

# Alcohol-related deaths by occupation, England and Wales, 2001–05

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**This article continues a long tradition of examining alcohol-related deaths by occupation in England and Wales. Results are presented for men and women which show those occupations with the highest and lowest indicators of alcohol-related mortality in 2001–05. For both sexes, many of the occupations with the highest alcohol-related mortality were found among those working in the drinks industry, including publicans and bar staff. Low indicators of alcohol-related deaths were found for men who worked as farmers and drivers, and women who worked with children.**

## Introduction

Alcohol-related mortality for different occupations in England and Wales has long been monitored by the Office for National Statistics (ONS) and its predecessor organisations. The Decennial Supplement published by the Registrar General in 1895 was the first attempt to comprehensively assess mortality from a range of selected causes for men in particular occupations.<sup>1</sup> Among the causes considered were both deaths from alcoholism and diseases of the liver. Decennial Supplements since then have regularly reported on alcohol-related mortality by occupation, and the last on occupational health considered deaths up to 1990.<sup>2</sup> Examining reports over this hundred year period reveals some consistencies, including the fact that the highest levels of alcohol-related mortality are routinely found among those who work with alcohol, such as publicans and bar staff.

Concern over alcohol misuse is not restricted to its impact on health and its effect on society through crime and anti-social behaviour. It has been estimated that up to 17 million working days are lost each year through alcohol-related absence and alcohol misuse costs some £6.4 billion a year in lost productivity.<sup>3</sup>

It is now particularly timely to consider recent patterns of alcohol-related deaths by occupation because death rates from causes related to alcohol misuse have been rising rapidly since the early 1990s. Rates in the United Kingdom almost doubled between 1991 and 2005.<sup>4</sup> Occupations also change over time and this analysis makes use of the latest occupational classification, as used in the 2001 Census. Counts of populations in occupational categories from that census also provide denominators for the calculation of Standardised Mortality Ratios, one of the mortality indicators presented here.

This article continues the tradition of monitoring alcohol-related mortality by occupation in England and Wales and identifies those occupations with the highest and lowest indicators of alcohol-related mortality in the period 2001–05.

## Methods

### Definition of alcohol-related deaths

The National Statistics definition of alcohol-related deaths only includes those causes regarded as being most directly due to alcohol consumption (Box one). It does not include other diseases where alcohol has been shown to make some contribution to increased risk, such as cancers of the mouth, oesophagus and liver. Apart from deaths due to poisoning with alcohol (accidental, intentional or undetermined), the definition excludes any other external causes of deaths, such as road traffic deaths, and other accidents and violence. This definition allows for consistent comparisons over time for those deaths most clearly associated with alcohol consumption.

## Box one

### National Statistics definition of alcohol-related deaths

#### International Classification of Diseases, Tenth Revision

F10	Mental and behavioural disorders due to use of alcohol
G31.2	Degeneration of nervous system due to alcohol
G62.1	Alcoholic polyneuropathy
I42.6	Alcoholic cardiomyopathy
K29.2	Alcoholic gastritis
K70	Alcoholic liver disease
K73	Chronic hepatitis, not elsewhere classified
K74	Fibrosis and cirrhosis of liver (Excluding K74.3-K74.5 – Biliary cirrhosis)
K86.0	Alcohol induced chronic pancreatitis
X45	Accidental poisoning by and exposure to alcohol
X65	Intentional self-poisoning by and exposure to alcohol
Y15	Poisoning by and exposure to alcohol, undetermined intent

### Mortality data

Deaths in England and Wales with an underlying cause regarded as being alcohol-related, according to the National Statistics definition, were extracted from annual files of deaths registered in 2001–05. Deaths were selected according to the International Classification of Diseases, Tenth Revision codes listed in Box One.

Information on occupation was also extracted from the mortality datafiles. At death registration the registrar is asked to enter the occupation of the deceased in all cases where he or she was aged 16 years or over. Where the deceased was retired, unemployed, or had been unable to work through ill health or disability, the registrar is asked to record the last full-time occupation. If the deceased had never had an occupation the relevant field is left blank.

### Occupation

ONS codes all occupations for deaths where the deceased was aged under 75. From 2001 onwards this has been done using the Standard Occupational Classification 2000 (SOC2000).<sup>5</sup> This classifies jobs in terms of their skill level and skill content. The structure of the classification is

hierarchical with nine major groups: broad occupational categories which are designed to bring together similar occupations. Within this are 25 sub-major groups, 81 minor groups and 353 unit groups.

### 2001 Census data

Population counts for occupations were obtained from information collected at the 2001 Census. Questions on occupation in the census were asked of all those aged 16 to 74. Respondents were asked for the full title of the main job they were doing in the week prior to the census, or their last main job if they did not work in the previous week.<sup>6</sup> Answers to the occupation questions were used to code people using SOC2000. Everyone aged 16–74 who was working in the week before the census was given a SOC2000 code, as were those aged 16–64 who were not working in the week before the census but who last worked in 1996 or later.

### Mortality analyses

Standardised Mortality Ratios (SMRs) were calculated using mortality data from 2001–05 and population counts from the 2001 Census. Earlier studies of occupational mortality have however noted the bias that can occur because of discrepancies in occupations recorded at death and in the census.<sup>7</sup> To try and limit the extent of this bias, analysis was restricted to those aged 20–64. As there remains a risk of numerator/denominator discrepancies with SMRs, a second mortality indicator was also calculated which was not dependent on information on the population at risk for each occupation. Proportional Mortality Ratios (PMRs) were selected as they do not require population denominators and have often been used for occupational mortality analyses.

For both indicators, deaths were only included for analysis if they had a valid SOC2000 code. These are only used to code those in paid employment, therefore students and other groups such as voluntary workers and carers were excluded.

PMRs compare the proportion of all deaths in a particular occupation that are alcohol-related, to the proportion in England and Wales. Expected values are calculated by applying the proportion of alcohol-related deaths in England and Wales to the number of deaths from all causes in each occupation group. These expected values are then compared to the actual number of alcohol-related deaths in each occupation.

PMRs therefore indicate how much more, or less, likely a death in a particular occupation is to be from an alcohol-related cause, as opposed to other causes, than a death to someone of the same age group and sex in England and Wales as a whole. Both PMRs and SMRs are normally multiplied by 100 for presentational purposes. If the proportion of alcohol-related deaths in an occupation was the same as the proportion in the population of England and Wales, the PMR would equal 100. A PMR of 50 means that an occupation has only half the expected proportion of alcohol-related deaths, while a PMR of 200 indicates that an occupation has twice the proportion of alcohol-related deaths than would be expected from the national population. The proportion of deaths which are alcohol-related may however be affected by the relative frequency of other causes of death. If mortality from all causes in a given occupation is low, a high PMR for alcohol-related deaths may be found, even if death rates from these causes are lower than rates in England and Wales.

To calculate the SMRs, age-specific alcohol-related mortality rates for England and Wales were applied to population counts for each occupation, by sex and age group, to produce the number of deaths expected from these causes. The SMR is then the ratio between the observed number of alcohol-related deaths in 2001–05 in each occupation, and the expected number.

SMRs indicate if the observed alcohol-related deaths in a specific occupation are lower (<100) or higher (>100) than the expected alcohol-related deaths in that occupation. This allows us to compare the level of alcohol-related mortality with the general population of England and Wales (SMR = 100). Results were calculated for men and women separately using national sex-specific mortality rates. This means that results cannot be directly compared between the sexes. They may, for example, indicate that in a particular occupation both sexes had a level of alcohol-related mortality higher than for England and Wales as a whole, but they cannot be used to make inferences on whether, within that occupation, alcohol-related mortality was higher for men or women.

As the SMRs were calculated with mortality data for the five-year period 2001–05, census population counts were multiplied by five to give an equivalent population at risk. Mortality rates for England and Wales were similarly based on mortality data for 2001–05 and mid-year estimates for 2001 multiplied by five.

### Results presented

Table 1 includes the PMR, SMR and number of alcohol-related deaths for each of the nine SOC2000 major groups, for men and women. Confidence intervals (at the 95 per cent level) are presented for both PMRs and SMRs to help ascertain whether differences between ratios are statistically significant. Where lower confidence limits are greater than 100 this indicates that a PMR or SMR is significantly higher than for England and Wales. Conversely, where upper confidence limits are lower than 100 this indicates results which are significantly lower than for England and Wales. A confidence interval which includes 100 indicates a result which may not differ significantly from the population as a whole.

The confidence intervals were also used to rank results presented in Tables 2 and 3 for SOC2000 unit groups. Rather than present figures for all 353 of these categories, results were sorted to take into account statistical variability. To establish the occupations with the highest alcohol-related mortality, occupations were sorted by the lower confidence limits of their PMRs. Results are only presented in Table 2 for those occupations where the PMR was significantly higher than for England and Wales (>100).

For Table 3 this was reversed and results are only included where PMRs were significantly lower than for England and Wales (<100). In Tables 2 and 3 the occupations with PMRs most significantly different from England and Wales are therefore presented at the top. To minimise the risk of chance findings, occupations are also included in Tables 2 and 3 only if there were more than ten alcohol-related deaths in 2001–05.

### Results

There were almost 23,000 alcohol-related deaths of people aged 20–64 in England and Wales in 2001–05. There were more than twice as many deaths among men as among women (15,436 and 7,477 respectively). For men, 16 per cent of these deaths did not have an occupation recorded at death registration but for women this figure was 51 per cent. Over half the female deaths were therefore excluded from our analyses of occupational groups which were based on 13,011 and 3,655 deaths for men and women respectively. Rates and proportions for England and Wales, used in the calculation of the SMRs and PMRs, were however based on all alcohol-related deaths for those aged 20–64.

Table 1 shows the PMRs, their corresponding SMRs and the number of alcohol-related deaths for the nine major occupation categories. For men, the highest PMR was for those working in occupations classified as ‘Elementary’ (109). The only other occupation group where the PMR was significantly higher than the male population as a whole was for those in ‘Skilled Trade Occupations’ (105). These two categories also had the highest SMRs: 132 for ‘Elementary’ and 128 for ‘Skilled Trade Occupations’. ‘Personal Service Occupations’ was the only other category where the SMR was significantly higher than for England and Wales (109). The lowest SMRs were for men working as ‘Managers and Senior Officials’ and in ‘Professional Occupations’ (47 and 49 respectively).

For women aged 20–64, only those working in ‘Skilled Trades Occupations’ had a PMR greater than 100 (116). This was also the only category with an SMR higher than 100 (101). This result however, unlike the PMR, was not significantly higher than for England and Wales. These results indicate that women who had an occupation recorded at death registration had lower alcohol-related mortality than for women as a whole in England and Wales.

Table 1

Alcohol-related deaths: Proportional and Standardised Mortality Ratios, by major occupation groups, 2001–05

England and Wales

SOC2000 code	Major occupation group	PMR	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	SMR	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	Number of alcohol-related deaths
<b>Men aged 20–64</b>								
1	Managers and Senior Officials	83	79	88	47	45	50	1,410
2	Professional Occupations	88	82	94	49	48	52	870
3	Associate Professional and Technical Occupations	103	98	109	76	75	80	1,333
4	Administrative and Secretarial Occupations	96	88	104	72	70	78	540
5	Skilled Trades Occupations	105	102	109	128	127	132	3,798
6	Personal Service Occupations	105	94	116	109	105	121	358
7	Sales and Customer Service Occupations	98	86	112	64	60	73	227
8	Process, Plant and Machine Operatives	83	79	87	88	85	92	2,098
9	Elementary Occupations	109	105	114	132	127	138	2,377
<b>Women aged 20–64</b>								
1	Managers and Senior Officials	79	71	88	47	45	53	340
2	Professional Occupations	62	55	70	38	36	43	250
3	Associate Professional and Technical Occupations	81	74	89	57	55	62	447
4	Administrative and Secretarial Occupations	81	75	87	51	50	55	820
5	Skilled Trades Occupations	116	101	133	101	94	115	208
6	Personal Service Occupations	87	80	95	65	64	71	553
7	Sales and Customer Service Occupations	80	71	90	38	36	43	286
8	Process, Plant and Machine Operatives	83	72	95	67	62	77	200
9	Elementary Occupations	97	89	105	54	53	59	551

Table 2 shows the unit level occupations with the highest indicators of alcohol-related mortality. Ordered by the lower confidence limits of their PMRs, male bar staff, and publicans and managers of licensed premises ranked highest. Men in these occupations, along with seafarers, had PMRs which indicated that they had twice the proportion of alcohol-related deaths that would be expected for men in England and Wales as a whole.

The first digit of the SOC2000 code indicates which of the major occupation groups the unit occupations are categorised in. Of the 20 occupations which met the criteria for presentation in Table 2, there were none in 'Professional Occupations' but two in the 'Managers and Senior Officials' category: publicans, and hotel and accommodation managers. Six occupations were in 'Skilled Trades Occupations' and five in 'Elementary Occupations'.

The results for male SMRs were rather different to the PMRs. The two occupations with the highest results were coal mine operatives and seafarers with SMRs of 852 and 798 respectively, indicating levels of alcohol-related mortality eight times higher than in the general male population. Bar staff had the next highest SMR (401). Three occupations which had PMRs that were significantly higher than for England and Wales, had SMRs which were not significantly higher: sales representatives, elementary security occupations, and hotel and accommodation managers.

For women, only seven occupations had PMRs which were significantly higher than 100 and based on at least ten deaths in 2001–05. As for men, bar staff and publicans were also the occupations for women which had the highest ranking PMRs. A further two of the seven occupations

were also in the catering industry: waiters/waitresses and chefs/cooks. These two occupations however had SMRs which were not significantly higher than in England and Wales as a whole. The highest SMR was for publicans (228) and three further occupations also had SMRs which were significantly higher than England and Wales: actors/entertainers (202), hairdressers (182), and bar staff (152). Although women working in elementary office occupations had one of the highest PMRs (192), the SMR for this category (47) was actually significantly lower than for England and Wales.

The occupations with the lowest indicators of alcohol-related mortality are reported in Table 3. For men, there were 26 occupational units which had at least ten deaths in 2001–05 and a PMR significantly lower than for England and Wales (upper confidence limit <100). The lowest PMR was for farmers (39) indicating that the proportion of male deaths from alcohol-related causes was less than two-fifths of what would be expected for men in England and Wales as a whole.

Of the 26 occupations with the lowest PMRs, nine were in the major category of 'Managers and Senior Officials'. Seven were classed as 'Process, Plant and Machine Operatives', with most of these being jobs which involve driving including driving instructors and drivers of heavy goods vehicles, vans, buses/coaches and taxis.

Of the 26 occupations with the lowest PMRs, 24 also had SMRs which were significantly lower than for England and Wales as a whole. Security guards and gardeners both had SMRs which were higher than 100 (102 and 106 respectively) but the confidence intervals for these results included 100.

**Table 2** Occupations with highest alcohol-related mortality, 2001–05

England and Wales

SOC2000 code	Occupation unit	PMR	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	SMR	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	Number of alcohol-related deaths
<b>Men aged 20–64</b>								
9225	Bar staff	223	180	274	401	323	491	92
1224	Publicans and managers of licensed premises	202	179	228	297	263	335	275
8217	Seafarers (merchant navy); barge, lighter and boat operatives	216	174	265	798	642	981	90
5431	Butchers, meat cutters	162	132	196	287	234	347	106
9121	Labourers in building and woodworking trades	136	126	146	352	327	379	736
3415	Musicians	156	122	196	361	283	455	72
5322	Floorers and wall tilers	159	121	204	177	135	227	61
5434	Chefs, cooks	138	121	156	226	198	257	242
4111	Civil Service executive officers	189	115	291	164	100	253	20
6221	Hairdressers, barbers	155	114	206	200	147	265	48
3311	NCOs and other ranks	136	111	164	376	308	455	109
3542	Sales representatives	128	109	148	103	88	119	179
5312	Bricklayers, masons	129	109	152	159	134	187	148
9249	Elementary security occupations n.e.c.	167	109	245	140	91	205	26
9231	Window cleaners	140	107	180	235	179	302	60
1221	Hotel and accommodation managers	146	106	196	108	79	145	44
5491	Glass and ceramics makers, decorators and finishers	151	103	215	170	115	241	31
5323	Painters and decorators	114	101	127	171	153	192	308
8122	Coal mine operatives	121	101	144	852	710	1014	128
9223	Kitchen and catering assistants	132	101	177	135	103	181	59
<b>Women aged 20–64</b>								
9225	Bar staff	203	155	273	152	116	204	59
1224	Publicans and managers of licensed premises	193	152	242	228	179	286	75
6221	Hairdressers, barbers	146	116	180	182	145	225	85
9219	Elementary office occupations n.e.c.	192	112	308	47	28	76	17
9224	Waiters, waitresses	159	109	223	121	84	170	33
5434	Chefs, cooks	124	102	151	119	97	144	106
3413	Actors, entertainers	185	101	310	202	110	338	14

**Table 3** Occupations with lowest alcohol-related mortality, 2001–05

England and Wales

SOC2000 code	Occupation unit	PMR	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	SMR	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	Number of alcohol-related deaths
<b>Men aged 20–64</b>								
5111	Farmers	39	27	54	27	19	38	33
8211	Heavy goods vehicle drivers	58	51	65	67	59	76	247
1136	Information and communication technology managers	49	34	69	22	15	31	33
1121	Production, works and maintenance managers	62	52	74	25	21	30	123
1122	Managers in construction	54	38	74	21	15	29	39
8214	Taxi, cab drivers and chauffeurs	62	51	74	69	57	83	121
1239	Managers and proprietors in other services n.e.c.	66	54	80	61	50	74	109
8212	Van drivers	69	59	80	54	46	63	169
8213	Bus and coach drivers	68	55	83	70	57	86	92
2211	Medical practitioners	58	37	85	27	18	40	25
8133	Routine inspectors and testers	60	41	85	39	27	56	31
1132	Marketing and sales managers	72	59	87	37	30	45	102
1162	Storage and warehouse managers	61	42	87	57	39	80	32
3119	Science and engineering technicians n.e.c.	63	44	88	25	17	35	34
2444	Clergy	50	25	89	25	13	45	11
8215	Driving instructors	53	29	89	48	26	80	14
9134	Packers, bottlers, canners, fillers	59	37	89	39	25	59	22
8229	Mobile machine drivers and operatives n.e.c.	64	44	90	55	38	77	33
3563	Vocational and industrial trainers and instructors	57	32	94	27	15	44	15
1151	Financial institution managers	70	50	96	27	19	37	38
1163	Retail and wholesale managers	76	58	96	21	16	26	65
1161	Transport and distribution managers	74	55	97	64	47	84	51
9241	Security guards and related occupations	84	72	97	102	87	118	183
3314	Prison service officers (below principal officer)	61	36	98	50	29	81	17
5223	Metal working production and maintenance fitters	87	77	98	76	67	86	265
5113	Gardeners and groundsman/groundswomen	84	71	99	106	89	125	144
<b>Women aged 20–64</b>								
6124	Educational assistants	35	21	56	14	8	22	18
9244	School mid-day assistants	40	22	66	18	10	30	14
2315	Primary and nursery education teaching professionals	64	52	77	58	47	70	107
1239	Managers and proprietors in other services n.e.c.	52	31	82	46	28	73	18
4150	General office assistants/clerks	71	59	83	39	33	46	139
6111	Nursing auxiliaries and assistants	63	44	86	46	32	63	37
6121	Nursery nurses	52	29	86	30	17	50	15
6122	Childminders and related occupations	51	27	87	35	18	59	13
1163	Retail and wholesale managers	60	39	88	27	18	40	26
4122	Accounts and wages clerks, book-keepers, other financial clerks	78	63	95	49	39	59	100
7111	Sales and retail assistants	84	73	96	42	36	48	214
1152	Office managers	67	44	97	39	26	57	27
4113	Local government clerical officers and assistants	69	47	97	101	69	142	33
4123	Counter clerks	73	52	99	39	28	54	40

For women, 14 occupational categories are included in Table 3. The lowest PMR was for educational assistants (35) and several other jobs which also involve education and working with children similarly had low proportions of alcohol-related deaths, including school mid-day assistants, primary and nursery education teachers, nursery nurses and childminders. All of the occupations with the lowest PMRs also had SMRs which were significantly lower than for England and Wales except for local government clerical officers and assistants. Their SMR was 101 but with confidence limits which ranged from 69 to 142.

## Discussion

There is a long tradition of ONS monitoring alcohol-related deaths by occupation and the findings that we have presented here are, in many ways, consistent with previous reports, particularly that the highest levels of alcohol-related mortality are found among workers in the drinks industry.

Of the 353 occupations analysed in 2001–05, bar staff and publicans had the highest PMRs for both sexes. Other occupations in the catering industry also had high indicators of alcohol-related mortality, including chefs/cooks, waiters/waitresses, and kitchen and catering assistants.

The first analysis by the Registrar General to examine male mortality by occupation and selected causes of deaths, reported on men dying in 1890–92.<sup>1</sup> That report found levels of mortality from alcoholism among innkeepers and their servants which were seven times higher than for England and Wales as a whole. Deaths from diseases of the liver were over six times higher than that expected for the general population. Other parallels are also present with our recent results, including the finding that all categories of farmers and farm workers had much lower levels of mortality from alcoholism and liver disease than the general population. This was still apparent over a century later when we found that farmers had the lowest male PMR.

Decennial Supplements in the Twentieth Century, which reported SMRs for men, confirmed that liver cirrhosis mortality for publicans and innkeepers was nearly eight times higher than for England and Wales as a whole in 1961<sup>8</sup> and by 1970–72 was nearly 16 times higher.<sup>9</sup> Other occupations which figured consistently in lists of the professions with the highest levels of male alcohol-related mortality include those in the catering industry, seafarers (including fishermen), writers and journalists, musicians and actors, medical practitioners and the armed forces. These were all occupations highlighted as having high proportions of alcohol-related mortality in the last Decennial Supplement on Occupational Health which reported on deaths between 1979–90.<sup>2</sup> That report also highlighted three occupational groups with high alcohol-related PMRs for women: publicans and bar staff, literary and artistic occupations, and hairdressers.

Similar findings to those in England and Wales have also been reported in other countries. Figures from the United States, for example, show that for alcohol-associated diseases in the 1980s, the highest PMRs among white men and women were for those working as bartenders and waitresses respectively.<sup>10</sup> In Sweden meanwhile, it has been reported that farmers have the lowest levels of alcohol-related deaths.<sup>11</sup>

Some of our findings however are not consistent with earlier reports. Male medical practitioners were among the occupations with the highest indicators of alcohol-related deaths in the 1960s, 1970s and 1980s. In 2001–05, however, they had a PMR of only 58 and an SMR of 27 (both results significantly lower than England and Wales). This change merits further comment as the behaviour of doctors has been taken as a marker of how harmful lifestyle behaviours are perceived in a country.<sup>12</sup> It is possible that the low SMR observed for male medical practitioners in 2001–05 is an artefact related to the use of population counts from the 2001 Census. The low PMR for this occupation suggests however that there has been a real change in alcohol-related mortality for male doctors. This may be similar to the situation with smoking where, once the hazards were recognised in Britain, doctors gave up smoking earlier than the general population. Suggested reasons for this include: doctors 'heard the message' more quickly; a contradiction developed between doctors' devotion to health and their smoking behaviour; smoking may also have become stigmatised in medical circles before it became so in the rest of society.<sup>13</sup>

Some of these factors may have led to reduced alcohol misuse among doctors and it has been suggested that there has been a cultural change towards drinking within the medical profession in recent years. Concern over alcohol (and other drug) misuse by doctors was, for example, reflected in a report by the Medical Council on Alcoholism in 1998,<sup>14</sup> and confidential reporting systems are also in place for doctors who are concerned about colleagues abusing alcohol or drugs and who may endanger their patients. Trends in alcohol consumption within the medical profession are not readily available, although figures from the General Household Survey for 1988 and 1990 indicated that the proportion of male doctors drinking at levels which exceeded weekly recommended units of alcohol was lower than the population as a whole.<sup>2</sup> When considering changes in alcohol-related mortality in the medical profession it should also be noted that the ethnic mix of doctors does not now reflect that of the general working population. In 2001 only 70 per cent of doctors were white, compared to 93 per cent of people working in all industries. In the 2001 Census, 21 per cent of doctors classified their ethnic group as Asian.<sup>15</sup>

In contrast to male medical practitioners, coal mine operatives, who had the highest SMR for men in 2001–05 (852), were not identified as an occupation with high indicators of alcohol-related mortality in either the 1970s or 1980s. In 1961 face workers in coal mines had an SMR of 142 for male liver cirrhosis mortality but other underground workers in coal mines had an SMR of only 80.<sup>8</sup> Our recent results may reflect that by 2001 fewer men were working in coalmines than in previous census years. The high SMR may indicate a higher risk of alcohol-related

mortality among former mine workers but it may also be a consequence of numerator/denominator bias as fewer men may have recorded a coalmining occupation in the 2001 Census but still have been recorded as coalminers at death registration.

The reasons why some occupations may be particularly prone to raised alcohol-related mortality have been explored by research studies. Plant in the 1970s, for example, explored whether some occupations attracted people who were already problem drinkers or whether certain professions created problem drinkers through work pressures. By investigating recruitment to breweries in Edinburgh he concluded that the drinks industry attracted people likely to already have high levels of alcohol consumption. Plant also found evidence that within the drinks trade there was strong social pressure to consume the available alcohol.<sup>16</sup> Following a literature review he proposed eight factors which had emerged as suggested explanations of why some occupations had high rates of alcohol-related problems,<sup>17</sup> including availability of alcohol at work, social pressure to drink at work, separation from family or social relationships, freedom from supervision, very high or very low income levels, collusion by colleagues, stress (including danger, responsibility and job insecurity), and recruitment of people who are predisposed to drink heavily. Many of these risk factors can be associated with those occupations listed in Table 2 with the highest indicators of alcohol-related mortality.

Among men in our study, the lowest PMRs were found in farmers. Hawton *et al* have suggested that farmers would be unlikely to sustain their farming operations if they were heavy drinkers.<sup>18</sup> They concluded that the general demands of farming discourage alcohol misuse and are unlikely to attract those who are already heavy users of alcohol. For men, driving-related occupations also had some of the lowest indicators of alcohol-related deaths, which has also been reported earlier. The Decennial Supplement of 1961, for example, reported low SMRs from liver cirrhosis for driving-related occupations.<sup>8</sup> The risk of disqualification for drink driving may clearly act as a deterrent against alcohol misuse for professional drivers.

Although analyses of deaths by occupation have a long reporting tradition, there have always been a number of problems associated with their calculation and interpretation. Direct comparisons of alcohol-related mortality for particular occupations cannot be made across time from results presented in the Decennial Supplements. SMRs and PMRs do allow comparison with the population as a whole, but when interpreting figures for 2001–05 it should be remembered that alcohol-related mortality rates have been rising rapidly in recent years, thus raising the baseline for comparison. A further challenge has always been that compared to men, only a small percentage of women have an occupation recorded at death registration. For this reason analyses have often been restricted to men. Another limitation is the fact that populations for occupational groups are only routinely available every ten years following the census. Mortality indicators which require population denominators, such as SMRs, can therefore be produced only at wide intervals. PMRs do not require population data, however, like SMRs, they have their own limitations.

As noted in the Methods section, SMRs by occupation are calculated using data collected at death registration and information collected at the decennial population census. A potential numerator/denominator bias can occur in using these ratios because of differences between occupations recorded at death and at census. We attempted to limit this bias by restricting analysis to deaths between ages 20–64, however to achieve reasonably robust results we also aggregated five years of mortality data. The latter may increase the risk of bias as it entails using population counts from 2001 with deaths registered up to 2005. (Mortality data could not be used either side of 2001 as SOC2000 was only introduced for coding deaths in that year.)

PMRs can avoid this problem of bias as a population count is not needed for their calculation. Both the numerator and denominator are derived only from death registrations, with the numerator being alcohol-related deaths and the denominator all deaths. PMRs, however, need to be interpreted with caution because, unlike SMRs, a high PMR does not imply higher excess mortality. The PMRs presented here only indicate an excess proportion of alcohol-related deaths. As noted earlier, the proportion of deaths which are alcohol-related may be affected by the relative frequency of other causes of death. If mortality from all causes in a given occupation is low, a high PMR for alcohol-related deaths may be found even if death rates from these causes are lower than rates in England and Wales. For example, in the results presented in Table 2, women in elementary office occupations had a PMR of 192 but an SMR of only 47. Their high PMR may therefore represent a deficit of deaths from other causes, as their level of alcohol-related mortality is actually lower than for women in England and Wales as a whole.

A further limitation when considering alcohol-related deaths by occupation is the risk that people who misuse alcohol may be less likely to be in employment, therefore leading to a high proportion of alcohol-related deaths being excluded from analysis. Our results indicate that a higher proportion of deaths from alcohol-related causes did not have an occupation recorded at death registration, compared to the population as a whole. In 2001–05, 12 per cent of men aged 20–64 did not have an occupation recorded at death, compared to 16 per cent for deaths with an underlying cause classified as alcohol-related. For all women aged 20–64, there were 42 per cent without an occupation recorded at death, but for alcohol-related causes this figure was 51 per cent. The results presented for women in Table 1 suggest that having any occupation recorded at death indicates lower alcohol-related mortality. Only one of the nine major occupation groups had a PMR for women which was significantly higher than for England and Wales and none of the SMRs for women in these groups were significantly higher than for women as a whole. Employment thus appears to have a generally protective effect for women against alcohol-related mortality.

Despite the limitations and challenges which have long been reported when examining deaths by occupation, reports on alcohol-related deaths over more than a century have consistently identified similar occupations as being most at risk. By presenting both PMRs and SMRs in this article we have allowed consistency between the two indicators to be examined. The findings largely reinforce earlier research regarding those occupations with the highest indicators of alcohol-related mortality. In particular, it is very clear that those with access to alcohol at work are more likely to die from alcohol-related causes, compared to the population as a whole.

## Key findings

- In England and Wales in 2001–05, the occupations with the highest proportions of alcohol-related deaths for men were bar staff, publicans and seafarers. Bar staff and publicans were also the occupations with the highest proportions of alcohol-related deaths for women.
- Compared to the population as a whole, levels of alcohol-related mortality (as measured by SMRs) were highest among men who worked as coal mine operatives and seafarers. The highest SMRs for women were for publicans and actors/entertainers.
- Other occupations within the drinks, catering, entertainment and hospitality industries had high indicators of alcohol-related mortality.
- Low indicators of alcohol-related deaths were found for men who worked as farmers and drivers, and women who worked with children.
- Employment appears to have a protective effect for women against alcohol-related mortality.

One of the key aims of the government's alcohol harm reduction strategy is to work in partnership with the drinks industry.<sup>3</sup> The strategy notes that the industry needs to be at the heart of preventing and tackling alcohol misuse and should play a greater role in disseminating messages which encourage responsible consumption. Our findings indicate that these messages need to be strongly directed at workers within the drinks industry, as well as to their customers.

## References

1. *Supplement to the Fifty-Fifth Annual Report of the Registrar General* (1895) HMSO: London.
2. Drever F (1995) *Occupational Health Decennial Supplement*. Series DS No. 10. HMSO: London.
3. Prime Minister's Strategy Unit (2004) *Alcohol Harm Reduction Strategy for England*.
4. Office for National Statistics (2006) *Alcohol-related death rates in the UK 1991–2005*. Online report available at: [www.statistics.gov.uk/statbase/Product.asp?vlnk=14496](http://www.statistics.gov.uk/statbase/Product.asp?vlnk=14496)
5. Office for National Statistics (2000) *Standard Occupational Classification 2000*, Vol.1. TSO: London. Available online at: [www.statistics.gov.uk/methods\\_quality/ns\\_sec/soc2000.asp](http://www.statistics.gov.uk/methods_quality/ns_sec/soc2000.asp)
6. Office for National Statistics. 2001 Census form available online at [www.statistics.gov.uk/census2001/censusform.asp](http://www.statistics.gov.uk/census2001/censusform.asp)
7. Office of Population, Censuses and Surveys (1986) *Occupational mortality: the Registrar General's Decennial Supplement for England and Wales*. Series DS No.6. HMSO: London.
8. Office of Population, Censuses and Surveys (1961) *The Registrar General's Decennial Supplement: Occupational Mortality*. HMSO: London.
9. Office of Population, Censuses and Surveys (1978) *Occupational mortality 1970–72; Decennial Supplement*, Series DS No. 1. HMSO, London.
10. Burnett C, Maurer J and Dosemeci M (1997) *Mortality by Occupation, Industry and Cause of Death, 1984–1988*. National Institute for Occupational Safety and Health.
11. Hemstrom O (2002) Alcohol related-deaths contribute to socioeconomic differentials in mortality in Sweden. *European Journal of Public Health* **12**, 254–62.
12. Sebo P, Bouvier Gallacchi M, Goehring C, Künzi B, and Bovier PA (2007) Use of tobacco and alcohol by Swiss primary care physicians: a cross-sectional survey. *BMC Public Health*. Published online: [www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1781430](http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1781430)
13. Davis, R M (1993) When doctors smoke. *Tobacco Control* **2**, 187–88.
14. Working Group on the Misuse of Alcohol and Other Drugs by Doctors (1998) *The Misuse of Alcohol and Other Drugs by Doctors*, pp 1–15. British Medical Association: London.
15. Yar M, Dix D and Bajekal M (2006) Socio-demographic characteristics of the healthcare workforce in England and Wales – results from the 2001 Census. *Health Statistics Quarterly* **32**, 44–55.
16. Plant M (1978) Occupation and alcoholism: cause or effect? A controlled study of recruits to the drink trade. *The International Journal of Addictions*, **13**(4), 605–26.
17. Plant M (1979) Occupations, drinking patterns and alcohol related problems: conclusions from a follow up study. *The British Journal of Addiction*, **74**, 267–73.
18. Hawton K, Simkin S, Malmberg A, Fagg J, and Harriss L (1998) *Suicide and Stress in Farmers*. TSO: London.