

Global Health Impact of Asbestos: An Experience from Thailand

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Abstract

Asbestos has been imported by Thailand for more than 30 years, because there are no asbestos mines in the country. It is imported for manufacturing purposes from several countries such as the Russian Federation, Canada, and Brazil. Nowadays, only chrysotile and amosite are allowed to be used in Thailand. The data from the Thai Customs Department showed that the amount of imported raw material increased from 90,700 tons in 1987 to 181,348 tons in 2002 (at a cost of US\$ 54 million). Most of it (90%) is used in cement manufacture, i.e. roof tile and cement pipe. In 2004, sixteen asbestos-using factories with 1,900 workers were registered at the Department of Industrial Work, Ministry of Industry. Most of them (13/16) are located in the central area of the country. Environmental monitoring has been carried out periodically since the year 2000. The data showed that most of measured samples had asbestos levels higher than the standard level (2 fibers/cc).

Neither asbestosis nor any other serious asbestos related disease has ever been reported to the Workmen's Compensation Fund in this country. However, a few pleural thickening cases (13/701) were notified from one study. The latest survey, in 2003, showed that 29% of high risk workers (41/140) had some abnormality in their chest x-rays. Although asbestosis or other asbestos related disease cases have never been reported or detected, the prevention and control of the diseases is still very important. Nowadays, at least 3 government agencies (Ministry of Industry, Ministry of Labor, and Ministry of Public Health) have a major role in controlling asbestos. These organizations have to collaborate to set up and develop control measures to reduce asbestos exposure among high-risk groups.

Introduction

In Thailand, asbestos has been imported for more than 30 years. It is used in several industries throughout the country. For example, 90% of imported raw asbestos is used in cement manufacture, mainly for roof tiles and cement pipe. The remainder is used in brake & clutch production (8%) and in the production of vinyl floor tiles, gaskets, or heat insulating materials (2%). In 2004, sixteen asbestos-using factories with 1,784 workers are registered at the Department of Industrial Work, Ministry of Industry.

These comprise one of the high-risk groups for occupational asbestos-related diseases in the country.

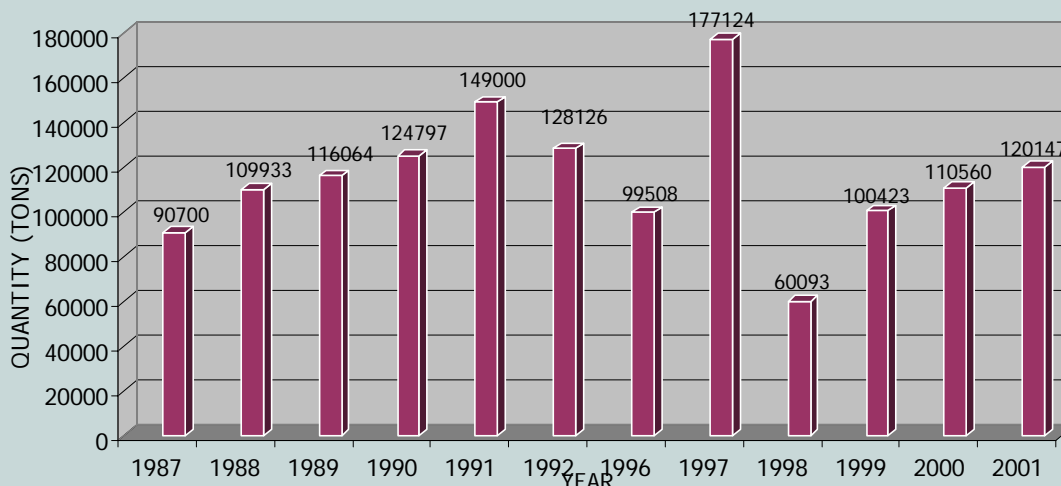
At least 3 government agencies have a major role in controlling asbestos. The Department of Industrial Work regulates and controls the import, use, and storage of asbestos. Because of its extreme toxicity, crocidolite has been banned under the Hazardous Substance Act B.E.2535 (or 1992). In addition, asbestos is also regulated under the Labour Protection Law of the Ministry of Labour. The legislation indicates an occupational exposure standard level for asbestos in order to protect workers' health. The Bureau of Occupational and Environmental Diseases (former Division of Occupational Health), Department of Disease Control, Ministry of Public Health has a duty to provide occupational health and safety guidelines and services for the control of asbestos.

Asbestosis is one of 8 occupational diseases under an active health surveillance scheme run by the Bureau of Occupational and Environmental Diseases. The scheme has been established for more than 10 years. However, most of the tasks are focused on silicosis and lead poisoning because of a higher target population. Therefore, very little information is available from the surveillance system.

Production and use

Since there are no asbestos mines in Thailand, it is imported for manufacturing purposes from several countries. Moreover, only chrysotile and amosite are allowed for use in the country because of the Hazardous Substance Act B.E.2535. Nowadays, the trend of imported raw materials, especially chrysotile, is increasing. Data from the Thai Customs Department show that the amount of imported asbestos increased from 90,700 tons in 1987 to 120,147 tons in 2001 (Fig. 1). In addition, the total amount in 2002 was 181,348 tons which included 176,412 tons of chrysotile (97.3%), 451 tons of crocidolite (0.2%), and other asbestos (4,485 tons). This shows that crocidolite was still being imported in spite of the legal ban. The largest quantity of imported asbestos in 2002 was from the Russian Federation, followed by Canada and Brazil as shown in Table 1.¹

Fig.1 Amount of Imported Asbestos in Thailand 1987 - 2001



Source : Thai Customs Department : Import & Export statistics, 1987-2001.

Table 1. The amount of imported asbestos in Thailand by countries in 2002

Country	Amount (Tons)
1. Russian Federation	46,132
2. Canada	42,091
3. Brazil	33,740
4. Kazakhstan	28,500
5. Zimbabwe	22,759
6. Czech Republic	1,914
7. Belize	1,656
8. Swaziland	1,638
9. South Africa	1,476
10. Botswana	1,080
11. Germany	216
12. Vietnam	55
13. Belgium	50
14. China	36
15. Australia	5
16. Ukraine	0.02
Total	181,348

Source: Thai Customs Department: Import & Export Statistics, 2002

Exposure measurements

Environmental investigations together with health examinations in asbestos-using factories, such as roof tile, brake & clutch, vinyl floor tile and cement pipe factories, were first carried out by the Bureau of Occupational and Environmental Diseases in 1987. The results of air sampling and analysis for asbestos in the working environment revealed that 4 out of 20 investigated factories had asbestos in the working environment above the ACGIH TLVs (1986-87) for chrysotile (2 fibers/cc). Brake & clutch factories, especially in the mixing process areas, were found to have the highest concentrations of asbestos compared to other factory types. Table 2 shows the concentration of asbestos in the working environment in 20 factories investigated during 1987-88^{2,3}. Both area air sampling and personal air sampling were conducted in the investigation. It was found that roof tile, vinyl floor tile and cement pipe factories were large-scale establishments with good manufacturing practices and engineering control. However, most brake & clutch factories were small-scale with inadequate engineering control together with poor safety management and practices. It was recognized that to give technical recommendations on the safe use of asbestos, the ACGIH TLV of 2 fibers/cc would need to be suggested as the criterion level to asbestos-using factories, even though Thai labour law regulates at 5 fibers/cc.

Table 2. Asbestos concentration in working environment of 20 factories investigated by Division of Occupational Health, 1987-88.

Factory Type	Numbers	Asbestos in area samples (fiber/cc)		Asbestos in personal samples (fiber/cc)	
		1987	1988	1987	1988
1. Roof tile	7	0.00-0.68 (0.10±0.14)	0.00-12.00* (0.51±2.39)	0.00-1.11 (0.18±0.29)	0.00-0.75 (0.14±0.21)
2. Cement pipe	2	0.00-0.34 (0.13±0.13)	0.12	0.12-2.13* (1.33±0.91)	0.25
3. Vinyl floor tile	1	0.00-0.29 (0.04±0.08)	0	0.00-0.18 (0.04±0.07)	0
4. Asphalt undercoat and acrylic paints	3	0.00-0.08 (0.03±0.03)	0.00-0.58 (0.09±0.23)	0.00-0.06 (0.03±0.03)	0.48
5. Brake & clutch	7	0.00-9.26* (1.20±2.06)	0.00-4.44* (0.56±0.90)	0.01-58.46* (3.06±10.12)	0.00-3.73* (0.81±0.96)

Note: * means above ACGIH TLV (1986-87) for chrysotile which was 2 fibers/cc
Figures in each cell represent range values with mean ± SD in bracket.

In addition, two asbestos exposure investigations were carried out by: 1) National Institute for the Improvement of Working Conditions and Environment (NICE) in 2000 by using NIOSH method #7400 for air sampling and fiber counting technique,⁴ and 2) Department of Industrial Works in 2001 by following WHO recommended method (1997).⁵ The results (Table 3) show that working in brake & clutch factories, especially in the mixing and cold-press areas in brake production carried a higher risk of asbestos-related disease than working in asbestos cement plants. These results confirmed former investigations.

Table 3. Asbestos concentration in working environment investigated by NICE in 2000 and by Department of Industrial works in 2001.

Factory type	Year 2000		Year 2001	
	numbers	Asbestos conc. (fiber/cc)	numbers	Asbestos conc.(fiber/cc)
1. Roof tile & pipe	4	0.01-2.2* (0.81±0.72)	4	0.01-0.77 (0.09±0.21)
2. Brake	5	0.24-43.31* (6.93±8.19)	25	0.01-25.71* (1.07±3.11)
3. Clutch	2	0.62-2.41* (1.45±0.65)		

Note: * means above ACGIH TLV for chrysotile which was 2 fibers/cc. (Even though it was adjusted to be 0.1 fiber/cc in 2001)

Asbestos related diseases

Neither asbestosis nor any other serious asbestos related disease has ever been reported to the surveillance schemes or the Workmen's Compensation Fund in this country. However, small numbers of pleural thickening cases have been noted in surveys conducted by the Bureau of Occupational and Environmental Diseases. The first survey was carried out in 24 factories in 1987. The data showed that 13 out of 701 workers had pleural thickening from standard chest x-ray (Table 4). Eight of them had worked for more than 10 years. Unfortunately, they have never been followed up. After that, three studies have been conducted. The results of the current survey showed that 9 out of 106 workers had pleural thickening with one suspected case of early asbestosis.

Table 4. The results of surveys

Year	No. of factories	No. of workers	No. of Abnormal CXR	No. of pleural thickening	No. of suspected asbestosis
1987	24	701	13	13	-
2000	6	669	?	-	-
2003	6	140	41	5	-
2004	8	106	31	9	1

Conclusions and recommendations

1. Although neither asbestosis nor any other serious asbestos related disease has ever been detected or reported in the country, the prevention and control of such diseases is still very important. Since the trend of using asbestos-containing materials is increasing and the concentrations of asbestos in working environments are high, the number of cases will be expected to be high in the near future. Therefore, all relevant organizations should cooperate to establish a national asbestos control program. This includes the improvement of legislation and enforcement, development of occupational health services systems for asbestos exposed workers (especially disease detection and reporting systems), and increasing awareness of asbestos related disease among employers, employees and public.
2. A proposal to change the TLV-TWA of 5 fibers/cc for asbestos is under consideration by an expert committee in Thailand. At the same time, the Hazardous Substance Committee is reviewing the control of asbestos use, i.e., reduction of use and finally a ban sometime in the future.
3. To conform with the Hazardous Substance Act B.E. 2535, the Department of Industrial Works has drafted criteria for the safer use of asbestos relating to a range of issues:
 - 3.1 labelling;
 - 3.2 storage;

- 3.3 industrial hygiene and engineering control in factories;
 - 3.4 environmental monitoring program;
 - 3.5 safety measures, such as spray prohibition, safe use of asbestos products;
 - 3.6 respiratory protection program; and
 - 3.7 health examinations.
4. The concerned organizations, namely the Department of Industry, Department of Disease Control, and Department of Social Welfare and Labour Protection, should cooperate fully in order to expand the occupational health service to cover the small-scale, under-served industrial sector, including a surveillance system for occupational diseases.

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