steroidal anti-inflammatory drugs, and chronic respiratory disease which reduces oxygenation to the lining of the stomach. The wide mortality difference found between the Routine class and the Higher managerial and professional class from gastric and duodenal ulceration, suggests a differential exposure profile to these risk factors.

Mortality from external causes

The Government's strategy for health in England identified accidents as a key area for health improvement.⁵⁴ This document set a target to reduce accidents by one fifth by the year 2010, and the mortality estimates reported in this analysis provide evidence of progress towards this target among men in different socio-economic positions during the first decade of the 21st century. Previous decennial analyses of mortality from accidents has shown a widening trend between RGSC social classes, with the rate of death three times higher in unskilled manual workers compared with Professionals in 1970–72, increasing to more than four times higher in 1991–93. Analysis by NS-SEC shows the ratio in death rates between the Routine class and the Higher managerial and professional class in 2001–03 to be smaller, but this ratio is in line with that reported by Fitzpatrick and Dollamore (1999).¹⁸

A key departure between this analysis and the analysis of mortality differentials by an earlier version of NS-SEC for 1991–93 is the relative mortality of the Small employers, own account workers class. In the earlier analysis, this class had less than two-fifths the mortality from accidents occurring in all men and had the lowest mortality from these causes compared with all other NS-SEC classes. In this analysis, the Small employers, own account workers had 86 per cent of the mortality occurring in all men. A possible explanation for this change is the less accurate mapping of the Standard Occupational Classification 1990 (SOC90) and employment status definitions in the early 1990s to the NS-SEC version used in that analysis, and the fact that only 10 per cent of households in the 1991 census were coded to SOC90, requiring grossing fractions to be used in the construction of denominators. The analysis presented here has a clearer concurrence with the socio-economic pattern found in the decennial analysis by RGSC in 1991–93, and is likely to be a more valid comparison of the mortality experience of the Intermediate and Small employers, own account workers classes from accidents.

Health Safety Executive figures report the risk of death from fatal injuries at work is highest among the agricultural, construction, extraction and transport sectors, and lowest in the education, health, business and finance and retail and wholesale sectors.⁵⁵ A breakdown by employment status showed the rate of fatal injury among the self-employed during 2001–03 was higher than among employees, reflecting the proportionately greater number of self-employed people working in higher risk industries such as construction and agriculture. This is likely to further explain the less advantageous position found in the Small employers, own account workers class in accident mortality compared with other causes of death examined in this analysis. The impact of occupational circumstances and their associated risk of injury have greater influence on the socio-economic pattern from external causes.

This reasoning is supported by the lower mortality experienced by the Lower supervisory, technical class, which results from occupational composition: the distribution of underlying occupational risks concealed in previous analyses by RGSC is brought into sharper focus in NS-SEC analyses. The RGSC social class transitions from Skilled manual to the Lower supervisory, technical class may contain occupations with a lower occupational risk profile than is the average for social class IIM. This premise requires more detailed analysis of accidental mortality at the occupational level.

Accidents place a large burden on the public health and health care services, and this analysis shows rates of death from accidents were highly variable by socio-economic position. It is estimated that 4,679 fewer deaths

from accidental causes would have occurred if the age-specific rates of death found among men in the Large employers, higher managers class in 2001–03 had applied across the population of men aged 25–64 in England and Wales. This figure demonstrates the scale of potential health gain achievable from eminently preventable accidental causes of death.

Mortality from suicide and events of undetermined intent

A notable contrast in deaths from suicide and events of undetermined intent between the Routine class and the Higher managerial and professional class is reported. The inequality is comparable with that found between social classes V and I in 1991–93. The similarity in the ratio of death rates is interesting in light of the polarised economic conditions prevailing in each period. However, no NS-SEC class in 2001–03 had a rate of death as high as that of social class V in 1991–93.

The favourable mortality position of the Lower supervisory, technical class compared with the Intermediate class in this analysis is interesting, given the superior employment relations circumstances of the latter class. This difference between the two classes was also seen in 1991–93.¹⁸ Overall, the ordering of the classes in the 1991–93 analysis was different to the analysis reported in this article in one respect: the more favourable position of the Small employers, own account workers in 1991–93 was not upheld in 2001–03, as men in this class had mortality rates similar to men in both the Intermediate class and the Lower supervisory, technical class.

Social factors have been shown to predict suicide in studies using individual level data in the United Kingdom.^{56,57} Unemployment, car access and tenure were found to be the most important influences on suicide in an analysis of the period 1983–92 using ONS Longitudinal Study data. This study showed no statistical association between suicide and RGSC social class after controlling for unemployment, car access and tenure. A comparative study of suicide in ten European countries (including England and Wales) conducted by the Erasmus Medical Centre, found a relationship between a composite socio-economic indicator based on tenure and educational attainment and suicide in men in England and Wales in the period 1991–96. The latter study reported a stronger association between indicators of disadvantage (that is, educational attainment and tenure) and suicide than that found in the Lewis and Sloggett study using the same data source, but the latter study examined a later time period, 1991–96. While these studies found less sizable socio-economic variations than decennial analyses of socio-economic position based on occupation during 1991–93 and 2001–03, both studies were restricted to a 1 per cent sample of deaths, compromising statistical power.

The *Independent Inquiry into Inequalities in Health* report¹² cited elements of social exclusion as key markers for self-harm, some of which are associated with low socio-economic position such as lack of social support for lone parents, lack of pre-school education provision, poor housing conditions and unhealthy workplaces. Since then, the Government's White Paper *Saving Lives: Our Healthier Nation*¹³ set out a challenging target to reduce the death rate from suicide and undetermined injury by at least a fifth by the year 2010, and the UK government's suicide prevention strategy⁵⁸ outlines the need to target resources at groups of people who have an increased risk of suicide. Our analysis has demonstrated an association between socio-economic position and suicide, and identifies those classes who have a higher rate of death compared with the national average.

Conclusion

This investigation into adult male mortality by NS-SEC provides indicators of the health impacts of different social and occupational circumstances in England and Wales in the early 21st century. The use of 100 per cent of death occurrences and optimised population denominators has enabled precise, statistically robust estimates of

mortality to be computed across a range of causes of death using a detailed version of the NS-SEC, and establishes an association between male mortality and the employment relations operating in different occupations. The persistence of sizeable disparity in rates of death between men in advantaged and disadvantaged socio-economic circumstances at the start of the 21st century, particularly in causes of death with clear potential for health gain through prevention, such as accidents, suicide, IHD, cerebrovascular diseases and lung cancer, sets challenges for public health in England and Wales in future years.

Key findings

- A pattern of increasing mortality with more disadvantaged socio-economic position is observed across the major causes of death
- Among major causes of death, the largest ratios of death rates between the most and least disadvantaged groups were observed from IHD, lung cancer, chronic lower respiratory diseases, suicide, and all liver diseases
- The Semi-routine and Routine classes have significantly higher rates of death compared with the average for all men of this age for the majority of causes of death examined
- The mortality rates experienced by the Higher managerial and professional class across all causes of death examined, were notably lower compared with the average for all men

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