

## Commentary

# Asbestos and Asbestos-related Diseases in Vietnam: In reference to the International Labor Organization/World Health Organization National Asbestos Profile

Van Hai Pham<sup>1</sup>, Thi Ngoc Lan Tran<sup>2</sup>, Giang Vinh Le<sup>3,\*</sup>, Mehrnoosh Movahed<sup>4</sup>, Ying Jiang<sup>4</sup>, Nguyen Ha Pham<sup>5</sup>, Hisashi Ogawa<sup>4</sup>, Ken Takahashi<sup>4</sup>

<sup>1</sup> Centre for Environmental Science and Sustainable Development, National Institute of Labor Protection, Hanoi, Vietnam

<sup>2</sup> General Department of Preventive Medicine and Environmental Health, Ministry of Health, Hanoi, Vietnam

<sup>3</sup> Department of Epidemiology, Hanoi Medical University, Hanoi, Vietnam

<sup>4</sup> Department of Environmental Epidemiology, Institute of Industrial Ecological Sciences, University of Occupational and Environmental Health, Kitakyushu, Japan

<sup>5</sup> Occupational Health, World Health Organization, Hanoi, Vietnam

## ARTICLE INFO

## Article history:

Received 3 September 2012

Received in revised form

27 February 2013

Accepted 27 February 2013

## Keywords:

asbestos

asbestos-related diseases

ILO/WHO National Asbestos Profile

ILO/WHO

Vietnam

## ABSTRACT

This paper describes progress on formulating a national asbestos profile for the country of Vietnam. The Center of Asbestos Resource, Vietnam, formulated a National Profile on Asbestos-related Occupational Health, with due reference to the International Labor Organization/World Health Organization National Asbestos Profile. The Center of Asbestos Resource was established by the Vietnamese Health Environment Management Agency and the National Institute of Labor Protection, with the support of the Australian Agency for International Development, as a coordinating point for asbestos-related issues in Vietnam. Under the National Profile on Asbestos-related Occupational Health framework, the Center of Asbestos Resource succeeded in compiling relevant information for 15 of the 18 designated items outlined in the International Labor Organization/World Health Organization National Asbestos Profile, some overlaps of the information items notwithstanding. Today, Vietnam continues to import and use an average of more than 60,000 metric tons of raw asbestos per year. Information on asbestos-related diseases is limited, but the country has begun to diagnose mesothelioma cases, with the technical cooperation of Japan. As it stands, the National Profile on Asbestos-related Occupational Health needs further work and updating. However, we envisage that the National Profile on Asbestos-related Occupational Health will ultimately facilitate the smooth transition to an asbestos-free Vietnam.

© 2013, Occupational Safety and Health Research Institute. Published by Elsevier. All rights reserved.

## 1. Introduction

Vietnam has been importing and consuming asbestos since the 1960s. In recent years, the country has used only chrysotile asbestos; more than 90% is used to manufacture asbestos-cement (AC) roof sheets, and the remainder is used to manufacture car brakes and thermal insulation. The country also imports many asbestos-containing products (ACPs).

The Vietnamese Health Environment Management Agency (VIHEMA) of the Ministry of Health implemented the “Protection of Workers’ Health” project during the years 2009–2011. This project

was funded by the government of Japan, and its implementation was overseen by the Hanoi Office of the World Health Organization (WHO). The task of formulating a national profile on asbestos use and asbestos-related diseases (ARDs) was assigned to the National Institute of Labor Protection (NILP) in Vietnam, and was formally dubbed the “National Profile on Asbestos-related Occupational Health (NPAROH)”. The NPAROH closely refers to the “Outline for the Development of National Programmes for Elimination of Asbestos-Related Diseases, 2007”, advanced by the International Labor Organization/World Health Organization (ILO/WHO) [1]. Hereafter, the profile annexed to this Outline will be referred to as

\* Corresponding author. Department of Epidemiology, Hanoi Medical University, 1 Ton That Tung, Dong Da, Hanoi, Vietnam.

E-mail address: [giangvinhle@gmail.com](mailto:giangvinhle@gmail.com) (G.V. Le).

the “ILO/WHO National Asbestos Profile”. The renaming was deemed necessary to provide a Vietnamese context, and to emphasize occupational exposure. The objective of this paper is to describe progress on formulating the NPAROH, with reference to the outline provided in the ILO/WHO National Asbestos Profile. The full NPAROH document is available on the website of “National Institute of Labour Protection: Asbestos Resource Centre” [2].

## 2. Mechanism for collecting relevant information

The Center of Asbestos Resource (CAR) was established in 2010 by the VIHEMA and the NILP, with the support of the Australian Agency for International Development (AusAID), as a coordinating point for asbestos-related issues in Vietnam (Fig. 1). The main function of the CAR is to formulate, maintain, and update the NPAROH. Information on asbestos was collected during 2009–2011. First, focal points were designated to provide relevant information; these included the Vietnamese Customs, the Vietnamese Roof Sheet Association, the Hospital of the Ministry of Construction, the Worksafe Agency of the Ministry of Labor, Invalids and Social Affairs (MOLISA), and the medical preventive centers situated in the provinces and cities. These organizations collected information from each of the concerned networks. The NILP managed the CAR administratively, and the VIHEMA provided medical guidance. This system of information gathering has proven effective to date, but a stable budget from the government and other sources is warranted.

## 3. National asbestos profile of Vietnam

### 3.1. Current regulations

The Vietnamese government, in recognizing the hazards of asbestos, issued the following legal documents, with the aim of managing asbestos, and controlling its hazards. In 2001, Decision Number 115/2001/QĐ-TTĐ of the Prime Minister stated that asbestos would be banned in 2004. However, in 2004, Decision Number 133/2004/QĐ-TTĐ of the Prime Minister banned only the use of the amphibole group of asbestos. Chrysotile was allowed, with strict monitoring of the working environment and workers' health. In 2008, with Decision Number 121/2008/QĐ-TTĐ of the Prime Minister, the use of chrysotile was permitted until 2020 in the manufacturing of AC roof sheets, under strict monitoring of

the working environment and workers' health. These decisions were accompanied by the issuance of other legal documents by the respective ministries of Health, Labor, Construction, and Science and Technology. The Vietnam General Confederation of Labor also issued circulars, guidelines and regulations, to minimize the health risks of workers, and improve the working environment [2].

### 3.2. Importation and consumption of asbestos

Fig. 2 shows the trend of raw asbestos importation, based on data from Vietnamese Customs. It should be noted that the majority of the raw asbestos used in Vietnam is imported. According to this information source, asbestos import began in 1992 at 10,000 metric tonnes (tons hereafter), increased to 60,000+ tons by the year 2000, and was sustained at about 60,000–70,000 tons after 2005 (the historical peak was 75,100 tons in 2007). By contrast, the statistics on asbestos use for Vietnam recorded by the United States Geological Survey (USGS) indicate that importation began in 1998 at 36,507 tons, then fluctuated from 20,000–60,000 tons through 2007 (the historical peak was recorded at 103,000 tons in 2005). A comparison indicates that the values reported by Vietnamese Customs are almost always higher than those of the USGS, by a factor of 10–200+% [3,4]. Regardless of the data source, however, today Vietnam continues to import an average of more than 60,000 tons of raw asbestos per year. Fig. 3 shows the breakdown of countries from which asbestos was imported during 1992–2011, with Russia accounting for more than 80%, followed by the United States (during the earlier years), China, Kazakhstan, and Canada [5].

### 3.3. Importation of asbestos-containing materials

Approximately 20 companies import asbestos into Vietnam, and were surveyed for further information on asbestos importation. The bulk of imported raw asbestos is used for the production of AC roof sheets. There are 35 AC roof sheet enterprises operating throughout the country: 20 in the north, 10 in the central area, and five in the south. The total capacity of production is 95 million m<sup>2</sup> of roof sheets per year. One company manufactures car brakes, and uses 60 tons of raw asbestos per year. Two companies produce molten phosphate fertilizers, which are composed of serpentine,

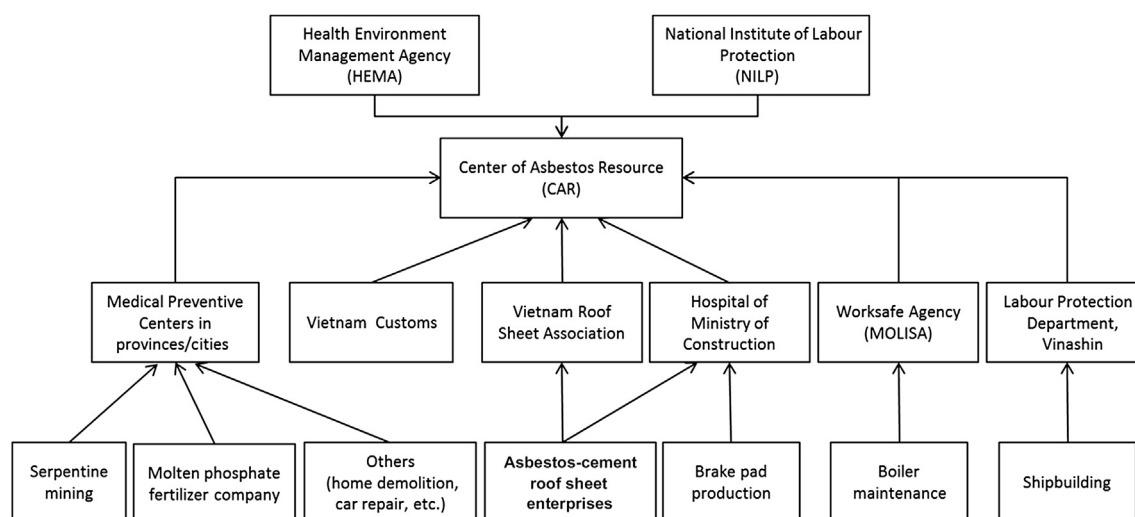


Fig. 1. Administrative structure relating to the collection of information on asbestos and asbestos-related diseases.

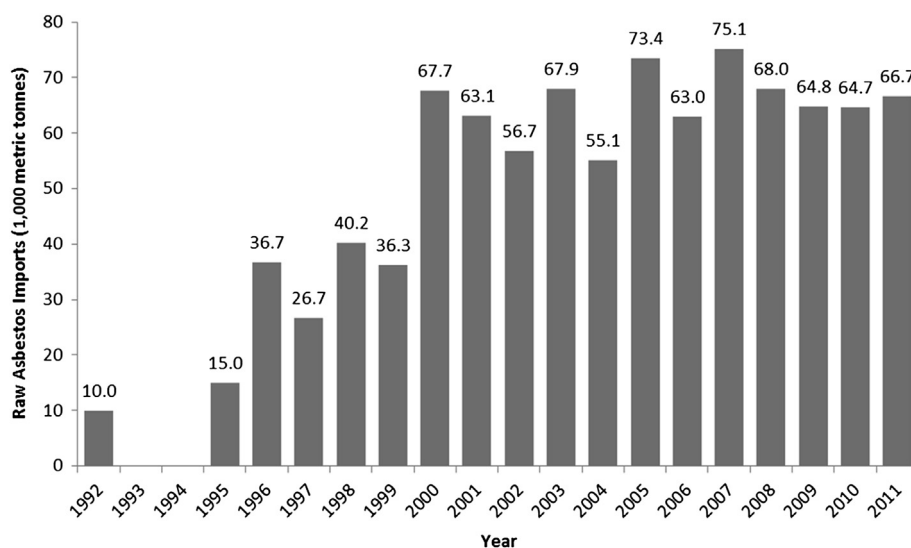


Fig. 2. Importation of raw asbestos into Vietnam during 1992–2011.

containing various amounts of asbestos, apatite, and rock. The total use of serpentine in this industry is about 300,000 tons per year.

In addition to raw asbestos, ACPs are imported into Vietnam; these include asbestos sheets, fabrics, insulators, fire-resistant cloths, gaskets, and ropes. They are commonly sold in merchandise shops in large cities, such as Hanoi and Ho Chi Minh City. Until recently, ACPs were imported from countries such as China, Thailand, and India, as well as countries that now have bans (e.g. Korea, Japan, and Singapore) [6].

### 3.4. Domestic production of asbestos

Vietnam has some asbestos-rock mines, but the reserve is small. The asbestos from these mines mainly consists of the amphibole group (tremolite and actinolite), and some of the serpentine (chrysotile) groups. In general, this asbestos is of poor quality, and the asbestos content of the rocks is very low, usually below 1%. Because this fraction should be over 5% for the purpose of industrial mining, the economic significance of these rocks is considered poor. The largest asbestos mine is located in Thanh Hoa province, and has a capacity of 100,000 ton/year, for the purpose of producing molten phosphate fertilizer [2]. Serpentine rocks are not equivalent to asbestos, nor are they the only rocks that may contain Naturally

Occurring Asbestos (NOA). Ultramafic rocks, to which serpentine rock belongs, may contain asbestos as contaminants, if they were subject to metamorphosis under heat and pressure; and the contaminated asbestos may contain both serpentines and amphiboles. Therefore to ascertain NOA potential, a wide variety of metamorphosed ultramafic rocks should be examined, and the examination list may contain talc, olivine, serpentine, etc.

### 3.5. Domestic production of asbestos-containing materials

There are about 35 AC roof sheet production companies in Vietnam. In addition, according to a report from the provinces, there is one company producing car brakes, with raw asbestos consumption of about 60 tons per year.

### 3.6. Number of workers exposed to asbestos

We estimate the total number of workers directly and indirectly exposed to asbestos in Vietnam to be approximately 5,700 annually (Fig. 4) [2]. The bulk of these individuals (75%) are engaged in the production of AC roof sheets (4,350), followed by molten phosphate fertilizer (923), shipbuilding and boiler maintenance (406), and the production of car brakes (21). Notably, however, the number for

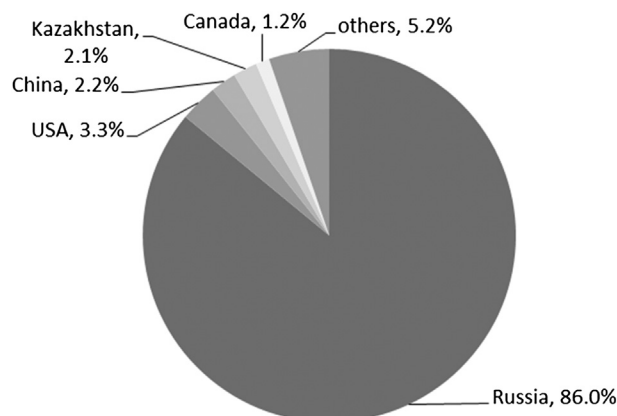


Fig. 3. The five leading countries from which raw asbestos has been imported into Vietnam.

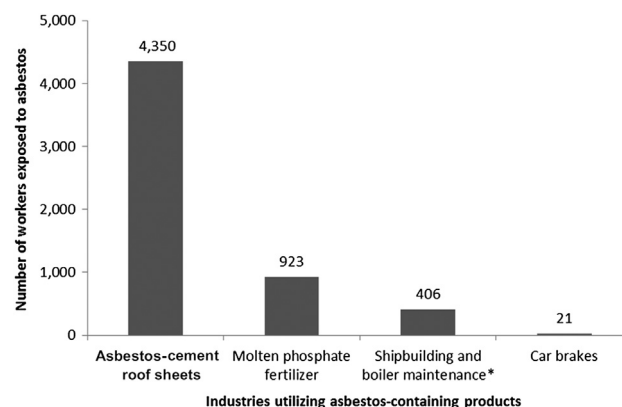


Fig. 4. The number of workers exposed to asbestos (direct and indirect), in industries that handle asbestos-containing products. \*Only partial data are available.

shipbuilding and boiler maintenance represents only a small fraction of the true number, because data are not available for the entire industry. Similar problems may also affect the other categories.

### 3.7. List of asbestos-related industries

Chrysotile is used mostly in the manufacturing of AC roof sheets, and some in the manufacturing of car brakes and thermal insulation. The technology for manufacturing AC roof sheets has been improved, in terms of reducing (but not eliminating) the exposure of workers. However, exposures are known to occur in processes such as asbestos bag tearing, cement pouring/mixing, and unloading sheets from the shaping machine.

### 3.8. High-risk industries

As shown in Table 1, we examined the job tenures of workers at all of the 31 surveyed AC roof sheet production companies, as well as at the two oldest companies. Whereas most workers had job tenures of less than 15 years overall, workers at the two oldest companies, particularly Dong Nai (established in 1963), had much longer job tenures. However, as the provided job tenure information reflected only that at the surveyed company, it may not reflect the cumulative lifetime exposure of individuals who have worked in asbestos-related jobs at more than one company. If information on job tenure is to be better utilized as a surrogate for the length of asbestos exposure, additional information should be collected to encompass lifetime job tenures in relation to asbestos. In addition to the industrial processes where asbestos is used for manufacturing, exposure occurs in industrial processes where asbestos containing materials are used, or the user industry. Power plants (asbestos has been applied to equipment including boilers since 1970s), the construction industry (where AC roof sheets and other asbestos containing materials are applied), and the car repair industry are such examples. Although the situation regarding these user industries was not the subject of investigation by the government, future investigations should look into the situation of these user industries.

### 3.9. Estimate of the disease burden

There has been no effort, so far, to estimate the disease burden in Vietnam.

### 3.10. Prevalence and statistics of ARDs

### 3.11. Asbestos-related lung cancer

### 3.12. Incidence of mesothelioma.

Here, items number 3.10, 3.11 and 3.12 will be discussed together. Ngoan et al. reported the cancer mortality pattern in

Vietnam, which included a count of 300 mesothelioma cases during 2005–2006. However, the level of certainty of this number is unknown [7]. A survey of health conditions found that the commonly reported conditions among AC roof sheet workers were upper-respiratory disease (47–48%), and eye diseases (>10%). The survey may have missed other important conditions, including the incidence/prevalence of chronic diseases. The Hospital of the Ministry of Construction performs annual chest X-rays and computed tomography (CT) scans on 400–500 workers from the AC roof sheet factories, and only three cases of asbestosis have been diagnosed since 1976 [8]. There have been no officially recognized cases of asbestos-related lung cancer or mesothelioma to date in Vietnam. It is important to note, however, that several cases of malignant mesothelioma have recently been confirmed, based on pathological examination, in collaboration with Japanese experts.

### 3.13. Asbestos-containing house stocks and vehicle fleets.

There has been no effort, so far, to describe the situation on asbestos-containing house stocks or vehicle fleets.

### 3.14. Compensation for ARDs.

Since 1976, asbestosis has been recognized as an occupational disease that is eligible for government compensation. To date, only three cases of asbestosis have been recognized.

### 3.15. National occupational exposure limits for chrysotile

### 3.16. System for inspection and enforcement of exposure limits.

Here, items number 3.15 and 3.16 will be discussed together. The national standards for asbestos exposure in the working environment are 0.1 fiber/cc per 8 hours, and 0.5 fiber/cc per 1 hour. During the period 2009–2011, the above standard was exceeded in 3 of 56 (2009), 1 of 71 (2010), and 1 of 54 (2011) of the asbestos samples tested. Samples were taken over a period of 3 years from 14 surveyed companies, the names of which are listed in our full report [2]. The government has sought to reinforce hygienic conditions by stipulating the use of personal protective equipment, monitoring the working environment and workers' health, mandating training in safety and health, and implementing periodic health examinations and insurance. Eight medical centers throughout the country are equipped with asbestos-sampling instruments, and two have phase-contrast microscopes to count asbestos fibers. Most of the centers are staffed with more than 10 medical doctors, and thus have a good capacity to monitor workers' health. However, fewer than half of the centers are currently designated to monitor and examine workers' health. This situation should be improved. In order to have a profile that is conducive to program development, the contents of the profile should be reviewed, and examined in terms of deficient areas and missing links. Lack of health data, even after the survey of 31 AC roof sheet industries, lack of industrial hygiene follow-up to assess the cause of overexposures and any improvements in hygiene, and discrepancy of national standards for asbestos exposure from most other countries, are some of the noteworthy irregularities.

### 3.17. Estimated economic losses due to ARDs.

There has been no effort, so far, to estimate the economic losses due to ARDs in Vietnam.

**Table 1**  
Distribution of job tenure among workers in the 31 surveyed, and the two oldest, asbestos-cement roof sheet production enterprises in Vietnam

		Job tenure (y)				Total
		1–4	5–15	16–25	>25	
All 31 enterprises						
	No.	1,767	1,965	349	225	4,306
	%	41.0	46.6	8.1	5.2	100.0
Selected examples (y established)						
Đông Anh (1980)	No.	96	236	112	91	535
	%	17.9	44.1	20.9	17.0	100.0
Đồng Nai (1963)	No.	28	15	98	47	188
	%	14.9	8.0	52.1	25.0	100.0

### 3.18. Major studies on the epidemiology of ARDs.

There are few, if any, studies on the epidemiology of ARDs in Vietnam. Several studies have been conducted on improving the working environment in terms of dust control. Recently, researchers have made some progress towards finding workable substitutes for asbestos. For example, one roof-sheet factory successfully substituted polyvinyl alcohol (PVA) for asbestos. However, PVA roof sheets are 20–30% more expensive than their asbestos counterparts, and thus the product did not succeed in the marketplace.

In conclusion, under the NPAROH framework, the Vietnamese administration succeeded in compiling relevant information for 15 of the 18 designated items outlined in the ILO/WHO National Asbestos Profile, some overlaps of the information items notwithstanding. In Vietnam, a government decree allows the use of chrysotile, until the year 2020. Against this background, the VIHEMA and NILP are taking the initiative to formulate a national asbestos profile, within the original framework of the NPAROH. Hopefully, this will assist all stakeholders (i.e. the government, industries, workers, and society at large) in understanding the situations related to asbestos use, and its effect on public health. In particular, the government can use the findings and experiences from compiling the NPAROH to improve policies and legal measures, including the facilitation of banning asbestos. The authors envisage that the NPAROH will prompt the formulation of an action plan involving all stakeholders, and enhance the smooth transition to an asbestos-free Vietnam. Currently, however, the NPAROH needs further work and updating, to be more useful in this important endeavor.

### Conflict of interest

No potential conflict of interest relevant to this article was reported.

### Acknowledgments

The authors acknowledge the support of the OSH Project funded by the MHLW, Japan, co-ordinated by the WHO-WPRO and the Core-to-Core Program (Asia-Africa Science Platform) of the Japan Society for the Promotion of Sciences, and the assistance of colleagues at the NILP, General Custom, Hospital of Ministry of Construction, Vietnam Roof Sheet Association and Department of Labour Protection, Vinashin and the Medical Preventive Centers in the provinces and the cities.

### References

- [1] International Labour Organization/World Health Organization (ILO/WHO). *Outline for the Development of National Programmes for the Elimination of Asbestos-Related Diseases*. Geneva (Switzerland): ILO/WHO; 2007.
- [2] The National Profile on Asbestos Related Occupational Health in 2009, 2010, 2011 [Internet]. Hanoi (Vietnam): Asbestos Resource Center. 2011 [cited 2012 Aug 20]. Available from: <http://www.amiang.vn/index.aspx?page=news&subpage=viewdetail&ng=1&n=120>.
- [3] Virta RL. Worldwide asbestos supply and consumption trends from 1900 through 2003. Virginia (VA): United States Geological Survey (USGS). Circular 2006;1298:80.
- [4] United States Geological Survey (USGS). *Mineral Industry Surveys, World Asbestos Consumption from 2003 through 2007*. Virginia (VA): USGS; 2009.
- [5] Vietnam Customs. Asbestos data base from 2009 through 2011. Hanoi (Vietnam): IT and Trade Statistics Department, General Department of Customs, Ministry of Finance of Vietnam; 2011. Report No.: HS2011–2524. 10 p. [in Vietnamese].
- [6] Vietnam Customs. Asbestos data base from 2009 through 2011. Hanoi (Vietnam): IT and Trade Statistics Department, General Department of Customs, Ministry of Finance of Vietnam; 2011. Report No.: HS2011-6812. 25 p. [in Vietnamese].
- [7] Ngoan LT, Lua NT, Hang LT. Cancer mortality pattern in Viet Nam. *Asian Pac J Cancer Prev* 2007;8:535–8.
- [8] Hang LT. Occupational health and diseases of asbestos workers. Hanoi (Vietnam): Hospital of Ministry of Construction; 2011. Report No: SK2009-11-TLAC. 12 p. [in Vietnamese].