
Occupational Safety and Health Service

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Number 2:1997
Respiratory Symptoms and
Asbestos Dust Exposure

NEW ZEALAND ASBESTOS EXPOSURE REGISTER

Respiratory symptoms and asbestos dust exposure

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Occupational Health Report Series

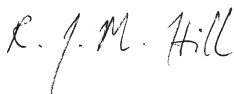
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Foreword

It is with pleasure I write the foreword to this report, the first arising from the National Asbestos Exposure Register.

The findings do not indicate a significant level of symptoms as a result of exposure to asbestos dust in this particular group. Nevertheless, the Occupational Safety and Health Service (OSH) remains constantly vigilant about asbestos exposure at work and is currently revising the Asbestos Regulations.

Readers of the report are also reminded that the third annual report on asbestos is now available from OSH. In it was described a small but disturbing feature — the presence of disease occurring among the children and spouses of former asbestos workers.



R J M Hill

General Manager

Occupational Safety and Health Service

Abstract

The New Zealand Asbestos Exposure Register was created to establish a record of individuals with past asbestos exposure. The authors of this study have analysed the records of a group of 2257 individuals on this register, who formed the largest occupational group. Information was gathered by a self administered questionnaire about jobs, duration, and the years in each job, as well as respiratory symptoms, age and smoking habit.

A cumulative exposure index was created for each individual on the basis of: a) years of exposure; b) degree of exposure (based on job title); and c) type of exposure (minimal, intermittent or continuous).

The reported symptom prevalences were analysed by cumulative exposure index, age, and tobacco smoking. On the basis of published data, shortness of breath was expected to be associated with exposure, but this was not the case when age and smoking were taken into account in the analysis. In fact, only asthma (based on reported wheezing and breathlessness) was associated with cumulative asbestos exposure.

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Background to the study

Is exposure to asbestos dust in the New Zealand context an independent cause of respiratory symptoms (cough, phlegm, shortness of breath and wheeze) taking into account other relevant factors such as age and smoking?

The New Zealand Asbestos Exposure Register currently comprises approximately 13,000 self referred people. A group of 2257 were selected for study based on the fact that of all the classified occupations, carpenters and builders formed the most clearly defined group.

Background to the registers

The National Asbestos Registers were established in March 1992 in line with the recommendations made to the Minister of Labour, by the Asbestos Advisory Committee. The relevant sections of this document are as follows:

Formation of the Asbestos Advisory Committee

The Asbestos Advisory Committee was established in October 1990 as an ad hoc body to report to the Minister of Labour on issues relating to the health effects and use of asbestos in New Zealand, adequacy of controls and legislation and clarification of the legal entitlements available for affected workers. This followed increasing public concern about the past and present effects of asbestos on workers, former workers and their families.

Establishment of the National Asbestos Registers

Recommendation 4 of the Report of the Asbestos Advisory Committee¹ to the Minister of Labour advised: *That an asbestos medical register be established for people who have been significantly exposed to asbestos. OSH should be the organisation responsible for establishing, maintaining and funding the medical register.*

The medical register should be in two parts:

Part 1 - Those notified as having been exposed to asbestos;

Part 2 - Those notified as having an asbestos-related disease.

The system should allow movement of the name of a registered person from part 1 to part 2 of the register when indicated.

Notifications to part 1 of the medical register were to be made by those who felt that they had been exposed to asbestos, or by people acting on their behalf (and following consultation) such as an employer, union official, relative or friend.

Notification to part 2 of the medical register would be done by medical practitioners.

A Notifiable Occupational Disease System (NODS) was established in 1992 and the asbestos registers have been incorporated in that scheme. This was in accordance with recommendation 5 of the Asbestos Advisory Committee.

The Asbestos Exposure Register

The Department of Labour's Occupational Safety and Health Service (OSH), in association with Electricorp Production, undertook an extensive advertising campaign in March and April 1992. Advertisements were published in all of the major newspapers, and several trade magazines.

The interest generated as a result of this campaign has ensured a high response rate for the exposure register. Notifications have been made by individuals, trade unions, occupational health nurses, doctors, the Asbestos Diseases Association of New Zealand and by some larger companies.

Notifications are directed either to branch offices of OSH or directly to the Registrar.

In recommendation 4, the committee had envisaged that people wishing to be recorded on the asbestos exposure register would have their exposure assessed at an OSH branch. Only those people who were judged as having had "significant exposure" would then be recorded on this register. However the huge response from those individuals who had been exposed made it impractical to screen registrants in this fashion.

Once a person has notified OSH that they have been exposed to asbestos, an asbestos exposure registration form is sent. The registration form collects information about the individual, their work exposure to asbestos and the state of their respiratory health.

When the form has been completed and returned to the Registrar the details are recorded on a database. The individual is then sent a copy of a special edition of OSH's magazine *Safeguard* which is dedicated to asbestos and its associated health problems. If the person indicates that they have a family doctor, the doctor is informed that their patient has been included on the asbestos exposure register, and is sent a copy of OSH's booklet *Asbestos Exposure and Disease: Notes for medical practitioners*.

The register will provide a database of the numbers of people exposed to asbestos through their occupation in New Zealand. OSH is providing information to the people recorded on this register and to their doctors. Through the operation of this register OSH is hoping to raise the awareness of the possible health effects of asbestos exposure among the general public and the medical profession.

Methods

From the questionnaire (appendix 1), which was self administered, respiratory questions, smoking history, work exposure to asbestos and age were available for study. The exposure index was established on the basis of duration of exposure, intensity of exposure (based on the job category), using a 1-5 grading and frequency of exposure using a 1-3 grading. The Exposure index grid is shown below.

Notes for calculating exposure index

A = Total years exposure

B = Degree of exposure (unprotected)

5 = Mining, milling, processing

4 = Boiler work, railway carriages, ships, spraying insulation

3 = Asbestos cement, construction, demolition, removal

2 = Electrical, friction products

1 = Loading, driving, environmental

C = Type of exposure

5 = Continuous

2 = Intermittent

1 = Minimal

D = product of A x B x C

	1	2	3	4	5
A					
B					
C					
D					
Total = sum of all Ds					

Statistical analysis was carried out using a SAS program to explore potential correlations between exposure, respiratory symptoms, age and smoking history.

1 Report of the Asbestos Advisory Council to the Minister of Labour, April 1991. Occupational Safety and Health Service, Department of Labour.

Summary data

Of the 2257 studied, 2246 were male and 11 were female, there were 2074 European, 116 Maori, 36 Pacific Islanders and 31 other ethnic groups.

The mean age of the group was 49 with a range of 17 to 89.

Of the group: 882 never smoked, 1003 were ex-smokers, and 372 were smokers.

Results

Table 1: Demographic factors and smoking associated with asbestos exposure

Cumulative exposure score	0-69 (n=551)	70-119 (n=506)	120-199 (n=702)	200+ (n=498)
Mean Age at Registration (sd)	43.0 (13.5)	46.0 (10.5)	50.5 (9.9)	57.1 (8.9)
Mean age at starting work (sd)	17.8 (3.7)	17.6 (3.5)	17.6 (3.5)	18.3 (4.6)
Mean age stopping work with asbestos (sd)	31.9 (11.4)	35.0 (12.4)	36.6 (10.9)	40.1 (12.8)
Mean years exposure (sd)	8.0 (5.8)	17.3 (6.0)	25.8 (6.2)	37.3 (9.5)
Mean exposure intensity* (sd)	5.7 (2.6)	5.9 (2.2)	6.4 (2.2)	7.7 (3.4)
Gender Males (%)	541 (98.2%)	504 (99.6%)	702 (100%)	496 (99.6%)
European/other (%)	492 (89.3%)	463 (91.5%)	671 (95.5%)	479 (96.2%)
Maori (%)	49 (8.9%)	33 (6.5%)	22 (3.1%)	12 (2.4%)
Pacific Islander (%)	10 (1.8%)	10 (2.0%)	9 (1.3%)	7 (1.4%)
Smokers: Never (%)	229 (41.6%)	196 (38.7%)	275 (39.2%)	182 (36.6%)
Ex-smokers (%)	218 (39.6%)	217 (42.9%)	313 (44.6%)	255 (51.2%)
Current (%)	98 (17.8%)	91 (18.0%)	109 (15.5%)	58 (11.7%)
Pipe/cigar (%)	6 (1.1%)	2 (0.4%)	5 (0.4%)	3 (0.6%)
cigs/day (current smokers)	14.7 (7.3%)	15.0 (7.5)	16.4 (7.4)	16.1 (8.1)
* = Exposure index/years of exposure				
Overall mean exposure score (sd) = 139.2 (93.8)				
Overall mean years exposure (sd) = 22.1 (12.5)				
Overall mean intensity exposure (sd) = 5.0 (3.7)				

This table looks at a range of demographic factors in relation to exposure indices. It can be seen that the mean age at starting work is the same across all exposure groups. The years of exposure and the mean exposure intensity increase across the cumulative exposure score groups. There was no difference between gender and ethnicity across exposure groups but there were less current smokers in the two highest exposure groups.

Distribution of Exposure Index Values

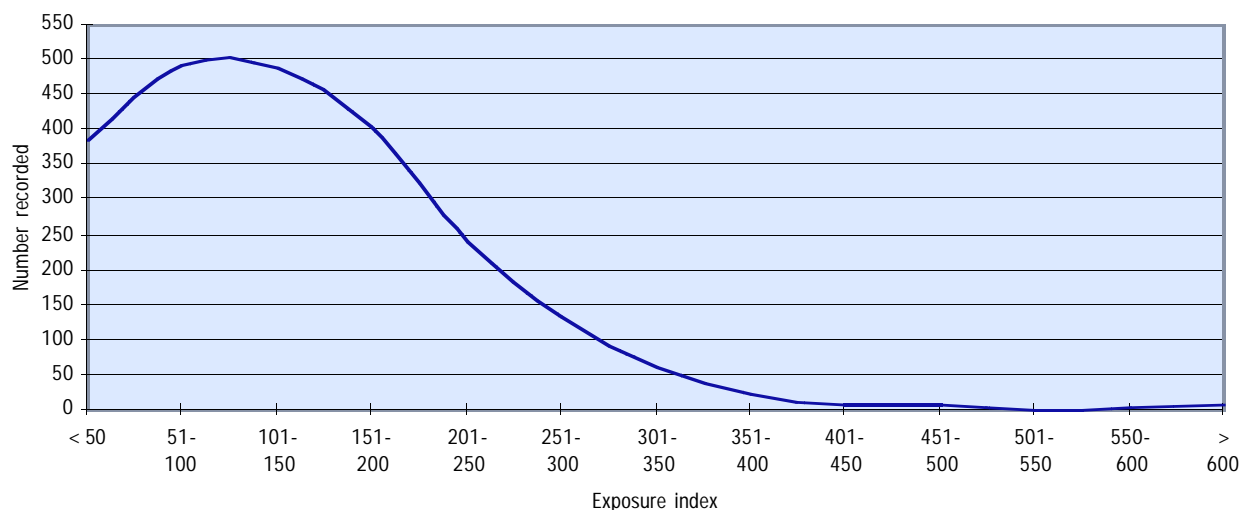


Table 2: Wheeze by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	168	154	199	132	653	74.04%
	Yes	61	42	76	50	229	25.96%
	% Yes	26.64%	21.43%	27.64%	27.47%	882	
Ex	No	134	146	186	160	626	62.41%
	Yes	84	71	127	95	377	37.59%
	% Yes	38.53%	32.72%	40.58%	37.25%	1003	
Current	No	52	52	66	31	201	54.03%
	Yes	52	41	48	30	171	45.97%
	% Yes	50.00%	44.09%	42.11%	49.18%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table, which looks at wheeze by exposure and smoking, indicates an increasing rate of wheeze with smoking habit in all exposure categories but no increasing rate of wheeze with exposure in any of the smoking categories.

Table 3: Wheeze without a cold by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	187	169	216	147	719	81.52%
	Yes	42	27	59	35	163	18.48%
	% Yes	18.34%	13.78%	21.45%	19.23%	882	
Ex	No	150	173	222	174	719	71.68%
	Yes	68	44	91	81	284	28.32%
	% Yes	31.19%	20.28%	29.07%	31.76%	1003	
Current	No	67	62	77	39	245	65.86%
	Yes	37	31	37	22	127	34.14%
	% Yes	35.58%	33.33%	32.46%	36.07%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table examines the prevalence of wheeze in the absence of a cold by exposure and smoking habit. There is no trend with increasing exposure but there is a difference in the rate between non-smokers and ex-smokers and between non and current smokers. There is also a small but consistent difference between ex-smokers and current smokers in all exposure groups.

Table 4: Wheeze with breathlessness by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	220	188	265	177	850	96.37%
	Yes	9	8	10	5	32	3.63%
	% Yes	3.93%	4.08%	3.64%	2.75%	882	
Ex	No	209	207	296	249	961	95.81%
	Yes	9	10	17	6	42	4.19%
	% Yes	4.13%	4.61%	5.43%	2.35%	1003	
Current	No	98	92	110	55	355	95.43%
	Yes	6	1	4	6	17	4.57%
	% Yes	5.77%	1.08%	3.51%	9.84%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table compares the prevalence of wheeze with breathlessness in relation to asbestos exposure and smoking habit. Again there is no trend in the increasing prevalence of these symptoms with increasing asbestos exposure. However, there is a very minor trend of increasing symptoms with smoking category.

Table 5: Shortness of breath by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	179	154	197	134	664	75.28%
	Yes	50	42	78	48	218	24.72%
	% Yes	21.83%	21.43%	28.36%	26.37%	882	
Ex	No	145	145	202	141	633	63.11%
	Yes	73	72	111	114	370	36.89%
	% Yes	33.49%	33.18%	35.46%	44.71%	1003	
Current	No	64	61	75	35	235	63.17%
	Yes	40	32	39	26	137	36.83%
	% Yes	38.46%	34.41%	34.21%	42.62%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table looks at the presence of breathlessness according to smoking habit and asbestos exposure. There is a consistent difference in the rate of breathlessness between the lowest and highest exposure groups in all smoking categories however this trend disappears when adjusted for age (see table 13). There is an increasing rate in shortness of breath with smoking habit.

The following three tables (6,7, and 8), show a graded response to shortness of breath with asbestos exposure and smoking habit.

Table 6: Shortness of breath without cough by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	199	167	230	152	748	84.81%
	Yes	30	29	45	30	134	15.19%
	% Yes	13.10%	14.80%	16.36%	16.48%	882	
Ex	No	174	167	249	181	771	76.87%
	Yes	44	50	64	74	232	23.13%
	% Yes	20.18%	23.04%	20.45%	29.02%	1003	
Current	No	87	80	96	47	310	83.33%
	Yes	17	13	18	14	62	16.67%
	% Yes	16.35%	13.98%	15.79%	22.95%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table looks at shortness of breath among the exposure group. There is a weak trend of increasing shortness of breath with increasing exposure. However, subsequent analysis showed that this trend disappears when the results are adjusted for age (see table 13). The prevalence was higher across all exposure groups for ex-smokers than for non and current smokers.

Table 7: Shortness of breath walking on the flat by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	221	188	260	168	837	94.90%
	Yes	8	8	15	14	45	5.10%
	% Yes	3.49%	4.08%	5.45%	7.69%	882	
Ex	No	200	204	285	221	910	90.73%
	Yes	18	13	28	34	93	9.27%
	% Yes	8.26%	5.99%	8.95%	13.33%	1003	
Current	No	96	84	107	54	341	91.67%
	Yes	8	9	7	7	31	8.33%
	% Yes	7.69%	9.68%	6.14%	11.48%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table illustrates breathlessness when walking on the flat according to asbestos exposure and smoking habit. There is a consistent trend of increasing breathlessness with exposure in the non-smoking group. However, this trend disappears when adjusted for age (see table 13). This consistency is less apparent in the ex and current smoking groups although the difference between the lowest and highest exposure groups is noted.

The trend of shortness of breath with smoking habit is less apparent in this table, although there is difference between non-smoking group and the ex and current smoking groups.

Table 8: Shortness of breath walking up a slight incline by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	202	171	221	149	743	84.24%
	Yes	27	25	54	33	139	15.76%
	% Yes	11.79%	12.76%	19.64%	18.13%	882	
Ex	No	165	166	230	165	726	72.38%
	Yes	53	51	83	90	277	27.62%
	% Yes	24.31%	23.50%	26.52%	35.29%	1003	
Current	No	79	67	87	41	274	73.66%
	Yes	25	26	27	20	98	26.34%
	% Yes	24.04%	27.96%	23.68%	32.79%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table, which illustrates shortness of breath when walking up a slight incline and asbestos-exposure and smoking habit illustrates a clear trend between the low and high exposure groups however this trend disappears when adjusted for age (see table 13). Again, there is a difference between the non-smoking and ex- and current smoking categories.

Table 9: More short of breath than people of own age by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	201	170	233	156	760	86.17%
	Yes	28	26	42	26	122	13.83%
	% Yes	12.23%	13.27%	15.27%	14.29%	882	
Ex	No	183	180	246	196	805	80.26%
	Yes	35	37	67	59	198	19.74%
	% Yes	16.06%	17.05%	21.41%	23.14%	1003	
Current	No	80	75	89	52	296	79.57%
	Yes	24	18	25	9	76	20.43%
	% Yes	23.08%	19.35%	21.93%	14.75%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table examines shortness of breath in relation to others of the same age by exposure and smoking habit. There is a mixed response with asbestos exposure in the three smoking categories with a consistent trend in the ex-smoking category. Once again there is a trend with smoking habit in the first three exposure groups which is not present in the highest group. However this trend disappears when adjusted for age (see table 13).

The question could be asked as to how valid answers are to a question which requires a subjective comparison with another person.

Table 10: Woken by shortness of breath by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	203	175	246	163	787	89.23%
	Yes	26	21	29	19	95	10.77%
	% Yes	11.35%	10.71%	10.55%	10.44%	882	
Ex	No	181	193	257	208	839	83.65%
	Yes	37	24	56	47	164	16.35%
	% Yes	16.97%	11.06%	17.89%	18.43%	1003	
Current	No	91	81	100	48	320	86.02%
	Yes	13	12	14	13	52	13.98%
	% Yes	12.50%	12.90%	12.28%	21.31%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table shows the relationship between waking at night short of breath, asbestos exposure, and smoking habit. There is little pattern in this table, apart from a clear trend of increasing rate with smoking habit in the highest exposure group.

Table 11: Cough by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	194	173	229	153	749	84.92%
	Yes	35	23	46	29	133	15.08%
	% Yes	15.28%	11.73%	16.73%	15.93%	882	
Ex	No	175	189	253	195	812	80.96%
	Yes	43	28	60	60	191	19.04%
	% Yes	19.72%	12.90%	19.17%	23.53%	1003	
Current	No	73	67	87	45	272	73.12%
	Yes	31	26	27	16	100	26.88%
	% Yes	29.81%	27.96%	23.68%	26.23%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table illustrates cough by asbestos exposure and smoking habit. It shows no trend in the rate of cough with increasing asbestos exposure, but a consistent trend in the rate of cough with smoking habit.

Table 12: Cough and phlegm by exposure and smoking

Smoking	Symptoms	Exposure				Total	% of Total
		0-69	70-119	120-199	200 +		
Non	No	208	181	248	162	799	90.59%
	Yes	21	15	27	20	83	9.41%
	% Yes	9.17%	7.65%	9.82%	10.99%	882	
Ex	No	184	195	266	209	854	85.14%
	Yes	34	22	47	46	149	14.86%
	% Yes	15.60%	10.14%	15.02%	18.04%	1003	
Current	No	78	73	89	50	290	77.96%
	Yes	26	20	25	11	82	22.04%
	% Yes	25.00%	21.51%	21.93%	18.03%	372	
Total		551	506	702	498	2257	
Percent		24.41%	22.42%	31.10%	22.06%	100%	

This table examines the presence of cough and phlegm in relation to asbestos-exposure and smoking habit. There is no consistent trend in the rate of these symptoms with increasing asbestos exposure. There is a consistent trend associated with smoking habit, which is less marked at the highest exposure group.

Table 13: Odds ratio for symptoms by level of cumulative exposure

Cumulative exposure score	0-69 (n=551)	70-119 (n=506)	120-199 (n=702)	200+ (n=498)
Mean age at registration (sd)	43.0 (13.5)	46.0 (10.5)	50.5 (9.9)	57.1 (8.9)
Mean age at starting work (sd)	17.8 (3.7)	17.6 (3.5)	17.6 (3.5)	18.3 (4.6)
Mean age stopping work with asbestos (sd)	31.9 (11.4)	35.0 (12.4)	36.6 (10.9)	40.1 (12.8)
Mean years exposure (sd)	8.0 (5.8)	17.3 (6.0)	25.8 (6.2)	37.3 (9.5)
Mean exposure intensity* (sd)	5.7 (2.6)	5.9 (2.2)	6.4 (2.2)	7.7 (3.4)
Gender males (%)	541 (98.2%)	504 (99.6%)	702 (100%)	496 (99.6%)
European/other (%)	492 (89.3%)	463 (91.5%)	671 (95.5%)	479 (96.2%)
Maori (%)	49 (8.9%)	33 (6.5%)	22 (3.1%)	12 (2.4%)
Pacific Islander (%)	10 (1.8%)	10 (2.0%)	9 (1.3%)	7 (1.4%)
Smokers: Never (%)	229 (41.6%)	196 (38.7%)	275 (39.2%)	182 (36.6%)
Ex-smokers (%)	218 (39.6%)	217 (42.9%)	313 (44.6%)	255 (51.2%)
Current (%)	98 (17.8%)	91 (18.0%)	109 (15.5%)	58 (11.7%)
Pipe/cigar (%)	6 (1.1%)	2 (0.4%)	5 (0.4%)	3 (0.6%)
cigs/day (current smokers)	14.7 (7.3%)	15.0 (7.5)	16.4 (7.4)	16.1 (8.1)

* = Exposure index/years of exposure

Overall mean exposure score (sd) = 139.2 (93.8)

Overall mean years exposure (sd) = 22.1 (12.5)

Overall mean intensity exposure (sd) = 5.0 (3.7)

Odds ratio for symptoms by level of cumulative exposure

Cumulative exposure score	0-69 (n=551)	70-119 (n=506)	120-199 (n=702)	200+ (n=498)
<u>Univariate analysis</u>				
Wheezing or whistling	1.00	0.79	1.00	0.97
Breathlessness with wheeze	1.00	0.79	1.09	0.99
Wheezing not with colds	1.00	0.70	1.00	1.05
Cough	1.00	0.73	0.95	1.08
Shortness of breath	1.00	0.97	1.45	1.44
- while walking on flat	1.00	0.96	1.12	1.89
- while walking on incline	1.00	1.07	1.30	1.71
- 'more than people my age'	1.00	1.02	1.26	1.24
Woken by shortness of breath	1.00	0.79	1.03	1.18
Cough and phlegm	1.00	0.74	0.95	1.06
Emphysema*	1.00	1.12	1.12	1.57
Asthma#	1.00	0.86	1.01	0.78

Adjusted for age, ethnicity and smoking

Wheezing or whistling	1.00	0.70	0.80	0.61
Breathlessness with wheeze	1.00	0.71	0.87	0.62
Wheezing not with colds	1.00	0.61	0.78	0.64
Cough	1.00	0.66	0.74	0.66
Shortness of breath	1.00	0.84	0.79	0.69
- while walking on flat	1.00	0.89	0.81	0.84
- while walking on incline	1.00	0.96	0.90	0.77
- 'more than people my age'	1.00	0.94	1.03	0.82
Woken by shortness of breath	1.00	0.72	0.83	0.72
Cough & Phlegm	1.00	0.66	0.75	0.65
Emphysema*	1.00	1.03	0.88	0.99
Asthma#	1.00	0.97	1.34	1.29

* Shortness of breath without cough

Wheezing with breathlessness.

The table on the facing page presents the findings for each symptom question and for each level of asbestos exposure. For example, line 1 of the univariate analysis shows that if the lowest exposure category is taken as the base line of 1.0 then the prevalence odds ratios for wheezing or whistling (compared with lowest exposure category), are 0.79, 1.00 and 0.97 for the other three higher levels of asbestos exposure respectively.

The univariate analysis (crude prevalence odds ratios), shows trends disappear in the multi variate analysis in which the data are adjusted for age, ethnicity and smoking.

The main reason for this is that shortness of breath and asbestos exposure are both related to age. Thus the associations between shortness of breath and asbestos exposure in the univariate analysis are in fact artefacts (that is they are confounded by age), and disappear when the findings are age-adjusted.

The one possible exception is wheeze with breathlessness which shows a modest increased risk with increasing cumulative asbestos exposure.

In summary then, this is the only symptom that showed significant trends with cumulative asbestos exposure when the data were adjusted for age.

Discussion

This is the first study to be completed from an analysis of the New Zealand asbestos exposure register, and investigates the possible relationship between lifetime asbestos exposure and respiratory symptoms. This analysis was based on one selected uniform occupational group (asbestos cement workers) within the larger register. This group included those who worked in the two major asbestos cement manufacturing plants, and building workers who were exposed to the asbestos-cement dust when cutting and drilling asbestos cement board.

Exposure to asbestos is classically associated with the development of non malignant and malignant respiratory disease. In particular, progressive symptoms are related to the development of pulmonary parenchymal disease (asbestosis) with restrictive lung changes. The common symptoms associated with this condition are progressive shortness of breath.

However, recent work suggests that pleural disease may be associated with symptoms in their own right and symptoms and physiological signs of airways obstruction may also relate to asbestos exposure.

It was as a result of these earlier findings that the present study was designed and undertaken, given the advantage of such a large public health register.

The results of the study did not demonstrate evidence of a significantly independent effect of cumulative lifetime asbestos exposure on the presence of reported respiratory symptoms — such as cough, phlegm, wheeze, and shortness of breath — after age, sex and cigarette smoking had been taken into account. Of interest, however, was the finding of a non-significant association with a questionnaire diagnosis of asthma and cumulative asbestos exposure. Although the effect appeared small, the numbers within each exposure group were large and this may well have clinical significance.

The study raises a number of interesting points. The exposure in this group of workers was a mix of asbestos and cement dust. It is impossible to divorce the effects of these two agents, although further analysis of the register would allow this point to be addressed.

There are some potential reasons behind the lack of observed association between asbestos exposure and reported symptoms. These could have been related to technical aspects relating to the coding of individual worker exposures or the fact that time since last exposure to asbestos was not taken into account and may thus

influence the natural fall of symptoms with time after exposure ceases.


However, the coding of workers' previous exposure was cross-checked and confirmed to be accurate. The information on which the study is based related to self reported symptoms among self referred people and detailed occupational histories are not available. Furthermore, the analysis was performed again investigating the effects of intensity of exposure or years of exposure separately and this did not result in any significant change.

In summary, we demonstrate no significant relationship between pulmonary symptoms and cumulative lifetime asbestos exposure, with the possible exception of a diagnosis of asthma.

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Appendix: Questionnaire used



**OCCUPATIONAL SAFETY
& HEALTH SERVICE**

DEPARTMENT OF
LABOUR
TE TARI MAHI

Asbestos Exposure Registration

The Asbestos Register is operated by the Occupational Safety and Health Service of the Department of Labour (OSH).

If you have any questions about the form or the register, please contact:

*The Registrar,
New Zealand Asbestos Registers,
Occupational Safety and Health Service,
P O Box 3705,
Wellington.*

All the information you provide will be kept confidential.

Personal details

Surname

Given names

Home address

Telephone numbers

Home:

Work:

4 Were you born in New Zealand?

Yes **Go to Question 5**

No If no, in what year did you arrive in New Zealand?

5 What is your date of birth?

DayMonthYear

6 Sex

Male Female

7 What is your ethnic origin?

European

Maori

Pacific Island

Asian

Other

Employment history

8 How old were you when you began full time employment?

10 What work do you do now?

11 What is the name and address of your current employer?

How long have you been in this job?

In this job, have you ever worked with asbestos?

No Yes

If yes, please describe how:

12 Please describe your past jobs:

Past job and past employer (Start from when you left school)	What was your age then?	When were you in this job? From 19?? to 19??	Did you work with asbestos in this job? (Yes/No)	If you worked with asbestos in this job, please describe how you came to be exposed:

Continue on a separate sheet if necessary.

3 Have you ever worked with asbestos?

No **Go to Question 14**

Yes

If yes, in which of these occupations?

Asbestos mining (e.g. Cobb River).

Loading or unloading asbestos at a wharf, on the railway or while truck driving (e.g. Auckland or Christchurch Wharves).

Asbestos processing (e.g. at Hardie's, Fletcher's or other industries).

Commercial plumbing (e.g. insulating or lagging boilers).

Manufacturing or maintaining electrical equipment.

Manufacturing or maintaining brakes or clutches.

Manufacturing or maintaining railway vehicles (e.g. wagons, loco's, carriages or worked at NZR workshops).

Spraying insulation.

Building or repairing ships.

The repeated cutting of asbestos board.

Construction or demolition.

Asbestos removal.

Other exposures, please describe: (e.g. washing an exposed persons overalls).

4 Have you ever lived with a person exposed to asbestos?

No **Go to Question 15**

Yes

If yes, was the person:

A wife, husband or partner

A parent

Other, please describe:

Personal health details

15 Where do you go for health care?

Family doctor

Medical centre

Clinic

Other, please specify:

16 What is the name and address of your family doctor, medical centre or clinic?

17 What is the state of your health now?

Good

Moderate

Poor

18 Have you ever smoked?

I have never smoked. **Go to Question 21**

I used to smoke. **Go to Question 19**

I smoke now. **Go to Question 20**

19 At what age did you begin smoking?

On average, how many cigarettes did you smoke each day?

How old were you when you stopped smoking?

Go to Question 21

20 At what age did you begin smoking?

On average, how many cigarettes do you smoke each day?

