

The burden of occupational cancer in Great Britain

Technical Annex 5: Bladder cancer

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The aim of this project was to produce an updated estimate of the current burden of occupational cancer specifically for Great Britain. The primary measure of the burden of cancer used was the attributable fraction (AF), ie the proportion of cases that would not have occurred in the absence of exposure. Data on the risk of the disease due to the exposures of interest, taking into account confounding factors and overlapping exposures, were combined with data on the proportion of the target population exposed over the period in which relevant exposure occurred. Estimation was carried out for carcinogenic agents or exposure circumstances that were classified by the International Agency for Research on Cancer (IARC) as Group 1 or 2A carcinogens with strong or suggestive human evidence. Estimation was carried out for 2004 for mortality and 2003 for cancer incidence for cancer of the bladder, leukaemia, cancer of the lung, mesothelioma, non-melanoma skin cancer (NMSC), and sinonasal cancer.

The proportion of cancer deaths in 2004 attributable to occupation was estimated to be 8.0% in men and 1.5% in women with an overall estimate of 4.9% for men plus women. Estimated numbers of deaths attributable to occupation were 6,259 for men and 1,058 for women giving a total of 7,317. The total number of cancer registrations in 2003 attributable to occupational causes was 13,338 for men plus women. Asbestos contributed the largest numbers of deaths and registrations (mesothelioma and lung cancer), followed by mineral oils (mainly NMSC), solar radiation (NMSC), silica (lung cancer) and diesel engine exhaust (lung and bladder cancer). Large numbers of workers were potentially exposed to several carcinogenic agents over the risk exposure periods, particularly in the construction industry, as farmers or as other agricultural workers, and as workers in manufacture of machinery and other equipment, manufacture of wood products, land transport, metal working, painting, welding and textiles. There are several sources of uncertainty in the estimates, including exclusion of other potential carcinogenic agents, potentially inaccurate or approximate data and methodological issues. On balance, the estimates are likely to be a conservative estimate of the true risk. Future work will address estimation for the remaining cancers that have yet to be examined, together with development of methodology for predicting future estimates of the occupational cancers due to more recent exposures.

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Table 10: Attributable fraction for mineral oils (Talbert, 1979)

Occupational exposure		Mineral oils					
<i>'Best study' for RR estimate</i>	Reference	Tolbert (1979)					
	Type of study	Review					
	Sex	Male			Female		
	Exposure level	Higher	Lower & Background exposure	Total	Higher	Lower & Background exposure	Total
<i>Independent data:</i>	Industry Sectors	C-E Metal machinists only			C-E Metal machinists only		
	LFS 1979 numbers exposed	1,215,812	65,384	1,281,196	78,198	4,936	83,134
	Annual employment turnover	0.09	0.09		0.14	0.14	
	Numbers exposed in the REP (1955- 1994)	4,200,677	225,904	4,426,581	438,568	27,683	466,252
<i>Proportion of the population exposed</i>		0.22	0.01	0.23	0.021	0.001	0.026
<i>Proportion of cases exposed</i>							
<i>Relative risks</i>		1.39	1.00		1.39	1.00	
<i>Attributable fraction</i>		0.078	0.000	0.078	0.008	0.000	0.008
	'Random error' 95% confidence interval	[0.04 - 0.12]		[0.04 - 0.12]	[0.004 - 0.013]		[0.004 - 0.013]
<i>Attributable deaths</i>		243	0	243	13	0	13
<i>Attributable registrations</i>		548	0	548	23	0	23

Industry sectors:

A-B = Agriculture, hunting and forestry, fishing

C-E = Mining and quarrying, electricity, gas and water, manufacturing industry

F = Construction

G-Q = Service industries

Table 13: Attributable fraction for aromatic amines based on Sorahan et al., (1998)

Occupational exposure		Aromatic amines													
'Best study' for RR estimate	Reference	Sorahan et al (1998)													
	Type of study	W Midlands hospital-based case-control studies													
	Sex	Male													
	Exposure period	1955-1962					1955-1994								
	Exposure level	Dyestuffs	Leather work	Cable manufacturing industry	Textile printing and dyeing		Benzidine-based dye manufacture	MOCA - industrial chemicals	MOCA - rubber products	MOCA - plastic products		Medical and nursing occupations	Laboratory technicians		TOTAL
Independent data:	Industry Sectors	C-E	C-E	C-E	C-E	Total	C-E	C-E	C-E	C-E	Total	G-Q	G-Q	Total	
	CoE 1971 numbers exposed	24,241	16,449	34,325	52,842	127,857									
	CAREX numbers exposed						14	10	168	154	345	151	1,405	1,556	
	CAREX adjustment factor						1.4	1.4	1.4	1.4		0.9	0.9		
	Annual employment turnover	0.09	0.09	0.09	0.09		0.09	0.09	0.09	0.09		0.11	0.11		
	Numbers exposed in the REP	17,847	12,110	25,271	38,904	94,133	66	48	812	743	1,669	569	5,283	5,852	101,654
Proportion of the population exposed		0.001	0.001	0.001	0.002	0.005	0.00000	0.00000	0.00004	0.00004	0.00000	0.00003	0.00028	0.0003	0.005
Relative risks		2.61	2.51	2.46	2.32		2.32	1.70	1.89	1.73		1.62	1.05		
Attributable fraction	Levin's	0.001	0.001	0.002	0.003	0.007	0.00000	0.00000	0.00004	0.00003	0.00000	0.00002	0.00001	0.00003	0.007
	'Random error' 95% confidence interval	[0.000 - 0.006]	[0.000 - 0.002]	[0.000 - 0.005]	[0.000 - 0.009]		[0.00000 - 0.00002]	[0.00000 - 0.00000]	[0.00001 - 0.00007]	[0.00001 - 0.00006]		[0.00000 - 0.00005]	[-0.0001 - 0.0002]		
Attributable deaths		5	3	6	8	22	0	0	0	0	0	0	0	0	22
Attributable registrations		10	7	13	19	49	0	0	0	0	1	0	0	0	50

Occupational exposure		Aromatic amines														
'Best study' for RR Estimate	Reference	Sorahan et al (1998)														
	Type of study	W Midlands hospital-based case-control studies														
	Sex	Female														
	Exposure period	1955-1962					1955-1994									
	Exposure level	Dyestuffs	Leather work	Cable manufacturing industry	Textile printing and dyeing		Benzidine-based dye manufacture	MOCA - industrial chemicals	MOCA - rubber products	MOCA - plastic products			Medical and nursing occupations	Laboratory technicians		TOTAL
Independent data:	Industry Sectors	C-E	C-E	C-E	C-E	Total	C-E	C-E	C-E	C-E	Total	G-Q	G-Q	Total		
	CoE 1971 numbers exposed	27,433	4,364	12,132	21,682	65,611										
	CAREX numbers exposed						4	3	53	48	109	193	1,739	1,931		
	CAREX adjustment factor						1.5	1.5	1.5	1.5		0.8	0.8			
	Annual employment turnover	0.14	0.14	0.14	0.14		0.14	0.14	0.14	0.14		0.15	0.15			
	Numbers exposed in the REP	35,025	5,572	15,490	27,682	83,769	36	26	446	408	917	922	8,326	9,249	93,934	
Proportion of the population exposed		0.002	0.000	0.001	0.001	0.004	0.0000017	0.0000013	0.0000213	0.0000195	0.0000439	0.0000	0.0004	0.0004	0.004	
Relative risks		2.61	2.51	2.46	2.32		2.32	1.70	1.89	1.73		1.62	1.05			
Attributable fraction	Levin's	0.003	0.000	0.001	0.002	0.006	0.000002	0.000001	0.000019	0.000014	0.000036	0.000027	0.00002	0.00005	0.006	
	'Random error' 95% confidence interval	[0.000 - 0.010]	[0.000 - 0.001]	[0.000 - 0.003]	[0.000 - 0.006]		[0.000000 - 0.000008]	[0.000000 - 0.000002]	[0.000007 - 0.000035]	[0.000003 - 0.000030]		[0.000 - 0.0001]	[0.000 - 0.0003]			
Attributable deaths		4	1	2	3	10	0	0	0	0	0	0	0	0	10	
Attributable registrations		8	1	3	5	17	0	0	0	0	0	0	0	0	17	

