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INVITED REVIEW

Asbestos in Asia

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ABSTRACT

Asbestos is a global killer. Despite lessons learned in the developed world on the use of asbestos and its hazardous pulmonary consequences, its use continues to increase in Asia. Although some countries such as Japan, Korea and Singapore have curtailed the use of this mineral, there are numerous countries in Asia that continue to mine, import and use this fibre, particularly China, which is one of the largest consumers in the world. Numerous factors ranging from political and economic to the lack of understanding of asbestos and the management of asbestos-related lung disease are keys to this observed trend. Awareness of these factors combined with early intervention may prevent the predicted Asian 'tsunami' of asbestos diseases.

Key words: asbestos, asbestosis, Asia, mesothelioma.

Abbreviations: ARD, asbestos-related lung diseases; BAPE, benign asbestos-related pleural effusion; DPT, diffuse pleural thickening; OEHNI, Occupational and Environmental Health Network of India; WHO, World Health Organisation.

INTRODUCTION

Relating to asbestos—regardless of which language it is described in—the anxiety felt and the hazard towards human health remains the same, with no predilection for nationality or race. The World Health Organisation's (WHO) position on asbestos is very clear: asbestos is 1 of 10 substances of major public health concern, on par with mercury, lead and highly hazardous pesticides,[1] causing over 100 000 deaths per annum. All forms of asbestos have the potential to cause asbestos-related lung diseases (ARD), and despite claims made by specific groups,[2] all types of asbestos fibre are carcinogenic, with no known 'safe' level of exposure. Despite overwhelming evidence documenting the health hazard of asbestos exposure, asbestos consumption continues to rise in Asia without adequate protection of users and bystanders, with many future deaths predicted.

WHAT IS ASBESTOS?

Asbestos is a naturally occurring fibrous silicate mineral containing iron, magnesium, calcium or sodium that has crystallized to form long thin fibres. It occurs in two forms: serpentine and amphibole. Chrysotile (white asbestos) is the only member of the serpentine family and is the most commonly mined and used type of asbestos. Its fibres are long, curly and filamentous, making it an excellent raw material for products requiring flexibility. Classed among the amphiboles are crocidolite (blue asbestos) and amosite (brown asbestos); these fibres tend to be short, sharp and straight.

The Greek word for asbestos means 'inextinguishable', which is an apt description. Asbestos fibres are highly resistant to heat, fire and chemicals, which is why they have been used extensively throughout various industrial sectors. Due to its excellent heat resistance, asbestos is used to make products requiring insulating properties, including pipeline lagging, rope, plasterboards, electrical insulation, automotive clutches and brake pads for the construction of factories, power stations, public buildings, homes, ships, locomotives, lorries and automobiles. The flexibility and resistance to alkaline attack of asbestos fibres makes them ideal for products such as asbestos–cement roofing tiles, floor tiles and coverings, water tanks, sewage and water pipes. Its structural flexibility

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also lends itself to the fabric industry where it was spun and incorporated into textiles, which were then used in the manufacture of products such as fire blankets, heat resistant gloves and stage curtains.

ASBESTOS-RELATED LUNG DISEASES

ARD include non-malignant pleural diseases (pleural plaques, asbestos-related pleural effusion and diffuse pleural thickening (DPT)), asbestosis and asbestos-related cancer (malignant mesothelioma, cancers of the lung, larynx and ovary).

Inhalation of asbestos fibres is the common route of entry for asbestos fibres into the lung. Small, airborne fibres are carried into the lungs, where larger fibres tend to be deposited along the bronchial tree, and, smaller (<0.4 μm) and shorter (<10 μm) ones carried further towards the distal alveoli. Alveolar macrophages (approximately 14–21 μm) engulf and phagocytose a proportion of fibres. However, due to size limitations, long fibres are generally not cleared.[3] Sharp, rigid amphibole fibres are also more difficult to clear than their serpentine counterparts. The route of movement of asbestos fibres into the pleural space remains unclear with theories suggesting that lymphatics may have a role in this,[4] or perhaps a direct translocation of fibres from the lung into the pleura space.[5]

Non-malignant pleural diseases

Pleural plaques

Pleural plaques are common findings among individuals with an occupational exposure to asbestos fibres[6] and are the most frequent manifestation of asbestos exposure. It is regarded as a hallmark of asbestos exposure, developing 20–30 years after exposure. They are often incidental findings on chest radiographs and usually present as well-circumscribed plaques, which can be calcified. Although numerous studies have looked at the impact of pleural plaques on lung function, with varying results, the majority of studies show no significant association, although if extensive, they can produce evidence of extrapulmonary restriction.[5] As they are usually asymptomatic, there is no doubt that there are vastly more individuals with undiagnosed pleural plaques than is currently known. Some patients experience chest pain, especially in inspiration, and dyspnoea, especially if they have extrapulmonary restriction.

Benign asbestos-related pleural effusion

This tends to occur sooner after exposure (10–20 years) compared with other ARD. It is uncommon past 25 years post-exposure, at least in asbestos-exposed workers in the Wittenoom Gorge mines in Western Australia,[7] which mined mainly 'blue asbestos'. These effusions tend to be small and unilateral.[5] Presentation could be due to symptoms such as fever, pleuritic chest pain and dyspnoea, or it could be completely asymptomatic. This non-malignant cause of a unilateral pleural effusion can be difficult to diagnose as individuals are also at risk of developing mesothelioma, making benign asbestos-related pleural effusion (BAPE) a diagnosis of exclusion—although the different incubation periods post-exposure described above make that differential diagnosis a little easier.

Diffuse pleural thickening

This disease modality, unlike pleural plaques, is more sinister with greater symptomatic burden to patients. Pleural fibrosis of the visceral layer, with adhesion formation to the parietal pleura, leads to obliteration of the pleural space over time. This causes progressive and significant restriction to pulmonary function, particularly if there is involvement of the costophrenic angle.[5] It is commonly unilateral at the time of diagnosis, but many patients go on to develop contralateral disease.[8] DPT is not uncommon. In 2005, the prevalence of DPT in New South Wales, Australia was reported to be 74.3 cases per million.[9] Dyspnoea and chest pain are the most common presenting symptoms. However, patients can be asymptomatic, particularly early on in the disease process. Hence, estimating the true prevalence of this disease is difficult.

Asbestosis

Asbestosis is an industrial pneumoconiosis, causing interstitial lung fibrosis as a sequelae of high asbestos fibre count inhalation. This has been well documented in epidemiological studies.[10] Clinically, asbestosis manifests as dyspnoea, dry cough, with auscultatory findings of fine inspiratory crepitations and a restrictive pattern on lung function test. Clubbing is an uncommon feature.

Although the pathogenesis of this disease on a molecular level is not completely known, there is evidence that the inflammatory process that occurs from fibre irritation, together with mitochondrial and p53-mediated alveolar cell apoptosis and asbestos-induced chemotaxis of neutrophils, play a crucial role in the development of asbestosis.[3] Regardless of the mechanism of action, numerous industrialized countries in the west where asbestos use was banned decades ago has seen an increase in incidence of death attributed to asbestosis rising, such as in the United Kingdom (UK), which has seen a rise from 109 cases in 1978 to 412 in 2010,[11] although this trend is projected to fall in Europe within the next decade.[6]

Asbestos- related cancer

Malignant mesothelioma (MM) is an extremely aggressive tumour that develops on serous surfaces and is almost invariably fatal.[12] Pleural mesothelioma is the most common, accounting for approximately 90% of disease. It has a natural incidence of 1–2 per million per year;[13] however, its incidence among occupationally exposed individuals to asbestos is more than 40 times higher—some crocidolite workers have a lifetime MM risk of 10–20%.[14] Although sporadic BAP1 mutations are found in a large percentage of mesothelioma cases, and there are families in which BAP1 polymorphisms are associated with

mesothelioma, such families are rare and there is no evidence that BAP1 polymorphisms predispose to sporadic mesothelioma in the general population.[15] A latency period of 20–40 years is well recognized in this cancer.[14] Dyspnoea due to pleural effusion is a common presenting symptom.

Since the 1950s, global incidence of mesothelioma has been on the rise, and although accurate figures are hard to find, there has been an estimated 43 000 deaths a year.[6] This equates to 118 deaths a day. Australia now has the highest incidence of mesothelioma at 2.7 per million,[16] with the highest incidence per capita in Western Australia, due to its history of 'blue asbestos' (crocidolite) mining in Wittenoom and its widespread downstream utilization. This regional clustering is not uncommon, and similarly in countries such as the UK and Italy, mesothelioma mortality rates recorded are higher in areas with a history of ship building and various other asbestos-using industries.[17]

The past two decades have seen a shift in the risk groups and three waves of diseases are now recognized. The first wave of affected individuals were those in direct contact with raw asbestos (first wave) such as miners and those handling the raw fibres during the manufacture of asbestos products. The second wave of disease was seen in workers using asbestos products such as carpenters, plumbers and maritime workers including defence personnel.[17] This form of occupational exposure continues to account for the majority of cases. A 'new' third wave of disease has been identified in people with non-occupational exposure to asbestos. Examples of domestic exposure (family members of asbestos workers), air pollution from nearby asbestos plants were seen in the original studies in the 1960s, but are more common now and are also associated with exposure from buildings containing asbestos.[18] In Western Australia, this third wave is evident in home renovators, with a marked increase in this group over the past 10 years. In the period of 2005–2008, this accounted for 45% of MM, whereas in 2000–2004, it accounted for 13% of the cases. Worryingly, this continues to be on an upward trend.[19]

Lung cancer

Asbestos is carcinogenic and associated with all major histological types of lung cancer.[14] Therefore, being able to distinguish the lung cancer subtype will not help establish whether asbestos contributed to the lung cancer; neither do symptoms nor signs with which patients present.

Asbestos and smoking are supra-additive in the induction of lung cancer.[20] Historically, many individuals with exposure to asbestos were also tobacco smokers. However, regardless of tobacco use, exposure to asbestos increases the risk of lung cancer, even in non-smokers where there is a 3.6 increase in risk and, in smokers, a risk increase of 14.4.[20] This becomes even more important in Asia, because the incidence of cigarette smoking in Asia is rising sharply as it falls in the west. So the combined effects of cigarette smoking and chrysotile exposure are likely to lead to many lung cancer cases in Asia.

Although there is a non-causal relationship between asbestosis and lung cancer, having asbestosis is associated with doubling of an individual's risk of lung cancer mortality in both smokers and non-smokers, presumably reflecting the higher carcinogen load.[14,20] One of the first reports of this association was observed in the mid-1950s when post-mortem data on patients (from England and Wales) were reviewed. Then, it was observed that lung cancer was 15 times more likely if asbestosis was present.[21]

WHY IS ASBESTOS STILL BEING USED IN ASIA?

Asia has become the largest consumer of asbestos in the world and is responsible for two thirds of global asbestos consumption, currently totalling over a million tonnes per annum in the region. Despite the well-known detrimental effects of asbestos on the lungs, its use continues to increase (Fig. 1). Asia's proportion of global asbestos use rose from 14% in 1920–1970 to 33% in 1971–2000 and then to 64% in 2000–2007 period, and in 2011, 6 out of 10 countries with the highest consumption of asbestos were Asian countries,[22] with three out of the top five asbestos-producing countries being Asian (Russia, China and Kazakhstan).[6] Almost half of asbestos production was in Russia (49%) with 20% in China and 10% in Kazakhstan, and globally, most of the asbestos use was in China (29%), India (17%), Kazakhstan (7%), Indonesia (5%), Uzbekistan (5%), Thailand (4%), Vietnam (4%), Sri Lanka (2%) and Iran (1%).[23]

Asia is made up of countries at different stages of economic development and views about the use of asbestos vary. For example, in Singapore, asbestos use has been phased out with bans being implemented on the import of raw asbestos fibre and use in buildings in the late 1980s.[24] China, on the other hand, continues to mine chrysotile and is the top consumer of asbestos worldwide.

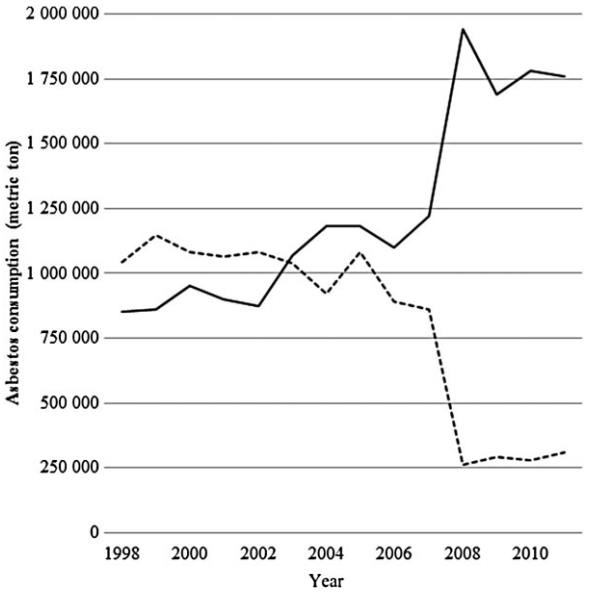

Figure 1 Worldwide consumption of asbestos. Data from U.S. Geological Survey (http://www.usgs.gov/). (- - -) Rest of the world, (—) Asia and Middle East.

Figure 2 Worker in India handling asbestos with minimal respiratory protection. (Photo courtesy of P Madhavan).

The reason for this is likely multifactorial. Asbestos is cheap, and therefore, its products are more affordable compared with the more expensive asbestos-free replacements. In Vietnam, a roof-sheet company successfully replaced asbestos with polyvinyl alcohol. However, these sheets were 20–30% more expensive and failed in the competitive profit-driven market.[25]

Furthermore, in many developing Asian countries with rapid population growth, such as China and India, the demand for housing is high, and consequently, the demand for asbestos-containing building products such as asbestos–cement roofing material and piping. In 2005, India's asbestos–cement industry alone accounted for almost 10% of global asbestos consumption.[26]

Employment is also a driving factor. Four out of ten of the top asbestos products manufacturers located in China employ approximately 6000 individuals,[26] and in that country, where poverty is a real threat, the fear of unemployment is perhaps greater than that of developing ARD.

Over recent decades, asbestos industries have transferred production to Asia, where the cost of labour is substantially cheaper. In selected cases, despite transferring engineering plants as a whole, it was observed that the health and safety measures that should have been followed were not in place.[22] The reasons for this are varied and could range from lack of overt environmental controls (Figs 2,3) to insufficient enforcement of predetermined laws.

Asbestos companies openly promote the 'controlled use' of asbestos, claiming that it can be used safely.[2]

Figure 3 Sack clearly labelled as containing 'white asbestos'. (Photo courtesy of P Madhavan).

However, due to a lack of social awareness, lack of environmental controls and ignorance about asbestos in many Asian countries,[22] 'controlled use' often equates to risky use. In other parts of the region, public awareness of asbestos hazard has been raised by scandals such as Japan's 'Kubota Shock' (2005), when national corporations admitted that asbestos operations had caused an epidemic of occupational and environmental disease and mortality, and the 2009 Korean exposé of asbestos-contaminated talc found in baby powder imported from China. Although Japan and Korea have now banned asbestos, asbestos use remains widespread and unregulated in developing countries, most of which lack the medical support and expertise needed to recognize and diagnose ARD.

WHAT IS KNOWN ABOUT ARD IN ASIA

Robust data on ARD, together with its sequelae, are lacking in many Asian countries. A report by Le *et al.* identified 47 Asian countries (as defined by the United Nations Statistics Division) with available data for either asbestos use and/or mortality from ARD. They found 30 countries with data for asbestos use only, 15 countries with data for both asbestos use and ARD-related mortality and 2 countries with data for ARD mortality only. They recorded a total of 12 882 asbestos-related deaths, of which, mesothelioma accounted for 93.2%.[27] During the period studied (1920–2007), asbestos consumption in Asia, as part of worldwide usage, increased nearly fivefold. It was also noted that countries with data for asbestos use and ARD had reduced their asbestos use substantially since 2001, perhaps realizing the burden of ARD. On the other hand, countries without data on ARD had continued to increase their consumption.[27]

Non-malignant pleural diseases

There is very little available data on this due to its relative asymptomatic nature. Kishimoto *et al.* reported that in their cohort of asbestos-related lung cancer patients, the proportion of pleural plaques, calcified plaques, rounded atelectasis and pleural effusion to be

81%, 66%, 5% and 22%, respectively,[28] although it was not specified if the pleural effusion was BAPE.

Asbestosis

Emergence of this disease in Asia is now evident. A study of workers in a Chinese textile factory, in 1972–2008, reported a 22% prevalence of asbestosis in their male workers.[29] Similarly, Kishimoto *et al.* reported that 34% of their asbestos-related lung cancer patients had evidence of asbestosis.[28] Furthermore, 62% of their cohort had >5000 asbestos particles per gram of dry lung (indicating occupational exposure), with 29% exceeding 50 000 particles (indicating high-level exposure).

Asbestosis due to environmental exposure has also been reported in the Chung-Cheong province of Korea, where there were numerous asbestos mines. Over 50 residents with no prior occupational exposure to asbestos were reported to have been diagnosed with asbestosis, likely due to environmental exposure.[30]

Asbestos-related cancer

Mesothelioma

There are mesothelioma data emerging now from some Asian countries, especially Japan, that are currently experiencing an epidemic of cases. The country's first case of pleural malignant mesothelioma was reported in 1973,[31] 1 year before asbestos use peaked.[32] Since the early 1980s, mesothelioma mortality has been increasing, with a rapid rise in the mid-1990s.[33] In 1994–2008, the annual rate of increase in mesothelioma was significant at 3.46%,[34] with 941 documented deaths in 2008, which rose to 1209 in 2010.[35] Although the first phase of Japan's asbestos ban was announced in 2004, asbestos exposures continue and asbestos-related disease is widespread. Japan is currently experiencing an epidemic of mesothelioma, and rates are only predicted to peak sometime between 2030 and 2039.[6] The relationship between asbestos use and mesothelioma is shown in Figure 4, clearly demonstrating a delay due to the known incubation period of the disease following asbestos exposure, a state of ignorance and false security that typifies government responses to the risks of asbestos.

In many Asian countries, neither a registry nor surveillance programme of asbestos-related cancers exists. For example, in India, where more than 70% of the workforce is unorganized, reporting of occupational health diseases are often lacking.[36] Therefore, mesothelioma data tend to be anecdotal, with a study reporting an incidence of 6.4% in their pleural biopsy samples.[36]

Lung cancer

The number of cases asbestos-related lung cancer in Japan increased drastically after the 2005 'Kubota shock', so much so that almost 1000 cases were reported in 2006 compared with less than 100 just 2 years earlier.[32] As has been observed in developed countries, histological subtypes are similar regardless of whether asbestos was a contributing factor. As part of their study, Kishimoto *et al.* was able to identify 152 patients from 18 hospitals from 2000 to 2008, who fulfilled the definition set out by the Japanese compensation law of asbestos-related disease (2006). They showed that histological classification was similar in both groups of patients (asbestos exposure versus no asbestos exposure). The overall survival between both groups was also not statistically significant.[32]

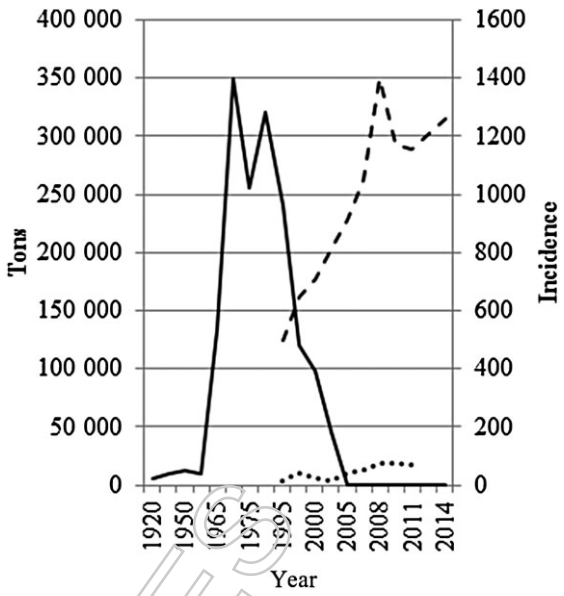

Figure 4 Asbestos consumption in Japan and associated mortality in malignant mesothelioma (MM) and asbestosis. Data from Dr Takashi Nakano, Osaka and World Asbestos Report (http://worldasbestosreport.org). (—) Asbestos, (- - -) MM mortality, (·····) asbestosis mortality.

ASBESTOS INDUSTRY STRATEGIES

Despite the known cancer incidence with the heavy use of white asbestos in populations of heavy smokers and the known mesothelioma incidence, the asbestos industry claims that the absence of asbestos mortality data in the vast majority of countries substantiates its claim that chrysotile (white) asbestos can be used safely. The strategies used by asbestos industry groups do bear an uncanny similarity to those used by cigarette companies to create a climate in which sales of their goods can flourish. In 2013, a multilingual, multimedia campaign was launched, targeting Asian asbestos markets. In newsletters, brochures and videos, on websites and at industry-funded conferences, information was distributed, which differentiated the hazard posed by crocidolite and amosite, types of asbestos no longer used, and chrysotile asbestos, which is mined in Russia, China, Brazil and Kazakhstan. At the 2013 meeting of the United Nations' Rotterdam Convention, the Russian delegation opposed UN efforts to include chrysotile on a list of hazardous substances. In support of their arguments, material was made available to delegates with headlines such as 'No Chrysotile Ban', 'Asbestos Phobia is a Weapon in the Business War', 'We have Always used and will use chrysotile in Kazakhstan!' and 'Motor Race Strikes Hard Against Anti-Asbestos Campaign!'.[37]

The problem is that although chrysotile is indeed not as carcinogenic as crocidolite and amosite, there is ample evidence that chrysotile is dangerous. The use of 'doubt science' is forestalling government action on asbestos use in Asia. When the Government of Pakistan was considering plans to ban asbestos in 2013, a letter was dispatched by Jean-Marc Leblond, Chairman of the International Chrysotile Association—a trade group representing asbestos interests—which expressed the view that 'consideration be given to a comprehensive review of the current scientific evidence regarding the significant difference in risk between asbestos fibre types'. The use of scientific evidence is to be applauded, but scientific evidence needs to be validated by objective enquiry and careful statistics, not unvalidated statements such as the familiar industry phrase 'When properly controlled and used, chrysotile asbestos in the [sic] modern day high-density applications does not present risks of any significance to public and/or worker health'. The coordinated efforts of pro-asbestos forces in Asia have included international scientific conferences in the Philippines and India promulgating 'doubt science'. The organizers, the International Chrysotile Association and the Asbestos Cement Product Manufacturers' Association, framed the discussion as an unbiased sharing of contemporary research findings by scientific experts. The fact that several speakers had links to asbestos vested interests in Canada, Russia and Brazil was not mentioned. All scientific meetings welcome disagreement and discourse, but expect that speakers that represent all points of view will be invited, that open discourse will be encouraged, and that objective verifiable data will be presented and that the standard obligatoration to declare potential bias/conflict of interest will be honoured.

At a New Delhi press conference held by the Occupational and Environmental Health Network of India (OEHNI), OEHNI Coordinator Mohit Gupta released a letter sent to Indian Ministers Ghulam Nabi Azad, Sis Ram Ola and Jayanthi Natarajan signed by 300 independent scientists and public health advocates, which condemned the efforts to promote asbestos use in India:

> Not a single reputable scientific agency in the world supports the claim put forward by the International Chrysotile Association and the Asbestos Cement Product Manufacturers' Association that chrysotile asbestos can be used safely. . . While Russia and Brazil reap the profits of exporting asbestos, it is India that will pay the price in human suffering and in financial costs.[38]

There is a global consensus regarding the human health risk posed by exposure to all forms of asbestos by those who are leaders in this field.

ARD IN THE FUTURE—ANOTHER ASIAN TSUNAMI?

With approximately 4.3 billion people, equating to 60% of the world's current population and a high population growth rate, it is predicted that Asia will see a large crop of ARD in the next few decades. Some of the cases will be benign (asbestosis and plaques), but it is likely that there will many cases of mesothelioma and lung cancer. Indeed, given the high rates of cigarette smoking in Asia (over 700 million and increasing) and its known multiplicative role with asbestos in the induction of lung cancer (see above), it is possible that asbestos-induced lung cancer may outstrip mesothelioma in Asia in terms of asbestos-induced malignancies, although the role of asbestos in these lung cancer patients is often 'hidden' behind their cigarette-smoking history.

Asian countries are active in trying to prevent this wave of ARD. In recent years, the Asian dialogue on asbestos has been transformed by contributions from a range of civil society groups including: Asian Asbestos Initiative, Asia Monitor Resource Centre, International Ban Asbestos Secretariat, Building and Wood Workers International, Japan Occupational Safety and Health Resource Center, Asian Citizen's Center for Environment and Health, the OEHNI, Japan Association of Mesothelioma and Asbestos-Related Disease Victims and Their Families, Korean Association of Asbestos Victims and Their Families, Other Media—Corporate Accountability Desk (India), Peoples Training & Research Centre (India), Occupational Health and Safety Centre (Mumbai), the Mine Labour Protection Campaign (Rajasthan), Occupational Health and Safety Association (Ahmedabad) and Centre for Occupational and Environmental Health and Toxics Link (India). As control of the regional asbestos agenda has slipped from the industry's grasp, international agencies such as the WHO and the International Labour Organisation have come under intense pressure from vested interests over their support for an end to asbestos use.

Reacting to the dissemination of propaganda on t-shirts distributed by a Thai asbestos–cement manufacturer, the WHO took the unusual step of holding a Bangkok press conference on International Workers' Memorial Day 2012 to clarify the situation.[39] On the same day, a hard-hitting video was uploaded to the WHO's website, which made its policy abundantly clear:[40]

- All forms of asbestos are hazardous to human health including chrysotile asbestos.
- 125 million people are exposed to asbestos at work every year.
- 107 000 people die every year from asbestos-related diseases.
- There are safer alternatives to asbestos.
- The WHO does not recognize chrysotile asbestos as a safe alternative.

The growth of support for national asbestos bans has been solidified in Asia by the formation of grassroots groups to coordinate joint ban asbestos action at home and abroad. These include the: Ban Asbestos Network of Japan (1987), Ban Asbestos Network of India (2002), Philippines Ban Asbestos Network (2005), Ban Asbestos Network of Korea (2008), Asian Ban Asbestos Network (2009), Indonesian Ban Asbestos Network (2010), Thailand Ban Asbestos Network (2012) and Bangladesh Ban Asbestos Network (2013).[41]

Sugio Furuya, Secretary-General of the Japan Occupational Safety and Health Resource Center and a leading member of the Asian campaign to ban asbestos is in no doubt as to what the future holds:

> Scientists predict that the epidemic of asbestos-related diseases in Japan will be replicated in asbestos-consuming countries throughout Asia. It is immoral as well as illogical for asbestos consumption to continue when the dangers of human exposure are so well known. The price of industry's asbestos profits is paid for by ordinary citizens who contract debilitating and fatal diseases. If the use of asbestos is no longer legal in the UK, Argentina, Japan or Australia, why is consumption increasing in India, Indonesia and Vietnam. Asbestos victims throughout Asia are determined to end the asbestos slaughter. Our campaign will continue until the deadly dust is banned.

Indonesia as an example

Increased awareness of the risks posed by asbestos has seen a reduction in asbestos use in some Asian countries but others have been slow to learn these invaluable lessons. There are around 50 countries in Asia, far too many to discuss in detail, hence, we will comment on the use of asbestos in Indonesia as an illustrative example.

Indonesia, a country of around 240 million people, is the world's eighth largest importer, processor, consumer and exporter of asbestos and asbestos materials. Between 1999 and 2004, its imports more than doubled, with the latest data showing annual consumption of 65 000 tonnes/year, although true figures are possibly much higher than that. The asbestos industry is huge in Indonesia, with more than 26 factories producing and using asbestos and employing more than 7000 workers in the process.[42] Consumption of asbestos-related products is high, for example, asbestos sheeting is widely used as it is easily available and cheap.

Although few cases of asbestos-induced mesothelioma or lung cancer have been reported, the long incubation period would predict that they are yet to see their expected wave of asbestos-induced cancers. Indonesian pulmonary and public health physicians and epidemiologists are active in the process of learning about asbestos diseases, in preparation of the expected cases. At least five major conference presentations on this subject have been given in the past few years. Furthermore, a consumer group has formed the Indonesian Ban Asbestos Network (Ina-Ban), and the Indonesian Ministry of Manpower has also issued decrees for asbestos worker protection and surveillance (Minister of Manpower Regulation No. PER-03-/MEN/1985 on occupational safety and health in the use of asbestos). At the same time, well-resourced lobbyists have conducted what are considered by some to propaganda exercises to promote the 'safe' use of chrysotile.

WHAT CAN BE DONE TO MINIMIZE RISK OF ARD IN ASIA?

1 Exposure reduction: The causal link between asbestos and ARD is well established. Therefore, it is obvious that minimizing exposure to the fibre would reduce the risk of developing ARD. In the UK, legal regulations in the use of asbestos have been in place since the 1930s and asbestos use was banned more than 10 years ago. Although some have suggested that the rate of increase in the incidence of mesothelioma deaths may be slowing down, the annual rate does continue to rise and it is also clear that when an upper limit for mesothelioma mortality has been predicted in any country, it has often been breached. This is of concern, especially given the clear effects of low-level exposure, for example exposure by home renovations, on large and often unsuspecting populations.

2 Early detection: One of the strategies that have proven of some use is to conduct regular surveillance of asbestos-exposed workers. This is more useful for the early detection of asbestosis, such as the presence of axillary crackles, which has been shown to be the earliest sign of asbestosis (Steer H, Robinson BWS, unpubl. obs.) rather than cancer, due to the long incubation period of the latter. The only surveillance mechanism possible for screening for mesothelioma is serum or urinary mesothelin levels, although their value as a screening tool is limited.[43]

3. Training in occupational lung disease skills: The recognition and care of victims of occupational asbestos exposure requires training and experience, which are hard to come by when these diseases are not well documented. The Australian National Centre for Asbestos Related Diseases has contributed to training in a number of Asian countries and has also developed the Australia-Asia Asbestos Research Cooperative to facilitate research collaborations and develop training fellowships in this area of pulmonary medicine (http://www.ncard.org).

CONCLUSION

Asbestos is widely used in Asia with little occupational protection and thus will produce many thousands of cases of ARD in the next decades. Reducing the risks of such diseases will require reduction in the use of asbestos, careful surveillance for ARD and improved levels of training in the recognition and diagnosis of these disease, and cooperation among government and non-government groups in the prevention of these diseases.

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