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Estimate of deaths attributable to passive smoking among UK adults: database analysis

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Abstract

Objective To estimate deaths from passive smoking in employees of the hospitality industry as well as in the general workforce and general population of the United Kingdom.
Design Calculation, using the formula for population attributable proportion, of deaths likely to have been caused by passive smoking at home and at work in the UK according to occupation. Sensitivity analyses to examine impact of varying assumptions regarding prevalence and risks of exposure.
Setting National UK databases of causes of death, employment, structure of households, and prevalences of active and passive smoking.
Main outcome measures Estimates of deaths due to passive smoking according to age group (<65 or ≥65) and site of exposure (domestic or workplace).
Results Across the United Kingdom as a whole, passive smoking at work is likely to be responsible for the deaths of more than two employed people per working day (617 deaths per year), including 54 deaths in the hospitality industry each year. Each year passive smoking at home might account for another 2700 deaths in persons aged 20-64 years and 8000 deaths among people aged ≥65.
Conclusion Exposure at work might contribute up to one fifth of all deaths from passive smoking in the general population aged 20-64 years, and up to half of such deaths among employees of the hospitality industry. Adoption of smoke free policies in all workplaces and reductions in the general prevalence of active smoking would lead to substantial reductions in these avoidable deaths.

Introduction

Evidence that exposure to passive smoking increases the risk of adults developing fatal diseases first emerged in 1981.[1 2] Many epidemiological studies have been carried out, and reviews in three continents have now concluded that passive smoking is a cause of serious disease in adults and children.[3–5] Smoke free policies have been introduced in various settings, but some workplaces still permit smoking and making hospitality venues (pubs, bars, nightclubs, hotels, and restaurants) smoke free is contentious. As the generation of tobacco smoke is not intrinsic to the process of selling food and drink, such venues could be made smoke free to protect the health of employees. Nevertheless, some organisations and individuals in the hospitality industry vigorously oppose this, claiming that such policies are an infringement of the personal liberty of their customers and will lead to damage to themselves.

It is important to distinguish between the economic impact people believe smoke free policies are likely to have before the policies themselves are introduced, the impact they are perceived to have had after their introduction, and careful studies of accepted economic indicators. The best economic indicators take into account the general economic conditions prevailing before and after smoke free policies are introduced because discretionary expenditure, such as that on drinking and dining, is particularly sensitive to these. Objective evidence has shown that smoke free policies have no adverse economic impact on the hospitality industry.[6 7]

By contrast, there have not been any calculations of the harm done to health from smoking in hospitality venues and certain other workplaces. I estimated the number of deaths due to passive smoking in employees of the hospitality industry and in the general workforce and general population of the United Kingdom.

Methods

Study population

In mid-2002, an estimated 39.4 million people aged 20 years and older lived in England and Wales; the figure for the United Kingdom was 12.9% larger at 44.5 million.[8] The corresponding figures for people aged ≥65 years were 8.4 million and 9.4 million, respectively.[8] At the same time 29.8 million people were in employment in the United Kingdom,[9] of whom 320 262 (1.1%) worked in pubs, bars, and nightclubs, and 829 401 (2.8%) worked in hotels and restaurants.[10]

Prevalence of passive exposure to tobacco smoke

Among adults of working age, around 30% are smokers,[11] and the estimated prevalence of passive smoking at home is 42%,[12 13] but this figure has been discounted to 37% to allow for the 13% of individuals who live alone. In people aged ≥65, the prevalence of active smoking is 15%[11] but partnering is non-random with respect to smoking status and 37% of people live alone. Allowance for both of these factors leads to an estimated prevalence of passive exposure at home of 13%. Nearly all pubs, bars, nightclubs, hotels, and restaurants currently permit smoking in at least some areas, leading to some passive exposure in all of their employees. The prevalence of passive smoking at work in the general workforce is 11%.[14]

Risks associated with exposure to tobacco smoke

Many studies have examined the hazards associated with domestic exposure of non-smokers to tobacco smoke generated by their partners, providing a relatively clear picture of the risks for lung cancer and ischaemic heart disease. After a report by

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Table 1 Deaths by cause, age, and occupation, United Kingdom, 2003 (population figures are ×1000)

	General population			Hospitality employees			
	20-64 years (n=35 056.6)	All workforce (n=29 847.0)	≥65 years (n=9429.7)	Fifth of pub, bar, nightclub workers* (n=64.1)	Fifth of hotel and restaurant workers* (n=165.9)	All pub, bar, nightclub workers (n=320.3)	All hotel and restaurant workers (n=829.4)
Lung cancer	7 317	6 230	25 032	16	41	79	203
IHD	14 949	12 727	97 380	32	83	160	415
Stroke	4 544	3 869	60 453	10	25	49	126

IHD=ischaemic heart disease.
*Estimated proportion of people whose entire working life is spent in that job.

Woodward and Laugesen to the New Zealand Ministry of Health,[15] based on earlier calculations by Kawachi et al,[16] I have adopted relative risks of 1.24 and 1.30, respectively, for these exposures, irrespective or age or sex. Studies of exposure at work are less numerous but suggest that figures of 1.24 and 1.20, respectively, are appropriate for both sexes.[15]

Seven studies, varying considerably in size and design, have examined the association between passive smoking and risk of stroke.[17–23] According to the method used by the Australian National Health and Medical Research Council Working Party,[4] I have used the median of the available values (1.45) as the best estimate of the probable relative risks and the lower and upper quartiles of the series (1.15 and 1.76, respectively) to define the uncertainty surrounding this estimate. As there are no equivalent estimates available for passive exposure at work, I applied the same figures for that setting.

Law and Hackshaw examined eight studies and estimated that passive smoking increases the risk of chronic obstructive pulmonary disease (COPD) in adults by 25% (95% confidence interval 10% to 43%).[24] I omitted chronic obstructive pulmonary disease from my present calculations, however, because none of the reviews cited earlier[3–5] accepts that it is causally related to passive smoking.

Though there are no published studies of the association between mortality in hospitality staff and passive smoking, Jarvis reported that non-smoking bar staff in London had a median salivary cotinine of 3.65 ng/ml, a figure 3.04 times higher than the median found in the same study for non-smokers married to smokers.[25] Application of this figure to the typical excess risks for workplace exposure used by Woodward and Laugesen[15] suggests that pub, bar, and nightclub staff experience relative risks of 1.73, 1.61, and 2.52 for lung cancer, heart disease, and stroke, respectively. Because staff working in hotels and restaurants are exposed to less smoke[26] I set their risks at the same level as for the general workforce.

Mortality from target conditions

I obtained counts of deaths from lung cancer (International Classification of Diseases, 10th revision, codes C33, C34), ischaemic heart disease (I20-I25), and stroke (I60-I69) in England and Wales during 2003 from the Office for National Statistics[27] according to age (<65 or ≥65). I adjusted the figures upwards by 12.9% and 12.4%, respectively,[8] to obtain UK estimates. To calculate the numbers of deaths in all employed people I multiplied the relevant figure for those aged 20-64 by 0.85 (the size of the total workforce relative to that of the whole population aged 20-64 in mid-2002). Similarly, multiplying the relevant estimated figure for deaths in the workforce by 1.1% and 2.8% gave numbers for cause specific deaths in workers in pubs or bars and in restaurants.

Statistical methods

I derived estimates of the cause specific numbers of deaths for both sexes combined for people aged <65 and ≥65 and for each site of exposure (home or work), using the formula $\{[p.(RR-1)]/[1+p.(RR-1)]\}$ for population attributable proportion (where p = prevalence of passive smoking at home and RR = relative risk) and applying the resulting fraction to the relevant total numbers of deaths from a specific cause. The number for total attributable deaths is the sum of the three cause specific numbers of deaths for a particular age group and setting.

I assumed that all employees in the hospitality industry were exposed to the same amount of passive smoking at home as the rest of the population. The hospitality industry employs a many young, casual, or temporary staff in a workforce with a high turnover,[10] and such people may soon shed the additional risk associated with heavy passive exposure to tobacco smoke in these venues when they move to other industries. The proportion of staff for whom hospitality work represents their chief lifetime occupation is not known but I estimated it at 20%. Accordingly, I divided by five the attributable numbers of deaths from passive smoking in hospitality venues derived from the size of the industry-wide workforce.

I tested the sensitivity of the results to some of the assumptions underlying the calculations. The calculations were repeated using the upper and lower 95% confidence limits of the relative risks, as given by Woodward and Laugesen.[15] The effect of setting the relative risk for stroke to that for ischaemic heart disease was also tested. Finally, I performed a new set of calculations using the original relative risks but setting the prevalences of smoking to those currently observed in Australia (24% in middle aged adults; 10% in those aged ≥65)[28] and assuming all hospitality venues had become smoke free, as has occurred recently in Republic of Ireland and Norway.

Results

Table 1 shows mortality statistics, and table 2 summarises the basic calculations. In 2003, an estimated 617 people died from the effects of passive smoking at work across the whole of the United Kingdom, 54 of whom were long term employees of the hospitality industry. Of the 54 people who died, almost half were employed in the pub/bar/nightclub sector, despite the smaller size of its workforce, because staff are exposed to higher concentrations of tobacco smoke. In the whole population aged 20-64, more than 2700 deaths attributable to passive smoking at home brought the total fatalities related to passive smoking to 3343. In those aged ≥65, the total number of attributable deaths approaches 8000, with fatal strokes and heart disease each contributing more than three thousand events.

Table 3 shows the effects of varying key assumptions. When I used the lower confidence limits of the relative risks for each of the three conditions linked to passive smoking, the number of attributable deaths related to domestic exposure fell by around 45% and those secondary to exposure at work by two thirds. When I used upper estimates of the relative risks, deaths in the general population and hospitality workforce were around 40%

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Table 2 Deaths attributable to passive smoking by cause, age, occupation, and site of exposure, United Kingdom, 2003

	General population			Hospitality employees			
				Exposed at work		Exposed at home	
	20-64 years exposed at home	All workforce exposed at work	≥65 years exposed at home	Fifth of pub, bar, nightclub workers	Fifth of hotel and restaurant workers	All pub, bar, nightclub workers	All hotel and restaurant workers
Prevalence of passive exposure	0.368	0.11	0.134	1.0	1.0	0.368	0.368
Relative risk							
Lung cancer	1.24	1.24	1.24	1.73	1.24	1.24	1.24
IHD	1.30	1.20	1.30	1.61	1.20	1.30	1.30
Stroke	1.45	1.45	1.45	2.37	1.45	1.45	1.45
Population attributable risk (expressed as proportion)							
Lung cancer	0.081	0.026	0.031	0.422	0.194	0.081	0.081
IHD	0.099	0.022	0.039	0.379	0.167	0.099	0.099
Stroke	0.142	0.047	0.057	0.578	0.310	0.142	0.142
Attributed deaths							
Lung cancer	594	160	778	7	8	6	17
IHD	1486	274	3753	12	14	16	41
Stroke	646	182	3428	6	8	7	18
Total*	2726	617	7959	24	30	29	76

IHD=ischaemic heart disease.
*May be affected by rounding in component estimates.

higher than in table 2 and those in the workforce as a whole increased even more because of the wide confidence intervals surrounding estimates of the risk for ischaemic heart disease associated with passive exposure at work. Table 3 also shows that all totals are distinctly sensitive to the relative risks used to calculate deaths attributable to stroke, where there is least information available on the risks associated with passive smoking. Finally, if all workplaces in the United Kingdom became smoke free, as has occurred in the Republic of Ireland, and if the general prevalence of smoking fell to levels presently seen in Australia, not only would all deaths attributable to passive smoking at work eventually disappear, but those in the general population related to passive smoking at home would also fall by a third.

Discussion

My calculations indicate that passive exposure to tobacco smoke at work is likely to be responsible for the deaths of more than two employed people every working day across the United Kingdom as a whole (617 deaths a year). They suggest that at least one employee in the hospitality industry dies from such exposure each week (54 deaths a year). Passive smoking at home might account for a further 2700 deaths in people aged 20-64 years (approaching eight a day) and a further 8000 deaths a year among people aged ≥65. Even using the lowest statistically defensible estimates of the risks associated with passive smoking, the numbers of attributable deaths remain sizeable: 204 across the whole workforce, including 22 in hospitality workers, for occupational exposure; 1600 and 4300 a year in those aged <65 and ≥65, respectively, for domestic exposure.

As with any epidemiological assessment of attributable risk, the present calculations depend on an assumption of cause and effect and do not identify specific individuals affected. Given that authorities on three continents have concluded that passive smoking causes disease in adults,[3–5] my calculations have a firm foundation. Though the data relating to passive smoking and cerebrovascular disease remain limited, I have accommodated this potential objection by recalculating the figures on the assumption that the relative risks for stroke and ischaemic heart disease are the same.

Table 3 Results of sensitivity analyses for deaths attributable to passive smoking

	General population			Hospitality employees			
				Exposed at work		Exposed at home	
Assumption applied	20-64 years exposed at home	All workforce exposed at work	≥65 years exposed at home	Fifth of pub, bar, nightclub workers	Fifth of hotel and restaurant workers	All pub, bar, nightclub workers	All hotel and restaurant workers
Lower 95% confidence limit*							
Subtotal	1684	204	4357	11	11	18	47
Difference (%)†	–1454 (–44)‡		–3602 (–45)	–32 (–59)§		—	
Upper 95% confidence limit*							
Subtotal	3683	1085	11426	33	46	40	102
Difference (%)†	1426 (43)‡		3467 (44)	25 (46)§		—	
Relative risk for stroke equivalent to relative risk for ischaemic heart disease							
Subtotal	2532	518	6860	22	26	27	70
Difference (%)†	–293 (–9)‡		–1099 (–14)	–6 (–10)§		—	
Australian prevalence plus smoking regulations as in Republic of Ireland¶							
Subtotal	2211	0	5384	0	0	24	61
Difference (%)†	–1131 (–34)‡		–2575 (–32)	–54 (–100)§		—	

*Taken from Woodward and Laugesen.[15]
†Difference relative to equivalent figures in table 2.
‡For all aged 20-65 years.
§For workplace exposure in all hospitality employees.
¶Figures for prevalence from White et al[28]; all workplaces in Republic of Ireland are now smoke free.

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Underlying assumptions

The cause specific population attributable proportions related to passive smoking at work given in table 1 are lower than those calculated elsewhere, such as in Finland,[29] because many of the assumptions inherent in the basic calculations have deliberately been set as conservative. For example, I regarded the intensity of exposure to tobacco smoke among staff working in restaurants and hotels, and the risks attendant thereon, as the same as that in other workplaces. Furthermore, the assumption that eight of nine employees across the whole of the United Kingdom now work in a smoke free environment may also be conservative. If the prevalence of active smoking in the hospitality workforce is higher than the average for the general population, totals of deaths from the target conditions will have been underestimated by multiplying national figures by the proportion of the population employed in the hospitality sector. In turn, deaths in that sector attributable to passive smoking would also be underestimated. In the absence of longitudinal data, I regarded only a minority of people working in the hospitality industry as doing so throughout their working life. I also assumed that those who changed jobs and people who retired from other occupations had no residual additional risk relating to their exposure at work.

My calculations do not formally take into account the well documented issue of a time lag between exposure to tobacco smoke and impact on health. As the prevalence of active smoking has been falling in the United Kingdom for several decades, however, the intensity of passive smoking in hospitality venues is also likely to have been falling, as have the intensity and prevalence of passive exposure in other settings, including domestic ones. Thus, use of current estimates for the prevalence of passive exposure is again conservative. The projection of mortality statistics for England and Wales to Scotland is also conservative, in that Scotland has higher rates of vascular disease and lung cancer. The calculation of the risks associated with passive occupational exposure of employees in pubs, bars, and nightclubs assumes a linear function, in keeping with known associations between active smoking and the diseases of interest, and is based on figures for median rather than mean salivary cotinine reported by Jarvis.[25]

Contribution of workplace exposure

The literature on the risks associated with passive smoking is dominated by studies of exposure of a non-smoker at home to the tobacco smoke generated by their partner. There are few studies that consider non-smokers who are exposed only at work, which explains why my calculations rest in part on application to workplaces of risks attendant on domestic exposure. The figures for deaths attributable to occupational exposure could be considered a subset of those for all deaths from passive smoking in middle age, which would decrease that given for non-occupational exposure in table 2 from 2700 to 2100. In this case, the deaths attributable to domestic and leisure time exposures would be almost four times greater than in the occupational group. Application of the same logic to hospitality employees indicates that half of deaths attributable to passive smoking in this group (54 out of 105) were consequent on occupational exposure.

Contribution of active *v* passive smoking

While there has been an out of court settlement providing compensation for the contribution of passive exposure to the development of lung cancer in a barman, who was himself an active smoker,[30] the question as to whether the risk of active and passive smoking are additive has not been examined epidemiologically. My calculations, however, assume that they are because there is abundant evidence that risks of cardiovascular disease and various cancers rise steadily with aggregate lifetime active smoking. In partitioning deaths in the whole population to those occurring within and outside the workforce, no allowance has been made for a healthy worker effect. Arguably, both of these factors might contribute to an overestimation of deaths caused by passive smoking. On the other hand, I have omitted severe morbidity from vascular disease in individuals who might have not developed these conditions had they been able to avoid being exposed to tobacco smoke.

Within these caveats, it is clear that adoption of smoke free policies in all workplaces in the United Kingdom might prevent several hundred premature deaths each year, while the reduction of the prevalence of active smoking to that already achieved in other parts of the English speaking world might avoid several thousand more.

What is already known on this topic

Passive smoking is accepted as a cause of fatal diseases in adults

Existing studies have shown these risks for both domestic exposure and exposure at work

What this study adds

Passive exposure to tobacco smoke at work may cause more than 600 deaths each year in the UK, including over 50 in people employed in the hospitality industry

Exposure at home may account for 2700 deaths in those aged 20-64 and 8000 in those aged ≥65

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1 Hirayama T. Non-smoking wives of heavy smokers have a higher risk of lung cancer: a study from Japan. *BMJ* 1981;282:183-5.
2 Trichopoulos D, Kalandidi A, Sparros L, MacMahon B. Lung cancer and passive smoking. *Int J Cancer* 1981;27:1-4.
3 Office of Environmental Health Hazard Assessment. *Health effects of exposure to environmental tobacco smoke. Final report September 1997.* Sacramento: California Environmental Protection Agency, 1997.
4 National Health and Medical Research Council Working Party. *The health effects of passive smoking: a scientific information paper.* Canberra: NHMRC, 1997.
5 Scientific Committee on Tobacco and Health. *Report of the scientific committee on tobacco and health.* London: Stationery Office, 1998.
6 Glantz SA. Effect of smokefree bar laws on bar revenues in California. *Tob Control* 2000;9:111-2.
7 Wakefield M, Siahpush M, Scollo M, Lal A, Hyland A, McCaul K, Miller C. The effect of a smoke-free law on restaurant business in South Australia. *Aust N Z J Public Health* 2002;26:375-82.
8 Office for National Statistics. *Mid-2002 population estimates: United Kingdom: estimated resident population by single year of age and sex—provisional results from the Manchester matching exercise (with armed forces correction).* www.statistics.gov.uk (accessed 9 May 2004).
9 Office for National Statistics. *Employment: workforce jobs by industry.* www.statistics.gov.uk/pdfdir/lmsuk0404.pdf (accessed 9 May 2004).
10 Sector Skills Development Agency. *Market assessment for the hospitality, leisure, travel and tourism sector.* Wath-upon-Dearne, South Yorkshire: SSDA, 2002.

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11 Office for National Statistics. *General household survey, living in Britain, 2002. Table 8.5: cigarette-smoking status by age and marital status.* www.statistics.gov.uk (accessed 9 May 2004).
12 Jarvis MJ, Goddard E, Higgins V, Feyerabend C, Bryant A, Cook DG. Children's exposure to passive smoking in England since the 1980s: cotinine evidence from population surveys. *BMJ* 2000;321:343-5.
13 Kurukulaaratchy RJ, Matthews S, Arshad SH. Does environment mediate the earlier onset of the persistent childhood asthma phenotype? *Pediatrics* 2004;113:345-50.
14 BMRB International. *A compilation of UK labour force statistics and smoking restrictions by ACCESS, for ASH.* London: Action on Smoking and Health, 2002.
15 Woodward A, Laugesen M. *Deaths in New Zealand attributable to second-hand cigarette smoke: a report to the New Zealand Ministry of Health.* Wellington: Wellington School of Medicine, 2000.
16 Kawachi I, Pearce NE, Jackson RT. Deaths from lung cancer and ischaemic heart disease due to passive smoking in New Zealand. *N Z Med J* 1989;102:337-40.
17 Molgaard CA, Bartok A, Peddecord KM, Rothrock J. The association between cerebrovascular disease and smoking: a case-control study. *Neuroepidemiology* 1986;5:88-94.
18 Lee PN, Chamberlain J, Alderson MR. Relationship of passive smoking to risk of lung cancer and of smoking-associated diseases. *Br J Cancer* 1986;54:97-105.
19 Donnan GA, McNeil JJ, Adena MA, Doyle AE, O'Malley HM, Neill GC. Smoking as a risk factor for cerebral ischaemia. *Lancet* 1989;ii:643-7.
20 Bonita R, Duncan J, Truelsen T, Jackson RT, Beaglehole R. Passive smoking as well as active smoking increases the risk of acute stroke. *Tob Control* 1999;8:156-60.
21 You RX, Thrift AG, McNeill JJ, Davis SM, Donnan GA. Ischemic stroke and passive exposure to spouses' cigarette smoking. Melbourne stroke risk factor study (MERFS) group. *Am J Public Health* 1999;89:572-5.
22 Iribarren C, Darbinian J, Klatsky AL, Friedman GD. Cohort study of exposure to environmental tobacco smoke and risk of first ischemic stroke and transient ischemic attack. *Neuroepidemiology* 2004;23:38-44.
23 Whincup PH, Gilg JA, Emberson JR, Jarvis MJ, Feyerband C, Bryant A, et al. Passive smoking and risk of coronary heart disease and stroke: prospective study with cotinine measurement. *BMJ* 2004;329:200-5.
24 Law MR, Hackshaw AK. Environmental tobacco smoke. *Br Med Bull* 1996;52:22-34.
25 Jarvis M. *Quantitative survey of exposure to other people's smoke in London bar staff.* London: Department of Epidemiology and Public Health, University College, 2001.
26 Johnsson T, Tuomi T, Hyvarinen M, Svinhufvud J, Rothberg R, Reijula K. Occupational exposure of non-smoking restaurant personnel to environmental tobacco smoke in Finland. *Am J Industrial Med* 2003;43:523-31.
27 Office for National Statistics. *Deaths by age, sex and underlying cause, 2003 registrations.* www.statistics.gov.uk/STABASE/Expodata/Spreadsheet/D8257.xls (accessed 3 June 2004).
28 White V, Hill D, Siahpush M, Bobevski I. How has the prevalence of cigarette smoking changed among Australian adults? Trends in smoking prevalence between 1980 and 2001. *Tob Control* 2003;12(suppl II):67-74.
29 Nurminen MM, Jaakkola MS. Mortality from occupational exposure to environmental tobacco smoke in Finland. *J Occup Environ Med* 2001;43:687-93.
30 McDonnell S. Anti-smokers hail landmark victory as hotels pay $20,000. *Australian* 1991 June 13:3.

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