E-14

Climate Change and Uncertainty from Below and Above

About the project: **Uncertainty from Below and Above**
www.steps-centre.org/project/uncertainty

Project briefing
October 2013

Summary

The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) is a global research and policy engagement centre uniting development studies with science and technology studies. Our interdisciplinary research is carried out with partners across Asia, Africa, Latin America and Europe.

In India, as part of the Uncertainty from Below and Above project, the STEPS Centre is working with leading research institutes - the Institute of Health Management Research, Kolkata; Sarai of the Centre for the Study of Developing Societies, Delhi; and the Gujarat Institute of Desert Ecology, Bhuj, Gujarat - in locations with distinctive ecological features and uncertainties brought about by climate change:

- **The Sundarbans (wetlands)**
- **Kachchh (drylands)**
- **Delhi & Mumbai (urban and peri-urban)**

Brothers standing on a temporary embankment surveying the approaching Hataniya-Doyaniya river in Sundarbans | Photo: IIHMR-STEPS Centre

Research focus

Global warming has brought about irreversible changes to the climate and environmental systems around the globe. For poor and marginalised citizens of the world who depend on natural resources for their lives and livelihoods, mere survival now means negotiating extensive additional burdens and challenges in an uncertain world.

The Uncertainty project is working to bridge the gap in the perceptions of those who theorise about climate change and uncertainty from 'above', those who experience it from 'below', as well as those in the 'middle' who act as intermediaries between the two.

The project conceptualises 'above' as the 'experts' who provide the 'official' accredited expertise. 'Below' is represented by local people and their largely 'experiential' knowledge rooted in everyday practices. We are also interested in the 'middle', which acts as the interface between the 'above' and the 'below', and of course, there are usually overlaps between the three.

"We are working to bridge the gap between climate change experts 'from above' and local people who experience it 'from below'"

Our project, funded by the UK's Economic and Social Research Council (ESRC), aims to explore the varied dimensions of climate-related uncertainties and their accompanying discourses.

We intend to generate discussion amongst a range of stakeholders to advocate and communicate sustainable pathways that deal with climate-related uncertainties that put the interests of the poor and marginalised upfront.

A mother and her children in front of their home in the Sundarbans after the devastation wrought by Cyclone Aila | Photo: IIHMR-STEPS Centre

A Herdsman travelling out to find greener pastures - rains have severely decreased over the years | Photo: GUIDE

Focus sites

The Sundarbans

The Sundarbans, a unique delta in West Bengal and Bangladesh, is one of the most visible victims of the ravages of climate change in India. The rapidly-changing ecosystem, coupled with decades of government neglect, has made this region particularly vulnerable.

Researchers from STEPS Centre partner the Institute of Health Management Research (IIHMR) are exploring how different people experience climate-related changes and accompanying challenges, their adaptation and resilience in terms of health and livelihood, and the overall developmental debate in challenging areas like Sundarbans.

Urban India

This part of the research, by Sarai of the Centre for the Study of Developing Societies (CSDS), will examine the relationships between different kinds of uncertainties in particular domains (e.g. natural disasters, water, energy, waste, and housing) in two of the biggest metropolises of India – Delhi and Mumbai. Their distinct topographical situations present differences in the way climate change is perceived in the two cities. Mumbai, being a coastal city, has specific concerns such as the effects of a rise in sea-levels. The rainfall pattern of the city, when seen in conjunction with its island terrain, suggests that soil erosion, landslide and flooding are likely to intensify. Other concerns - like heat-island effect, dwindling water resources, the generation of waste, rising energy demand and increasing concretization - are common with the issues in the landlocked city of Delhi.

Kachchh

Kachchh is a dryland area in western India known for scarcity and ecological uncertainty. In Kachchh, the STEPS Centre has partnered with the Gujarat Institute of Dessert Ecology (GUIDE) to understand the experiences and perspectives of climate-livelihoods connections in three of the district's diverse ecological areas: grasslands, agro-pastoral lands and the coast. Each area is experiencing various climate-related variability and vulnerabilities, including a change in rainfall and drought patterns. Local peoples' knowledges about extreme climate events and their impacts on livelihoods and society will also be explored, aiming to bring together perspectives and experiences from above, middle and below levels.

What will we do?

'Uncertainty' is experienced by different people in different ways. The perception of 'above' is generally based on 'theoretical' knowledge which may have very little to do with how everyday men and women understand, live and cope with uncertainty in their daily life. This is the missing dimension we seek to highlight.

Uncertainty project researchers will generate knowledge through collecting implicit and explicit narratives from, and communicating between, the 'above', 'middle' and 'below'. We intend to create a dialogue across these domains which aims to unravel a range of pathways of climate change and uncertainty from 'below' and 'above', seeking out whether alternative pathways more conducive to dealing with sustainability and social justice can emerge.

We want to make sure our research is relevant and useful to local stakeholders. We will work to inform the stakeholders from the 'above', 'middle' and 'below' of our research findings, seeking to help inform decision-making and to trigger the active involvement of civil society to protect the interests of the majority whose interests and perspectives are largely ignored in dominant debates about climate change and sustainability.

To trigger the active involvement of key stakeholders, the STEPS Centre Uncertainty project will focus on:

- Providing a comprehensive picture of climate discourses and how climate change is perceived and interpreted by a range of stakeholders.
- Promotion of a learning and sharing agenda to bring together multiple stakeholders – civil society organisations, academics, governments and funding agencies – to engage in research processes, to reflect on their own work, and to move towards promoting the needs and interests of the most vulnerable and poor.

How to get involved

We strive to 'unearth uncertainty' and facilitate dialogues with the key stakeholders, practitioners, end users and the wider community. A series of workshops, panel discussions, blogs, audio-visual reportage and focused fora have been planned, and we welcome new participants. Contact us if you'd like to get involved, or sign up via the website to receive STEPS Centre newsletters.

Contact for this project

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Dangerous Living at WasteFill Site
Photo: sanitationupdates.files.wordpress.com, Sarai, Delhi

About us

The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) is an interdisciplinary global research and policy engagement hub uniting development studies with science and technology studies. Based at the Institute of Development Studies and SPRU Science and Technology Policy Research, at the UK's University of Sussex, we work with partners around the world and are funded by the Economic and Social Research Council.

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OCCUPATIONAL & ENVIRONMENTAL HEALTH NETWORK OF INDIA

Grab the opportunity:

Government of India need to restrict Chrysotile Asbestos trade.

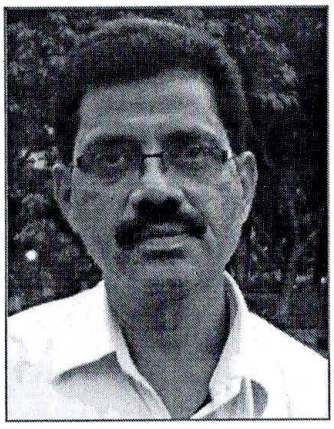
Vote for inclusion in PIC of Rotterdam Convention

Grab the opportunity:

The Indian Government has a rare opportunity to reverse its position on Chrysotile asbestos. Its continued support to the Asbestos industry has led to hundreds of workers, their families and community in general being exposed to asbestos and afflicted by asbestos related diseases including lung and mesothelioma cancers. Once diagnosed with asbestos related diseases, the cost of treatment in India is huge which needs to be paid by the victim and families which further marginalises them and pushing them under the line of poverty. At COP8 Government of India led by Narendra Modi has one more opportunity to chart a new path which is consistent with the principles of a welfare state.

Our neighbours are more progressive:

The hazards of Asbestos are well known. 55 countries have banned its use, trade, import, mining, manufacturing and other economic activities related asbestos. Land locked tiny country Nepal has already banned it while Sri Lanka has declared to ban import of asbestos roof sheets from 2018. They have planned to cease use of all asbestos products by 2024. Both are an inspiration for India.



India –one of largest importers:

India does not mine asbestos. It depends on import from Russia, Kazakhstan, and Brazil etc. Canada was biggest exporter of asbestos to India but Canada, too banned that export. India is one of world's largest importers of asbestos. In 2011-12 it imported over 378,122 tons, 396,493 tons in 2014-15 and by 2017 it is expected to rise by 605,000 tons with 9% growth.

Asbestos related diseases on rise:

Secretariat –43, Srinathdham Duplex, Dinesh Mill-Urmi Road, Vadodara-390007 India
Email – oehni.del@gmail.com, Tel :- 91-265-2345576

At the same time asbestos related diseases, too are on rise. In Ahmadabad during 2009-2012, 21 cases of mesothelioma were reported at Gujarat Cancer Research Institute, Ahmadabad while in 2013, only during one year they diagnosed 23 cases of mesothelioma. Mesothelioma is one of the rare cancers.

Occ. Health and Safety Association (OHSA) an NGO based in Gujarat found 4 cases of mesothelioma of which two were employed by asbestos factory, one was employed in foundry in Ahmedabad and one more had secondary exposure whose father had worked in the same asbestos factory, Gujarat Composites. Moreover, two more cases of other cancers have been found in employees of this factory which have identified to be as a result of asbestos exposure. Since 2010, Turner & Newall Trust has paid compensation to 1045 workers who worked in their subsidiaries in India.

The position of the Indian Government

For the last ten years' chrysotile asbestos has been recommended for listing in the Rotterdam Convention which adds restrictions to its trade. It has been blocked by a few countries who gain directly from the export of asbestos. Though there is credible and adequate scientific and medical evidence about the deadly nature of asbestos, the Government of India is refusing to learn any lessons. At the Rotterdam Convention meetings, India has not favoured to include chrysotile asbestos in Prior Informed consent (PIC) list.. We urge Government of India to take a firm step to protect the workers and citizens from asbestos at the Conference of Parties – COP8 currently going on in Geneva.

Victim's voice:

Rajendra Pevekar, asbestos victim from Mumbai is representing asbestos victims in India in this meeting to present their woes and appeal one and all to include chrysotile asbestos in PIC list to restrict trade of one of the most deadly material. He never worked in any asbestos factory but his father worked. His father brought home some asbestos fibres on his work clothes unknowingly and exposed the family members. In his child hood Rajendra was exposed and is suffering from asbestosis. His mother too is suffering from asbestosis. Numbers of his father's colleagues and their families have been victims of primary or secondary exposure to asbestos.

Restrictions would not have any adverse impact:

We strongly believe that restrictions on asbestos trade would not have any adverse impact on the trade. If included in PIC, importers will have better choice. They may then have opportunity to use safer alternate raw materials for their products. World will move towards healthier, safer and just world.

National Asbestos Profile:

OEHNI has launched this report recently. The report is supported by OEHNI, PTRC, AMRC, ABAN, IBAS and Suisse Solidar.

"It is also high time that the government take initiative in formulating a national plan for prevention and control of silicosis and asbestosis in India so that the objective of the WHO to eliminate silicosis by 2030 is achieved."

"There is an increasing pressure from all the concerned stakeholders for urgent action for protecting the workers and the general population against primary and secondary exposure to Chrysotile form of Asbestos fibres. Greater concerns on the central government are whether or not to ban the mining and use of chrysotile asbestos in India. Besides this a similar concern is felt through International community bringing pressure on the government for immediate action on the control measures and its elimination."

However, no data is available to establish the prevalence of Asbestos disease in small and medium scale enterprises using Chrysotile asbestos. Lack of such data has been an issue of greater concerns of the stakeholders and the Government for making a policy decision for inclusion of chrysotile asbestos under the Annex-3 of the Rotterdam convention to which India is a signatory to ban the same.

- Report of the Working Group on Occupational Safety and Health for the Twelfth Five Year Plan

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Asbestos industry – Hyderabad Asbestos,
– Karnataka

90% use in roofing
" " automobiles, now stopped in passenger vehicles
buses, trucks, tractors
(Nickel in the homes)
" " industrial packing. between lids
" " ropes, gloves, insulation
Water pipe – c̄ asbestos rope, in hotels, hostels
– from water tank

Rajender Penckar – father sweeper in asbestos factory
– son + mother c̄ asbestosis

Need for medical evidence – Dr Rajan Patil – free venue
+ Civilep, TN
Chennai mtg – Rakhal

Jagdish – to go to the SJMC dept of CH (Bobby)
start c̄ complicated cases

Start c̄ ESI.

Pulikesh Hydr – consultant v. learned, MPhil, wants UN pos'
in India since some time, Jodhpur (accom:)

Regist: – 9.30pm
Intro – 10 – 10.30; 10.30 – 12 noon NGO intro (moderated by RO)
45m – 1 hour – by Jagdish – asbestos, hazards, uses, ...
1 slide on Rotterdam convention
campaign Dec 15–16th,
½ hr – discu:
– init. of org for Delhi for
campaign, strategy
action
1.30
2pm lunch.
– global
pan asbestos network
– 2005–6 Toxic Link Delhi called a mtg
c̄ Madhav
OHS grp
Fernanda, Barry Castleman
Pan asbes: Network India (PANI)
Rani asbes: ...
fizzled left TL + hijacked
website run by him
PANI
Network relaunched in Delhi
in December 2017 (PAN)

Asbestos: elimination of asbestos-related diseases[1]

Fact sheet N°343, July 2014

Key facts

- About 125 million people in the world are exposed to asbestos at the workplace.
- According to WHO estimates, more than 107 000 deaths each year are attributable to occupational exposure to asbestos.

What is asbestos?

Asbestos is a group of naturally occurring fibrous minerals with current or historical commercial usefulness due to their extraordinary tensile strength, poor heat conduction, and relative resistance to chemical attack. For these reasons, asbestos is used for insulation in buildings and as an ingredient in a number of products, such as roofing shingles, water supply lines and fire blankets, as well as clutches and brake linings, gaskets and pads for automobiles.

The main forms of asbestos are chrysotile (white asbestos) and crocidolite (blue asbestos). Other forms are amosite, anthophylite, tremolite and actinolite.

Why is asbestos a problem?

All forms of asbestos are carcinogenic to humans. Exposure to asbestos, including chrysotile, causes cancer of the lung, larynx and ovaries, and also mesothelioma (a cancer of the pleural and peritoneal linings). Asbestos exposure is also responsible for other diseases such as asbestosis (fibrosis of the lungs), and plaques, thickening and effusion in the pleura.

Currently, about 125 million people in the world are exposed to asbestos at the workplace. According to the most recent WHO estimates, more than 107 000 people die each year from asbestos-related lung cancer, mesothelioma and asbestosis resulting from exposure at work. Approximately half of the deaths from occupational cancer are estimated to be caused by asbestos. In addition, it is estimated that several thousand deaths annually can be attributed to exposure to asbestos in the home.

It has also been shown that co-exposure to tobacco smoke and asbestos fibres substantially increases the risk for lung cancer – and the heavier the smoking the greater the risk.

WHO response

The World Health Assembly Resolution 58.22 on cancer prevention urges Member States to pay special attention to cancers for which avoidable exposure is a factor, including exposure to chemicals at the workplace and in the environment.

With Resolution 60.26, the World Health Assembly requested WHO to carry out a global campaign for the elimination of asbestos-related diseases "...bearing in mind a differentiated approach to regulating its various forms - in line with the relevant international legal instruments and the latest evidence for

1 http://www.who.int/mediacentre/factsheets/fs343/en/

effective interventions...". ...". Cost-effective interventions for prevention of occupational lung diseases from exposure to asbestos are among the policy options for implementing the global action plan for the prevention and control of noncommunicable diseases (2013-2020), as endorsed by the Sixty-sixth World Health Assembly in resolution WHA66.10 in 2013.

Eliminating asbestos-related diseases is particularly targeted at countries still using chrysotile asbestos, in addition to assistance in relation to exposures arising from historical use of all forms of asbestos.

WHO, in collaboration with the International Labour Organization and other intergovernmental organizations and civil society, works with countries towards elimination of asbestos-related diseases in the following ways:

- by recognizing that the most efficient way to eliminate asbestos-related diseases is to stop the use of all types of asbestos;
- by providing information about solutions for replacing asbestos with safer substitutes and developing economic and technological mechanisms to stimulate its replacement;
- by taking measures to prevent exposure to asbestos in place and during asbestos removal (abatement);
- by improving early diagnosis, treatment, and rehabilitation services for asbestos-related diseases;
- by establishing registries of people with past and/or current exposures to asbestos and organizing medical surveillance of exposed workers;
- by providing information on the hazards associated with asbestos-containing materials and products, and by raising awareness that waste containing asbestos should be treated as hazardous waste.

Asbestos in India - Status Report

Background

India is the largest importer[1] of asbestos, according to the United Nations Commodity Trade Statistics Database. Asbestos is primarily imported from Russia, Brazil and Kazakhstan. Over 90% of it goes into making corrugated roofing sheets that sell for as little as INR 300 (USD 7) and water pipes. More than 300,000 people in India are employed by companies producing the material directly or indirectly. In addition millions of construction workers are using asbestos products during construction activities with little or no protection. An estimated 55,000 workers, unmindful of the lethal effects of asbestos-laden material in the ships, slave for long hours and are exposed to its deadly fibres breaking ships at the Alang Ship breaking yard. There is no data available about number of small and medium scale enterprises using asbestos.

There has been a steady increase in the amount of Asbestos Fibre consumption and approximately Four hundred fifteen thousand tonnes of Asbestos fibres was consumed in 2011 and till April 2012 already one hundred and thirty five thousand tonnes has been consumed.

Year	Consumption
2007	2,83,000 tons
2008	3,00,000 tons
2009	3,60,000 tons
2010	4,00,000 tons
2011	4,15,000 tons (approx.)
2012	1,35,000 tons (approx.) till April, 2012

Table 1 - Year on Year Consumption of Asbestos Fibres in India[2]

A 15 percent duty is payable on asbestos imports, according to the Ministry of Commerce & Industry. The tariff, which stood at 78 percent in 1995, has been gradually cut over the past decade.

Facts

1. **Imports and Exports** - As per the prevailing Foreign Trade Policy, asbestos under heading 2524 can be imported freely with the exception of amosite which is restricted. However, the imports of crocidolite, actinolite, anthophyllite,

1 http://comtrade.un.org/db/ce/ceSnapshot.aspx?px=HS&cc=2524
2 In Response to questions answered on 11-5-2012 in Rajya Sabha

amosite and tremolite are restricted in terms of Prior Informed Consent (PIC) Procedure of Rotterdam Convention for Hazardous Chemicals and Pesticides.

Exports of asbestos were 1296 tonnes in 2011-12. In addition exports of asbestos-cement products were 41304 tonnes in 2011-12.

Imports of asbestos were 378,122 tonnes in 2011-12. The imports comprised chrysotile asbestos 377,302 tonnes and asbestos (others) 820 tonnes. Imports of asbestos were mainly from Russia (51%), Kazakhstan (18%), Brazil (13%) and Canada (7%)

Ministry of Environment and Forest, prohibits the imports of waste asbestos (dust and fibre), being a hazardous waste detrimental to human health and environment.

2. **Production Facilities** - According to Indian Bureau of Mines (IBM) Minerals Yearbook 2011, presently, there are about 75 plants engaged in the production of asbestos products in the country and these are mainly located in Gujarat, Karnataka, Madhya Pradesh and Andhra Pradesh. Besides, about 114 asbestos cement sheet and pipe units are reported from Rajasthan.

3. **Mining of asbestos in India –** Mining of asbestos is banned in India through a series of orders. In June 1986 a ban on expansion of area of existing asbestos mines was placed in the country. In March 1989 the ban was further extended to mining of those minerals as well where asbestos as contamination was found in substantial quantities. Since June 1993 all mining of asbestos has been banned.[3]

[4] According to the Indian Bureau of Mines (IBM) Minerals yearbook 2012 on asbestos, the production of asbestos in 2011-12 was 280 tonnes of Chrysotile variety of asbestos which increased by about 4% as compared to the previous year. The three mines in Andhra Pradesh had an average daily employment of 39 in 2011-12 as against 57 in the preceding year.

(Qty in tonnes; value in INR '000)

	2008-09		2009-10		2010-11		2011-12 (P)	
State	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value

3 Copy of letter is available with the author

4 Indian Bureau of Mines year book 2011, Mineral Review; Asbestos - http://ibm.gov.in/IMYB_2012_Asbestos.pdf

Andhra Pradesh	315	14521	243	12268	268	13341	280	12827

Table 1- Production of asbestos, 2008-09 to 2011-12 (Source IBM Yearbook 2012)

Despite the ban on mining being in place for more than 20 years, these three mines continue production of Chrysotile asbestos. There is no information available on Occupational health and safety of the workers of these mines. These mines in the private sector are in operation despite the fact that their leases expired on 3rd October 2005, 4th August 2005 and 24th September 2005 respectively[5]. The production in these mines have been suspended since last year after prolonged enquiries and litigation.

4. **Asbestos in Indian Parliament -** Issue of ban on use and mining of asbestos has been raised 80 times in Indian Parliament since the year 2000. In a questions answered on 21-2-14 in the Lok Sabha, the government accepts that 21 cases of Asbestosis were reported in 2010 from Gujarat and 2 cases were reported from Maharashtra in 2012. The government further adds that the exposure limit for the fibre has been reduced to 0.1 f/cc.

The White Asbestos (Ban on use and Import) 2014 bill was re-introduced in Rajya Sabha in 2014. The bill seeks to "provide for a total ban on use and import of white asbestos in the country and to promote the use of safer and cheaper alternative to white asbestos and for matters connected therewith and incidental thereto"[6]

Asbestos Fibre kept in an open sack in a pipe

5. Ministry of Environment and Forests (MoEF) - MoEF is the nodal Ministry responsible for giving environment clearances to various Factories including **Asbestos product manufacturing facilities.** The Ministry has issued the Environmental Impact Assessment Notification, 2006, which makes it mandatory for Asbestos fibre manufacturing units to take permission from MoEF to operate. However, No Asbestos Industry project has so far been denied Environmental Clearance

5 Documents on lease available with the author
6 http://164.100.24.219/BillsTexts/RSBillTexts/asintroduced/white-E.pdf

6. Indian Government is of the position that Asbestos especially Chrysotile Asbestos is safe to use and considering the economic environment, the use of asbestos should continue without hindrance. According to officials, sufficient safeguards are available in law to protect workers from harm and in case of harm remedies are available. There are no official figures of people suffering from diseases due to Asbestos and there are no mechanisms in place to track workers from production facilities

Situation on Ground

1. In India, asbestos products carry no health warnings, and trade unions have no mandate to prevent asbestos-related diseases at workplaces.

2. Most of the workers are in unorganized sector or contract workers. These workers are mostly migratory and are difficult to identify and track. Workers more often than not do not have identity cards making it difficult to file compensation claims.

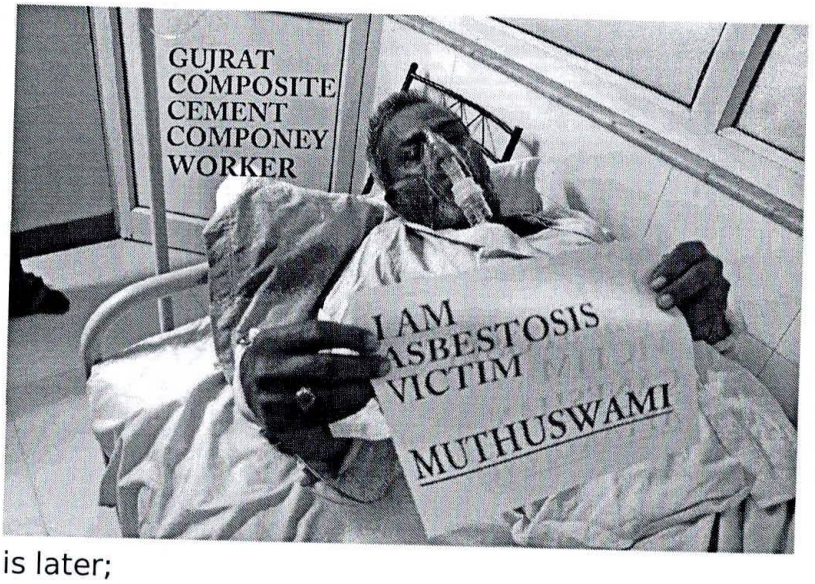
3. More than 800 workers and family members have been found suffering from Asbestos related disorders in Maharashtra, Madhya Pradesh, Coimbatore and West Bengal. These workers were employed by different subsidiaries of Turner and Newall and used to work producing brake lings, textile and other products from mainly Chrysotile Asbestos. In 2001 the liabilities for personal injuries through Asbestos exposure in Turner and Newall was transferred to a special UK trust fund. Since Jan 2010, more than 800 cases have been filed in the trust out of which 650 have been compensated. Victims include family members of the workers

4. In Gujarat, workers from Thermal Power Plant and Asbestos Cement product factory have been diagnosed as suffering from ARDs. Some of these workers have won compensation after lengthy court battles.

5. Tata Cancer Hospital has reported only 107 cases of Mesothelioma in 20 years. Ahmedabad Civil Hospital has detected 41 cases. 16 cases have been reported by NIOH from Alang ship breaking yard.

6. 18 cases of asbestosis have been confirmed among ex-miners in Rajasthan by NIOH

7. In 1996 the Supreme Court of India in Public Interest Litigation directed [7] -



- All the Industries are directed to maintain and keep maintaining the health record of every worker up to a minimum period of 40 years from the beginning of the employment or 15 years after retirement or cessation of the employment whichever is later;
- All the factories whether covered by the Employees State Insurance Act or Workmen's Compensation Act or otherwise are directed to compulsorily insure health coverage to every worker;
- The Union and the State Governments are directed to review the standards of permissible exposure limit value of fibre/cc in tune with the international standards reducing the permissible content as prayed in the writ petition referred to at the beginning. The review shall be continued after every 10 years and also as and when the I.L.O. gives directions in this behalf consistent with its recommendations or any Conventions;
- The Union and all the State Governments are directed to consider inclusion of such of those small scale factory or factories or industries to protect health hazards of the worker engaged in the manufacture of asbestos or its ancillary produce;

8. The Kerala State Human Rights Commission has ordered that asbestos roofing in the school building are avoided in future and the existing school building roofed with Asbestos sheets are also renovated by removing the asbestos sheets and replaced with country tiles.[8]

9. National Program to Eliminate Asbestos - Under the 12th five year plan applicable from the year 2012 to 2017, the Ministry of Labour and Employment has formulated a National program on identification, elimination and control of Asbestosis in India. The primary objectives of this scheme are to access the prevalence of Asbestos related disorders and creating a database on mortality and morbidity. **According to the Ministry document, in Large scale units prevalence of ARDs has been observed on a lower side of 46/1000**

7 Supreme Court order dated 27-01-1995
8 Order of Kerala State Human Rights Commission dated 31-1-2009

exposed workmen. Do they think 46 is a low number out of 1000? No data is available for small and medium scale industries.

There is no mention about safe disposal of asbestos waste or safe removal of asbestos during dismantling or renovation. No feedback or inputs were taken from the civil society and activists involved in the fight against asbestos in formulation of this scheme. There are no areas in the scheme where collaboration with NGOs is likely or is mandated.

10. A recent Ministry of Labour document stated the intention of the government of India "to enact a Ban on the use of Asbestos"? – whether it is another propaganda material for International audience has to be determined

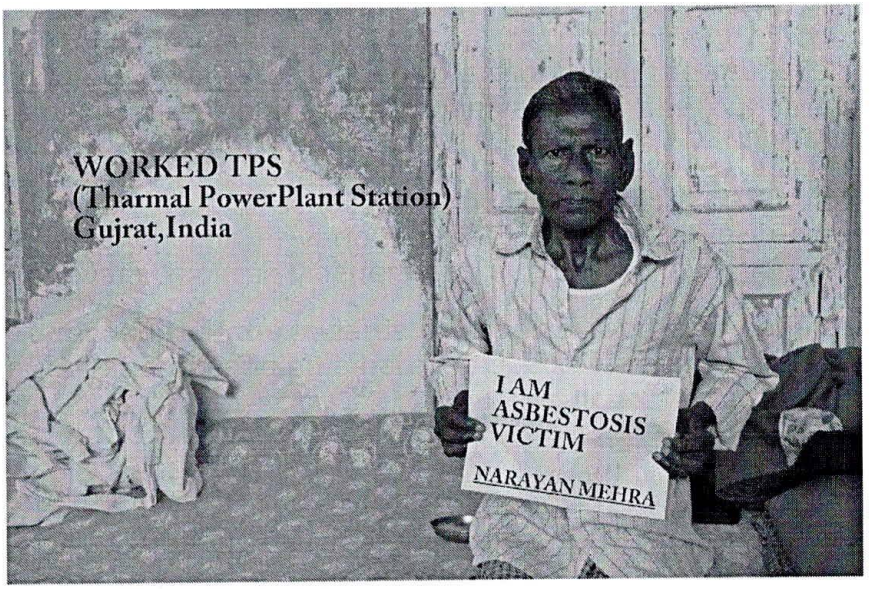
11. The anger of the villagers and residents in Odisha on the government inaction resulted in a road blockade of an asbestos cement plant bringing the production to a grinding halt. The plant was running with connivance of the authorities despite the clearance being cancelled earlier.

12. In Bihar, the villagers inspired by the school text books are fighting against setting up of Asbestos cement plants in various areas. The chief minister has assured to look into the grievances of the villagers.

13. National trade unions are recognizing the hazards of Asbestos and many affiliate unions of BWI and IndustriAll are demanding a ban on Asbestos.

"Scientific" Report by NIOH

In 2004, the Ministry of Chemicals and Fertilisers, Government of India, commissioned the National Institute of Occupational Health (NIOH), a premier research institute under the Indian Council of Medical Research (ICMR), to conduct a study titled Study of Health Hazards / Environment Hazards resulting from use of Chrysotile Variety of Asbestos in the country. Total Cost of study was initially INR 59.66 lakhs (USD 115,000) with INR 16 lakhs (USD 31,000) being contributed by the industry.



The study was commissioned in the light of the proposed inclusion of Chrysotile in the Prior Informed Consent (PIC) list of the Rotterdam Convention, which was recommended for listing twice by the Chemical Review Committee of the

Convention in 2005 and 2006. The Government of India's decision to base its position on science is indeed a laudable one. However, there have been serious methodological flaws in the way the study was designed, conducted, 'reviewed' and interpreted as has been pointed out since 2008 by public health scientists, Indian national trade unions and health activists.

NIOH has submitted the final version of the report to the Government. The draft report was not placed in public domain for comments even though comments from the industry associations were invited, received and incorporated. Although India changed its stance in 2010 and agreed to include asbestos in the PIC list, in COP 6 held in 2013, the GOI came back with the 'final' NIOH study to 'claim' that there was "no" health problem associated with Chrysotile asbestos use in India and therefore India was not going to support the listing anymore.

The criteria for selection of workers for the study expose a deliberate attempt by NIOH to 'not' find cases of asbestos related illnesses. For instance, no retired workers were selected for the study or some workers who had worked only for 5 years were chosen for the study. In one factory, the mean age of workers was 27.4 ± 6.5 (range 18-45 years). 71% were up to 30 years of age. Mean job duration was 4.5 ± 3.2 years. Minimum experience was 1 year and majority had experience of work up to 5 years. It is well known that asbestos related disorders have an extremely long latency period which can sometimes be more than 30 years.

On reading the 'final' NIOH study (2013), Dr Terracini commented:

"This report describes several cross sectional studies on active workers in asbestos working plants (and one on the general population living around an asbestos plant). This study design does not allow for any estimate of the occurrence of chronic (frequently lethal) conditions known to be caused by asbestos exposure, which require a latent period of many years. The incidence/mortality of such conditions cannot be estimated among active workers. It would require data on all workers who have been active in each plant, over the last (say, at least) 30 years after onset of exposure. Thus, this report cannot be used for claiming "harmlessness" of asbestos used in India."

"In addition, in the revision of the literature, the report omits to mention findings regarding the carcinogenicity of Chrysotile, which have led the International Agency of Cancer of the World Health Organization to describe Chrysotile as a carcinogen for the human species."

Conclusion

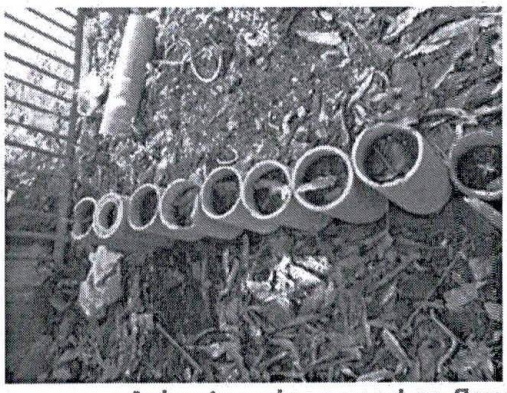
The apparent demand of asbestos is estimated to be 393 thousand tonnes by 2011-12 and 605 thousand tonnes by 2016-17 with 9% growth rate as per the Report of the Working Group for 12th Plan. The lessons learned by richer nations like the U.K. and Germany, which banned asbestos in factories decades ago, are slow to take

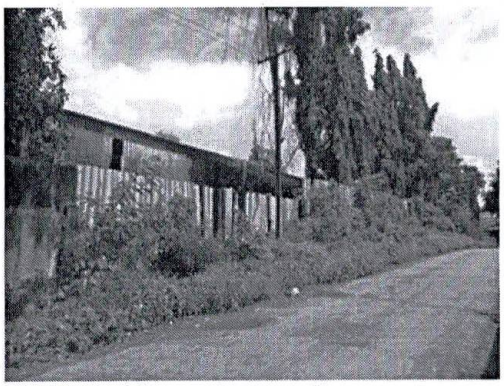
hold in India, where demand for a sturdy material to make roofs for millions of slum-dwellers serving the world's second fastest-growing major economy has overpowered concerns about worker safety

India faces a "looming time bomb" of serious health problems in workers because companies aren't penalized for compromising on employee safety and most doctors don't know how to diagnose occupational diseases. The government needs to urgently get its act together and immediately ban use of all forms of asbestos to prevent a silent Bhopal Disaster which is waiting to happen. There is currently a great policy paralysis and indecision on the part of the government with respect to Asbestos. On one hand the government states to an international audience that it is committed to ban asbestos but the actions and policies go in the opposite direction. More and more plants are given clearances and expansions without considering the effects on the workers and the general public. Absence of data is considered as a proof for the safety of the product but the officials fail to acknowledge the real reasons for lack of data – misdiagnosis, non-adherence to norms and no penal action for offences. Further, removal of asbestos remains a big challenge and an unacknowledged problem. Asbestos roofs and pipes are being removed from various places and agencies in an unscientific way creating problems even for the general public in the vicinity. Once asbestos is placed in buildings and infrastructure in communities, it stays there for decades, causing harm to health of countless men women and children, particularly as it deteriorates, is broken, is cut, gets re-used for other purposes, gets dumped. It is truly a deadly ticking time bomb that continues for years and years to create more victims. The cost of removing damaged and broken asbestos products, or remediation of damaged asbestos products, is colossal and represents a huge economic burden that we are wantonly placing on future generations. There is an immediate need to identify all victims of Asbestos related disorders and provide medical treatment, rehabilitation and compensation and ensure that the culprits and capitalists who have earned huge profits while endangering lives of innocent workers are brought to justice. These future victims will create a huge health burden on the already sparse resources of the country and thus an immediate ban on the use of this material is of utmost importance.

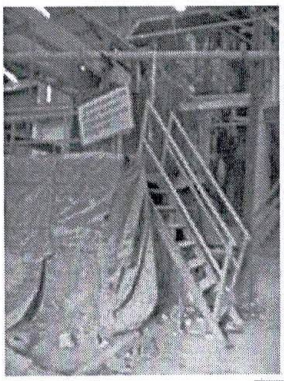
Photo Gallery

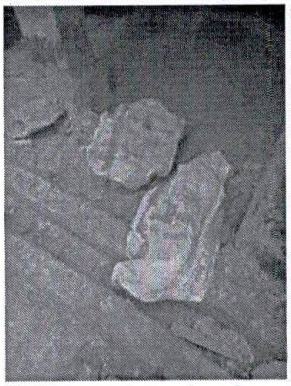
Asbestos Fibre bags collected by Raghunath Manwar from GCCL





Asbestos pipes used as flower pots and boundary wall





Asbestos fibre bags were seen inside the factory. Boundary wall made of Asbestos pipes.

The ILO position on safety in the use of asbestos[1]

06 September 2010

1. The ILO position on asbestos is governed by the international instruments (relevant Conventions and Recommendations, and International Labour Conference resolutions) adopted by the Organization, as well as ILO codes of practice. These international instruments provide solid legal bases as well as practical guidance for comprehensive preventive measures at the national and enterprise levels in order to protect workers and prevent asbestos-related diseases.

2. The ILO Asbestos Convention, 1986 (No. 162), provides for the measures to be taken for the prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos. Key provisions of Convention No. 162 concern:

    - replacement of asbestos or of certain types of asbestos or products containing asbestos with other materials or products evaluated as less harmful,
    - total or partial prohibition of the use of asbestos or of certain types of asbestos or products containing asbestos in certain work processes,
    - measures to prevent or control the release of asbestos dust into the air and to ensure that the exposure limits or other exposure criteria are complied with and also to reduce exposure to as low a level as is reasonably practicable.

3. The Occupational Cancer Convention, 1974 (No. 139), provides for the measures to be taken for the control and prevention of occupational hazards caused by carcinogenic substances and agents. Key provisions of Convention No. 139 concern:

    - periodically determining the carcinogenic substances and agents to which occupational exposure shall be prohibited or made subject to authorization or control;
    - making every effort to have carcinogenic substances and agents to which workers may be exposed in the course of their work replaced by non-carcinogenic substances or agents or by less harmful substances or agents;
    - reducing the number of workers exposed to carcinogenic substances or agents and the duration and degree of such exposure to the minimum.

4. A Resolution concerning asbestos was adopted by the International Labour Conference at its 95th Session in 2006. Noting that all forms of asbestos, including chrysotile, are classified as human carcinogens by the International Agency for Research on Cancer (IARC), and expressing its concern that workers continue to face serious risks from asbestos exposure, particularly in asbestos removal, demolition, building maintenance, ship breaking and waste handling activities, it calls for:

    - the elimination of the future use of asbestos and the identification and proper management of asbestos currently in place as the most effective means to protect workers from asbestos exposure and to prevent future asbestos-related diseases and deaths.

The Resolution also underlined that the ILO Convention on Safety in the Use of Asbestos, No. 162, should not be used to provide a justification for, or endorsement of, the continued use of asbestos.

In light of the instructions of the Governing Body following the Resolution, the Office has been:

- continuing to encourage member States to ratify and give effect to Conventions Nos. 162 and 139;

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1 http://www.ilo.org/safework/areasofwork/occupational-health/WCMS_360580/lang--en/index.htm

- promoting the elimination of the future use of all forms of asbestos and asbestos-containing materials;
- promoting the identification and proper management of all forms of asbestos currently in place; and
- encouraging and helping ILO member States to include measures in their national programmes on occupational safety and health to protect workers from exposure to asbestos.

Resolution concerning asbestos, 2006[2]

ILO Resolution | 01 June 2006 (adopted by the 95th Session of the International Labour Conference, June 2006)

The General Conference of the International Labour Organization,

- Considering that all forms of asbestos, including chrysotile, are classified as known human carcinogens by the International Agency for Research on Cancer, a classification restated by the International Programme on Chemical Safety (a joint Programme of the International Labour Organization, the World Health Organization and the United Nations Environment Programme),
- Alarmed that an estimated 100,000 workers die every year from diseases caused by exposure to asbestos,
- Deeply concerned that workers continue to face serious risks from asbestos exposure, particularly in asbestos removal, demolition, building maintenance, ship-breaking and waste handling activities,
- Noting that it has taken three decades of efforts and the emergence of suitable alternatives for a comprehensive ban on the manufacturing and use of asbestos and asbestos-containing products to be adopted in a number of countries,
- Further noting that the objective of the Promotional Framework for Occupational Safety and Health Convention 2006 is to prevent occupational injuries, diseases and deaths,

1. Resolves that:
   a) the elimination of the future use of asbestos and the identification and proper management of asbestos currently in place are the most effective means to protect workers from asbestos exposure and to prevent future asbestos-related diseases and deaths; and
   b) the Asbestos Convention, 1986 (No. 162), should not be used to provide a justification for, or endorsement of, the continued use of asbestos.
2. Requests the Governing Body to direct the International Labour Office to:
   a) continue to encourage member States to ratify and give effect to the provisions of the Asbestos Convention, 1986 (No. 162), and the Occupational Cancer Convention, 1974 (No. 139);
   b) promote the elimination of future use of all forms of asbestos and asbestos containing materials in all member States;
   c) promote the identification and proper management of all forms of asbestos currently in place;
   d) encourage and assist member States to include measures in their national programmes on occupational safety and health to protect workers from exposure to asbestos; and
   e) transmit this resolution to all member States.

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2 http://www.ilo.org/safework/info/standards-and-instruments/WCMS_108556/lang--en/index.htm

Asbestos Exposure and Cancer Risk

What is asbestos?

Asbestos is the name given to six minerals that occur naturally in the environment as bundles of fibers that can be separated into thin, durable threads for use in commercial and industrial applications. These fibers are resistant to heat, fire, and chemicals and do not conduct electricity. For these reasons, asbestos has been used widely in many industries. Additional asbestos-like minerals are found in the natural environment, including erionite.

Chemically, asbestos minerals are silicate compounds, meaning they contain atoms of silicon and oxygen in their molecular structure.

Asbestos minerals are divided into two major groups: Serpentine asbestos and amphibole asbestos. Serpentine asbestos includes the mineral chrysotile, which has long, curly fibers that can be woven. Chrysotile asbestos is the form that has been used most widely in commercial applications. Amphibole asbestos includes the minerals actinolite, tremolite, anthophyllite, crocidolite, and amosite. Amphibole asbestos has straight, needle-like fibers that are more brittle than those of serpentine asbestos and are more limited in their ability to be fabricated (1, 2).

How is asbestos used?

Asbestos has been mined and used commercially in North America since the late 1800s. Its use increased greatly during World War II (3, 4). Since then, asbestos has been used in many industries. For example, the building and construction industries have used it for strengthening cement and plastics as well as for insulation, roofing, fireproofing, and sound absorption. The shipbuilding industry has used asbestos to insulate boilers, steam pipes, and hot water pipes. The automotive industry uses asbestos in vehicle brake shoes and clutch pads. Asbestos has also been used in ceiling and floor tiles; paints, coatings, and adhesives; and plastics. In addition, asbestos has been found in vermiculite-containing garden products and some talc-containing crayons.

In the late 1970s, the U.S. Consumer Product Safety Commission (CPSC) banned the use of asbestos in wallboard patching compounds and gas fireplaces because the asbestos fibers in these products could be released into the environment during use. In addition, manufacturers of electric hairdryers voluntarily stopped using asbestos in their products in 1979. In 1989, the U.S. Environmental Protection Agency (EPA) banned all new uses of asbestos; however, uses developed before 1989 are still allowed. The EPA also established regulations that require school systems to inspect buildings for the presence of damaged asbestos and to eliminate or reduce asbestos exposure to occupants by removing the asbestos or encasing it (2).

In June 2000, the CPSC concluded that the risk of children's exposure to asbestos fibers in crayons was extremely low. U.S. manufacturers of these crayons agreed to eliminate talc from their products.

In August 2000, the EPA conducted a series of tests to evaluate the risk for consumers of adverse health effects associated with exposure to asbestos-contaminated vermiculite. The EPA concluded that exposure to asbestos from some vermiculite products poses only a minimal health risk. The EPA recommended that consumers reduce the low risk associated with the occasional use of vermiculite during gardening activities by limiting the amount of dust produced during vermiculite use. Specifically, the EPA suggested that consumers use vermiculite outdoors or in a well-ventilated area; keep vermiculite damp while using it; avoid bringing dust from vermiculite into the home on clothing; and use premixed potting soil, which is less likely to generate dust (2).

The regulations described above and other actions, coupled with widespread public concern about the health hazards of asbestos, have resulted in a significant annual decline in the U.S. use of asbestos. Domestic consumption of asbestos amounted to about 803,000 metric tons in 1973, but it had dropped to about 360 metric tons by 2015 (3, 5).

What are the health hazards of exposure to asbestos?

People may be exposed to asbestos in their workplace, their communities, or their homes. If products containing asbestos are disturbed, tiny asbestos fibers are released into the air. When asbestos fibers are breathed in, they may get trapped in the lungs and remain there for a long time. Over time, these fibers can accumulate and cause scarring and inflammation, which can affect breathing and lead to serious health problems (6).

Asbestos has been classified as a known human carcinogen (a substance that causes cancer) by the U.S. Department of Health and Human Services (HHS), the U.S. Environmental Protection Agency (EPA), and the International Agency for Research on Cancer (IARC) (2, 3, 7, 8). According to IARC, there is sufficient evidence that asbestos causes mesothelioma (a relatively rare cancer of the thin membranes that line the chest and abdomen), and cancers of the lung, larynx, and ovary (8). Although rare, mesothelioma is the most common form of cancer associated with asbestos exposure. There is limited evidence that asbestos exposure is linked to increased risks of cancers of the stomach, pharynx, and colorectum (8).

Asbestos exposure may also increase the risk of asbestosis (an inflammatory condition affecting the lungs that can cause shortness of breath, coughing, and permanent lung damage) and other nonmalignant lung and pleural disorders, including pleural plaques (changes in the membranes surrounding the lung), pleural thickening, and benign pleural effusions (abnormal collections of fluid between the thin layers of tissue lining the lungs and the wall of the chest cavity). Although pleural plaques are not precursors to lung cancer, evidence suggests that people with pleural disease caused by exposure to asbestos may be at increased risk for lung cancer (2, 9).

•Erionite has also been classified as a known human carcinogen by IARC (8) and by HHS (3). It is not currently regulated by the EPA.

Who is at risk for an asbestos-related disease?

Everyone is exposed to asbestos at some time during their life. Low levels of asbestos are present in the air, water, and soil. However, most people do not become ill from their exposure. People who become ill from asbestos are usually those who are exposed to it on a regular basis, most often in a job where they work directly with the material or through substantial environmental contact.

Since the early 1940s, millions of American workers have been exposed to asbestos. Health hazards from asbestos fibers have been recognized in workers exposed in the shipbuilding trades, asbestos mining and milling, manufacturing of asbestos textiles and other asbestos products, insulation work in the construction and building trades, and a variety of other trades. Demolition workers, drywall removers, asbestos removal workers, firefighters, and automobile workers also may be exposed to asbestos fibers. Studies evaluating the cancer risk experienced by automobile mechanics exposed to asbestos through brake repair are limited, but the overall evidence suggests there is no safe level of asbestos exposure (3, 8). As a result of government regulations and improved work practices, today's workers (those without previous exposure) are likely to face smaller risks than did those exposed in the past.

Individuals involved in the rescue, recovery, and cleanup at the site of the September 11, 2001, attacks on the World Trade Center (WTC) in New York City are another group at risk of developing an asbestos-related disease. Because asbestos was used in the construction of the North Tower of the WTC, when the building was attacked, hundreds of tons of asbestos were released into the atmosphere. Those at greatest risk include firefighters, police officers, paramedics, construction workers, and volunteers who worked in the rubble at Ground Zero. Others at risk include residents in close proximity to the WTC towers and those who attended schools nearby. These individuals will need to be followed to determine the long-term health consequences of their exposure (10). However, it is important to note that any symptoms these individuals experience may be related to exposure to debris components other than asbestos.

Although it is clear that the health risks from asbestos exposure increase with heavier exposure and longer exposure time, investigators have found asbestos-related diseases in individuals with only brief exposures. Generally, those who develop asbestos-related diseases show no signs of illness for a long time after exposure. It can take from 10 to 40 years or more for symptoms of an asbestos-related condition to appear (2).

There is some evidence that family members of workers heavily exposed to asbestos face an increased risk of developing mesothelioma (11). This risk is thought to result from exposure to asbestos fibers brought into the home on the shoes, clothing, skin, and hair of workers. To decrease these exposures, Federal law regulates workplace practices to limit the possibility of asbestos being brought home in this way. Some employees may be required to shower and

change their clothes before they leave work, store their street clothes in a separate area of the workplace, or wash their work clothes at home separately from other clothes (2).

Cases of mesothelioma have also been seen in individuals without occupational asbestos exposure who live close to asbestos mines (11).

What factors affect the risk of developing an asbestos-related disease?

Several factors can help to determine how asbestos exposure affects an individual, including:

- Dose (how much asbestos an individual was exposed to)
- Duration (how long an individual was exposed)
- Size, shape, and chemical makeup of the asbestos fibers
- Source of the exposure
- Individual risk factors, such as smoking and pre-existing lung disease
- Genetic factors, such as having a germline mutation in *BAP1*(12)

Although all forms of asbestos are considered hazardous, different types of asbestos fibers may be associated with different health risks. For example, the results of several studies suggest that amphibole forms of asbestos may be more harmful than chrysotile, particularly for mesothelioma risk, because they tend to stay in the lungs for a longer period of time (1, 2).

How does smoking affect risk?

Many studies have shown that the combination of smoking and asbestos exposure is particularly hazardous. Smokers who are also exposed to asbestos have a risk of developing lung cancer that is greater than the individual risks from asbestos and smoking added together (3, 6). There is evidence that quitting smoking will reduce the risk of lung cancer among asbestos-exposed workers (4). Smoking combined with asbestos exposure does not appear to increase the risk of mesothelioma (9). However, people who were exposed to asbestos on the job at any time during their life or who suspect they may have been exposed should not smoke.

How are asbestos-related diseases detected?

Individuals who have been exposed (or suspect they have been exposed) to asbestos fibers on the job, through the environment, or at home via a family contact should inform their doctor about their exposure history and whether or not they experience any symptoms. The symptoms of asbestos-related diseases may not become apparent for many decades after the exposure. It is particularly important to check with a doctor if any of the following symptoms develop:

- Shortness of breath, wheezing, or hoarseness

- A persistent cough that gets worse over time
- Blood in the sputum (fluid) coughed up from the lungs
- Pain or tightening in the chest
- Difficulty swallowing
- Swelling of the neck or face
- Loss of appetite
- Weight loss
- Fatigue or anemia

A thorough physical examination, including a chest x-ray and lung function tests, may be recommended. The chest x-ray is currently the most common tool used to detect asbestos-related diseases. Although chest x-rays cannot detect asbestos fibers in the lungs, they can help identify any early signs of lung disease resulting from asbestos exposure (2).

A lung biopsy, which detects microscopic asbestos fibers in pieces of lung tissue removed by surgery, is the most reliable test to confirm exposure to asbestos (2). A bronchoscopy is a less invasive test than a biopsy and detects asbestos fibers in material that is rinsed out of the lungs (2). It is important to note that these procedures cannot determine how much asbestos an individual may have been exposed to or whether disease will develop. Asbestos fibers can also be detected in urine, mucus, and feces, but these tests are not reliable for determining how much asbestos may be in an individual's lungs (2).

How can workers protect themselves from asbestos exposure?

The **Occupational Safety and Health Administration (OSHA)** is a component of the U.S. Department of Labor (DOL) and is the Federal agency responsible for health and safety regulations in maritime, construction, manufacturing, and service workplaces. OSHA established regulations dealing with asbestos exposure on the job, specifically in construction work, shipyards, and general industry, that employers are required to follow. In addition, the **Mine Safety and Health Administration (MSHA)**, another component of DOL, enforces regulations related to mine safety. Workers should use all protective equipment provided by their employers and follow recommended workplace practices and safety procedures. For example, National Institute for Occupational Safety and Health (NIOSH)-approved respirators that fit properly should be worn by workers when required.

Workers who are concerned about asbestos exposure in the workplace should discuss the situation with other employees, their employee health and safety representative, and their employers. If necessary, OSHA can provide more information or make an inspection. Information about regional offices can also be found on OSHA's website at https://www.osha.gov/html/RAmap.html.

More information about asbestos is available on OSHA's *Asbestos*page, which has links to information about asbestos in the workplace, including what OSHA standards apply, the hazards of asbestos, evaluating asbestos exposure, and controls used to protect workers. OSHA's national office can be contacted at:

Office of Public Affairs
Occupational Safety and Health Administration
U.S. Department of Labor
202–693–1999
1–800–321–6742 (1–800–321–OSHA)
1–877–889–5627 (TTY)
https://www.osha.gov/workers (workers' page)

Mine workers can contact MSHA at:

Office of Public Affairs
Mine Safety and Health Administration
U.S. Department of Labor
202–693–9400
https://www.msha.gov
https://www.msha.gov/support-resources/forms-online-filing/2015/10/15/hazardous-condition-complaint (Hazardous Condition Complaint)

The National Institute for Occupational Safety and Health (NIOSH), which is part of the Centers for Disease Control and Prevention (CDC), is another Federal agency that is concerned with asbestos exposure in the workplace. NIOSH conducts asbestos-related research, evaluates work sites for possible health hazards, and makes exposure control recommendations. In addition, NIOSH distributes publications on the health effects of asbestos exposure and can suggest additional sources of information. NIOSH can be contacted at:

Education and Information Division
Information Resources Branch
National Institute for Occupational Safety and Health
1–800–CDC–INFO (1–800–232–4636)
https://www.cdc.gov/niosh

What programs are available to help individuals with asbestos-related diseases?

Some people with asbestos-related illness may be eligible for **Medicare** coverage. Information about benefits is available from Medicare's Regional Offices, located in 10 major cities across the United States and serving specific geographic areas. The Regional Offices serve as the agency's initial point of contact for beneficiaries, health care providers, state and local governments, and the

general public. General information about Medicare is available by calling toll-free 1–800–633–4227 (1–800–MEDICARE) or by visiting the Medicare website.

People with occupational asbestos-related diseases also may qualify for financial help, including medical payments, under state workers' compensation laws. Because eligibility requirements vary from state to state, workers employed by private companies or by state and local government agencies should contact their state workers' compensation board. Contact information for state workers' compensation officials may be found at the U.S. Department of Labor (DOL) website.

If exposure occurred during employment with a Federal agency, medical expenses and other compensation may be covered by the **Federal Employees' Compensation Program**, which is administered by the DOL **Employment Standards Administration's Office of Workers' Compensation Programs**. This program provides workers' compensation benefits to Federal (civilian) employees for employment-related injuries and diseases. Benefits include wage replacement, payment for medical care, and, where necessary, medical and vocational rehabilitation assistance in returning to work. Benefits may also be provided to dependents if the injury or disease causes the employee's death.

In addition, the **Longshore and Harbor Workers' Compensation Program** provides benefits to longshoremen, harbor workers, other maritime workers, and other classes of private industry workers who are injured during the course of employment or suffer from diseases caused or worsened by conditions of employment. Information about eligibility and how to file a claim for benefits under either of these programs is available from:

Office of Workers' Compensation Programs
Employment Standards Administration
U.S. Department of Labor
1–866–692–7487 (1–866–OWCPIVR)
202–693–0040 (**Federal Employees' Compensation Program**)
202–693–0038 (**Longshore and Harbor Workers' Compensation Program**)
https://www.dol.gov/owcp

Eligible veterans may receive health care at a **Department of Veterans Affairs (VA)** Medical Center for an asbestos-related disease. Veterans can receive treatment for service-connected and nonservice-connected medical conditions. Information about eligibility and benefits is available from the VA Health Benefits Service Center at 1–877–222–8387 (1–877–222–VETS) or on the VA website.

What other organizations offer information related to asbestos exposure?

The organizations listed below can provide more information about asbestos exposure.

The **Agency for Toxic Substances and Disease Registry (ATSDR)** is the principal Federal agency responsible for evaluating the human health effects of exposure to hazardous substances. This agency works in close collaboration with local, state, and other Federal agencies, with tribal governments, and with communities and local health care providers to help prevent or reduce harmful human health effects from exposure to hazardous substances. The ATSDR provides information about asbestos and where to find occupational and environmental health clinics. The ATSDR can be contacted at:

Agency for Toxic Substances and Disease Registry
1–800–232–4636 (1–800–CDC–INFO)
1–888–232–6348 (TTY)
https://www.atsdr.cdc.gov/

The **U.S. Environmental Protection Agency (EPA)** regulates the general public's exposure to asbestos in buildings, drinking water, and the environment. The EPA offers a Toxic Substances Control Act (TSCA) Hotline and an Asbestos Ombudsman. The TSCA Hotline provides technical assistance and information about asbestos programs implemented under the TSCA, which include the Asbestos School Hazard Abatement Act and the Asbestos Hazard Emergency Response Act. The Asbestos Ombudsman focuses on asbestos in schools and handles questions and complaints. Both the TSCA Hotline and the Asbestos Ombudsman can provide publications on a number of topics, particularly on controlling asbestos exposure in schools and other buildings. The Ombudsman operates a toll-free hotline for small businesses, trade associations, and others seeking free, confidential help.

The EPA website includes a list of EPA state asbestos contacts. In addition, EPA's *Asbestos* page provides links to information about asbestos and its health effects, including suggestions for homeowners who suspect asbestos in their homes, and laws and regulations applicable to asbestos. Questions may be directed to:

U.S. Environmental Protection Agency
202–554–1404 (TSCA Hotline)
1–800–368–5888 (Asbestos Ombudsman)
https://www.epa.gov/asbestos

Another EPA resource that may be of interest is the brochure titled *Current Best Practices for Preventing Asbestos Exposure Among Brake and Clutch Repair Workers*. Released in April 2007, this brochure includes work practices for both automotive professionals and home mechanics that may be used to avoid asbestos exposure. It also summarizes existing OSHA regulatory requirements for professional auto mechanics.

The **U.S. Consumer Product Safety Commission (CPSC)** is responsible for protecting the public from unreasonable risks of serious injury or death from more than 15,000 types of consumer products, including asbestos, under the agency's jurisdiction. The CPSC maintains a toll-free 24-hour hotline where callers can obtain product safety and other agency information and report

unsafe products. In addition, CPSC publications provide guidelines for repairing and removing asbestos, and general information about asbestos in the home. CPSC can be contacted at:

Office of Information and Public Affairs
U.S. Consumer Product Safety Commission
(301) 504-7923 (M-F 8 am - 4:30 pm ET)
1–800–638–2772 (Hotline)
301-595-7054 (TTY)
https://www.cpsc.gov/

Individuals can also contact their local or state health department with questions or concerns about asbestos.

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Related Resources

Lung Cancer—Patient Version

Malignant Mesothelioma—Patient Version

What You Need To Know About™ Lung Cancer

Reviewed: June 7, 2017

India's contentious stand on Chrysotile asbestos is a cause for concern for environmentalists

A delegation from India is currently in Geneva to negotiate key treaties regulating the trade in hazardous materials, including chemicals and waste.

HEALTH (HTTP://WWW.HINDUSTANTIMES.COM/HEALTH/) Updated: May 03, 2017 14:28 IST

Malavika Vyawahare

Chrysotile asbestos has been banned in many parts of the world for being carcinogenic but is not listed as a hazardous substance under the Rotterdam Convention that regulates trade in harmful substances. (HT File)

An Indian delegation led by environment secretary Ajay Narayan Jha is in Geneva to negotiate some of the most important environmental treaties dealing with trade in hazardous chemicals and waste.

Environmentalists are paying close attention to India's stand on Chrysotile asbestos, a substance that has been banned in many parts of the world for being carcinogenic but is not listed as a hazardous substance under the Rotterdam Convention that regulates trade in hazardous substances.

"Chrysotile asbestos should be listed as a hazardous substance under the Rotterdam Convention," said Gopal Krishna of Toxics Watch Alliance, an India-based non-governmental organisation, adding, "all it does is places the onus on exporters of the material to another country to obtain prior informed consent (PIC)."

India's stand on the listing of the substance has been far from consistent. In 2011, the Indian delegation came out in favour of including it in the list, receiving a standing ovation for taking the stand. At the next convention in 2013, India reversed its stand based on a study by the National Institute of Occupational Health, that has been widely discredited.

This ambiguity has persisted with the government's statements not lining up with its actions. Last year, the environment minister for state Anil Madhav Dave said they were looking for alternatives to asbestos while maintaining that there were no studies from India linking Chrysotile asbestos to health impacts.

"Since the use of asbestos is affecting human health, its use should gradually be minimised and eventually end. As far as I know, its use is declining. But it must end," Dave said.

The largest Chrysolite producing and exporting countries have blocked proposals to have it included in the hazardous substances list. In the last Rotterdam Conference of Parties in 2015 eight countries opposed such a move: Russia, Kazakhstan, India, Kyrgyzstan, Pakistan, Cuba, and Zimbabwe. Russia is the largest asbestos producer, while India is the biggest importer of the substance.

The PIC mechanism allows countries to which a substance is being exported to have a say in whether they wish to allow future shipments of the hazardous substances. Currently, 47 chemicals are listed in Annex III of the Rotterdam Convention, of which 33 are pesticides and 14 industrial chemicals, are subject to this requirement.

Chrysotile asbestos is a variant of asbestos that industry representatives claim is not as hazardous to human health as other forms of Asbestos. It is predominantly used in asbestos cement building materials, which are used mostly in developing countries.

Over 50 countries including European Union, Japan and Australia have banned the use of Asbestos altogether.

It may be less harmful but it is far from benign, according to the World Health Organisation. "Asbestos (actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite) has been classified by the International Agency for Research on Cancer as being carcinogenic to humans," a 2014 WHO report (http://www.who.int/ipcs/assessment/public_health/chrysotile_asbestos_summary.pdf)said.

PROGRAMME OBJECTIVE SERIES:
PROBES/123/2008 – 2009

HUMAN HEALTH RISK ASSESSMENT STUDIES IN ASBESTOS BASED INDUSTRIES IN INDIA

CENTRAL POLLUTION CONTROL BOARD
(MINISTRY OF ENVIRONMENT AND FORESTS)
Website : www.cpcb.nic.in e-mail : cpcb@nic.in
August, 2008

130 pages

FOREWORD

The Central Pollution Control Board has published a number of documents under the Programme Objective Series (PROBES), regarding environmental issues and preventive & control measures for pollution. The present document, on the Human Health Risk Assessment Studies in Asbestos based Industries in India, is the latest such document. The Central Pollution Control Board through the Industrial Toxicology Research Centre, Lucknow, undertook the study for this document.

Asbestos is mainly used for manufacturing asbestos-cement sheets, asbestos-cement pipes, brake lining, clutch lining, asbestos yarn & ropes, gaskets & seals etc. Organised asbestos industrial units are mostly using imported chrysotile variety of asbestos. The indigenous asbestos is mostly used by the unorganized sector. This report provides detailed information on human risk of asbestos exposure and its health effects. The study includes asbestos monitoring at work environment, characterization and toxicity of indigenous asbestos, occupational and personal histories of workers, their clinical examinations, lung function tests and chest radiological examinations. It appears from the present investigation that unorganized units have poor industrial hygiene conditions. The report also recommends various preventive measures to reduce the risk of workers exposed to asbestos.

I would like to express our sincere appreciation for the work done by the team of Industrial Toxicology Research Centre, Lucknow. The suggestions made by the Project Advisory Committee members were valuable. The efforts made by my colleagues Sh. P.K. Gupta, Environmental Engineer and Sh. J.S. Kamyotra, Additional Director for coordinating the Study and for finalizing the Report under the guidance of Dr. B. Sengupta, Member Secretary, CPCB, deserve appreciation.

We in CPCB hope that this Study will be useful to the Asbestos manufacturing units, regulatory agencies, research organizations and to all those interested in pollution control.

27th May 2008

(J. M. Mauskar)

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CHAPTER 1.0

INTRODUCTION

1.1 Background

According to Pooley (1972), Piney was the first author to use the word "asbestos" referring to a fibrous mineral of Greek derivation which means "inextinguishable" or "unquenchable". The word "asbestos" is defined in Webster's Medical Dictionary as "a mineral that readily separates into long flexible fibres suitable for use as non-combustible, non-conducting, chemically resistant material".

Asbestos is a naturally occurring hydrated mineral silicate that crystallizes in fibrous form (Mossman et al., 1990b). Mineralogically asbestos can be classified into two major groups; the Serpentine, which includes the most abundant variety of asbestos i.e. Chrysotile and the Amphibole which includes Actinolite, Amosite, Anthophyllite, Crocidolite and Tremolite (Mossman et al., 1996, ATSDR, 2001). Both groups have different physico–chemical nature. Chrysotile is curly and stranded structure whereas amphiboles are straight and rod like structures (ATSDR). Amphiboles are generally more brittle and appear to be dustier and more fibrogenic than chrysotile (Mossman et al., 1990 ; Mossman and Gee, 1989).

Asbestos fibres bear unique properties of a high tensile strength, resistance to heat and many chemicals without having any detectable odor. Mineralogists some times refer that the minerals crystallize into bundles of thousands of flexible fibrils that look like organic fibres. Terms that are sometimes used to describe asbestos or similar minerals include fiber, fibrous, asbestiform and acicular. The term fibrous is used to describe a crystallization habit in which the fibres have a high tensile strength and flexibility than crystals in other parts of the same mineral; asbestiform is generally synonymous with fibrous or sometimes it means "like asbestos"; and acicular" refer to a crystal that has a needle-like form.

Even though the use of asbestos was known to medieval India, it was commercially exploited only since the beginning of this century. Asbestos is attractive in a broad variety of industrial applications because of its resistance to heat and chemicals, high tensile strength, and lower cost compared to man-made minerals. At the peak of its demand, about 3,000 applications or types of products were of asbestos-based (Ramanathan and Subramaniam, 2001). Asbestos is used for the manufacture of a variety of asbestos-based products mainly as asbestos-cement (AC) sheets, AC pipes, brake shoes, brake linings, clothes and ropes. AC industry is by far the largest user of asbestos fibre worldwide accounting for about 85% of all uses. Asbestos is also incorporated into cement construction materials (roofing, shingles, and cement pipes), friction materials (brake linings and clutch pads), jointing and gaskets, asphalt coats and sealants, and other similar products. As a result of these applications, an estimated 20% buildings including hospitals, schools and other

public and private structures contain asbestos containing materials (ACM). Asbestos in building does not spontaneously releases fibres, but physical damage to ACM by decay, renovation or demolition can cause release of airborne fibres.

Asbestos in air at work environment is a major cause of adverse effects on health of industrial workers. Industrialization and modernization with recent developments enhanced the demand and consumption of asbestos thus increasing the risk of exposure to asbestos.

1.2 Classification of Asbestos

1.2.1 Serpentine Group

1.2.1.1Chrysotile

Chrysotile, the only representative of serpentine, also called as white asbestos accounts for over 90% of the world's production of asbestos. Chrysotile is a sheet silicate, composed of planar-like silica tetrahedral with an overlying layer of brucite. The silica-brucite sheets are slightly warped because of structural mismatch, resulting in the propagation of a rolled scroll that forms a long hollow tube. These tubes form the composite fiber bundle of chrysotile. Some trace oxides are always present as a result of contamination during the formation of the mineral in the host rock. Chrysotile asbestos is composed of soft, silky, long, flexible, pliable, and curly and they tend to form bundles that are often curvilinear with splayed ends. Hydrogen bonding and/or extra fibril solid matter holds such bundles together. The individual fibres take the shape of spirally winded tubes. It is the cylindrical structure of fibre responsible for its fibrous natures. Chrysotile fibres naturally occur in length varying from 1 to 20 mm, with occasional specimens as long as 100 mm. In India, chrysotile fibres occur as thin veins of 10 mm to 100 mm thickness in serpentine rocks (Ramanathan and Subramaniam, 2001). In comparison to amphiboles, chrysotile is less resistant to heat.

1.2.2 Amphibole Group

The amphibole minerals are double chain of silica tetrahedral, cross-linked with bridging cations. The hollow central core typical for chrysotile is lacking. Amphibole fibres are generally more brittle and appear to be dustier and occur as pocket deposit in ultramafic rock.

1.2.2.1 Crocidolite

Typical crocidolite fibres bundles early disperse into fibres that are shorter and thinner than that of other amphibole asbestos fibres. It is also called as 'blue asbestos' because of its colour and possess fair spin ability.

1.2.2.2 Amosite

Amosite varies in color from yellow to gray to black brown. Tensile strength is much less than that of chrysotile or crocidolite, and it has only fair spin ability and poor resistance to heat. It is also called as 'brown asbestos'.

`Indian asbestos cement not a health hazard'

R.Y. Narayanan

Coimbatore , Oct. 20

THE Indian asbestos fibre cement is not a health hazard, as asbestos is perceived to be in the US, where the industry is facing flak for asbestos-related health problems.

The applications to which the asbestos cement is used in India is also different from asbestos use in the US and studies (of employees) conducted in factories manufacturing fibre cement sheets in India have not shown any occupational hazard caused by exposure to this product, according to an industry executive.

Speaking to *Business Line*, Mr Manish Sanghi, Executive Director (Marketing), Everest Industries Ltd (EIL), said Indians have been living under asbestos-roofed buildings for a long time and they "haven't seen anything happening to them" for generations.

He had seen photographs of buildings in the company that were taken in 1930s that reinforce this belief.

Asked about fears of asbestos causing health hazards, he said "asbestos is harmful, asbestos cement is not harmful". He said asbestos was a small fibre that was mined and if one inhaled that over a long period of time, it accumulated in the lungs and caused `asbestosis'. But when this is mixed with cement, one does not inhale it.

He said the company conducted a small study which showed that for a person working in the factory manufacturing asbestos fibre cement roofing sheets, where the exposure is "likely to be the maximum", it "would take him about 800 years to have a 5 per cent chance of getting the disease" which effectively means that nothing would happen during his lifetime.

Mr Manish Sanghi, whose company is manufacturing fibre cement roofing materials and interior building boards and has factories in four locations across the country, said the company conducted a small survey at its units near Coimbatore and in Kymore in Madhya Pradesh of people who had retired after working for 30 years to 40 years and checked their health status.

He said, "We have not found a single case of anybody having any asbestos-related diseases".

When pointed out that in the US asbestos was perceived to be causing health hazards, the EIL official said in the US, asbestos was used "primarily for insulation purposes".

For insulation use, it was sprayed and people inhaled it. In the US, the context was insulation and in India it was fibre cement (in a cement matrix). The two were entirely different.

He said asbestos, a fibrous silicate mineral that is incombustible, was being imported since mining of asbestos was not allowed in India.

Among the asbestos varieties, blue and brown caused more harm than the white variety. In the US, the first two were largely used. For sheeting purposes in India, the white asbestos variety was being used.

It was imported from Russia, Canada, Zimbabwe and Brazil in a fibre form by his company.

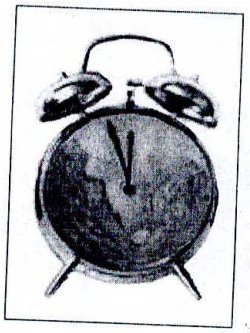
Mr Manish Sanghi said the raw asbestos would not come into any direct human contact during manufacture of sheets in any factory in India and the raw

material was fed into the system with its packing intact.

The asbestos fibre roofing has a market size of 1.5 million tonnes per year in the country and has been growing at the rate of 10 per cent per annum in the past four or five years.

INDIA'S ASBESTOS TIME BOMB

Edited by David Allen and Laurie Kazan-Allen



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About IBAS

The International Ban Asbestos Secretariat (IBAS) was established in 1999; it is an independent non-governmental organization which has two objectives: a worldwide ban on asbestos and justice for all asbestos victims. IBAS monitors, analyzes and disseminates news received from the ever-expanding network of individuals and groups involved in the international movement against asbestos, as well as information from legal, medical and industry sources. IBAS produces written material and organizes conferences to raise the profile of asbestos issues.

The work of IBAS is coordinated by Laurie Kazan-Allen.

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THE GRIM REALITY

"Everything I have in my life is due to (my employer) Saint-Gobain including my lung cancer."
Asbestos cancer victim, Sebastião Aparecido Alves da Silva, Brazil

"I used to be an athlete once, now if I even walk a little faster or climb a few flights of stairs, I am breathless. I can't even run a few paces."
Asbestosis sufferer, Ravindra Ganpat Mohite, India

"The pain is very strong, it [is] right through my chest and between my shoulders. I feel like an empty vessel which does not have lungs and a heart inside."
Asbestos sufferer, Lenora Lands, South Africa

"I loved my father, but I hate asbestos."
Ms. Kazumi Yoshizaki, daughter of Japanese mesothelioma victim

"I have lost my father, mother and one brother to asbestos cancer; of the rest of our family, one brother is battling mesothelioma and I have pleural plaques. My other two brothers appear, for the time being, free of any sign of asbestos-related disease but the sword of Damocles hangs over us all."
Eric Jonckheere, family member, Belgium

"My husband Alan paid the ultimate price for his exposure to asbestos – his life. One life lost to an asbestos-caused disease is tragic; hundreds of thousands of lives lost is unconscionable."
Mrs. Linda Reinstein, U.S.

"Asbestos diseases and asbestos cancers claim hundreds of thousands of lives each year. They are not legal inconveniences, political obstacles or financial statement entries. They are death and suffering incarnate."
Dr. Michael R. Harbut, U.S.

"I started with 25 (fellow workers). There's two of us left, the others are dead with asbestos. The graveyard is full of my (trade union) members. I have a black tie I constantly wear, attending funerals of asbestos cases."
UK asbestos worker and trade unionist Joe Cowell

PREFACE RAVINDRA GANPAT MOHITE

I was 21 years old when I joined the workforce of Hindustan Ferodo's Ghatkopar factory in the north of Mumbai (1973). I worked there for 33 years until 2006, when the factory, now called Hindustan Composites Limited (HCL), was closed down and workers were compelled to take early retirement under a voluntary retirement scheme.

My brother used to work for HCL and suggested that I get a job at the factory. I did not have any idea of the factory or what it manufactured. When I started, I was given the job of maintaining the machinery in the asbestos textile manufacturing section. There were two machines with 116 spindles and my job was to ensure that these machines operated smoothly. Our section produced yarns of polyester interweaved with asbestos fibers for making fire resistant textiles.

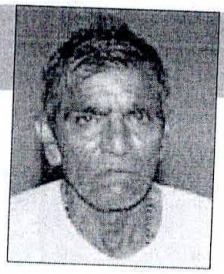
When I started work at the factory, neither I nor my colleagues knew anything about asbestos or its health effects. But during the course of our work, we noticed warning labels about dangers on drums and bags. Company officials did not tell us anything about the dangers of asbestos or the safety measures we needed to protect ourselves from hazardous exposures. It was only in 2004, 31 years after I started working with asbestos, that I came to know about the health impact of asbestos, through an initiative of our Union and a health check-up at the factory gate by members of the Occupational Health and Safety Centre. The factory management never told us anything. There were periodic health check-ups conducted by the company, which were done frequently earlier, but later infrequently. No data or diagnosis reports were ever shared with us. The company doctors looked at our health reports and X-rays 6-7 months after the check-ups or tests were done and never told us anything.

Although we were not told about the harm of asbestos, we were sometimes given cotton masks to wear. There was no air suction machine fitted in the production unit to remove dust. Our workplace used to be very dusty and workers were always covered with a layer of white dust. Now I know that many of us were exposed to dangerous levels of asbestos fibers while working in the factory due to poor working conditions. I know of at least 20 of my co-workers who died in their 50s. One of my colleagues died of cancer; he was in his 40s. There are two more that are now battling with throat and lung cancer. I used to be an athlete once, now if I even walk a little faster or climb a few flights of stairs, I am breathless. I can't even run a few paces. I was diagnosed with asbestosis during the 2004 factory gate medical check-up.

Neither HCL nor the government has done anything to help the injured workers who were exposed to asbestos. While the company flatly denies the occurrence of such exposure, the Government has never stepped in to do anything beneficial for the workers. Moreover, a case filed by our Union on behalf of 36 exposed workers in 2005 in the Court is being indefinitely delayed and in the last three years only 7 to 8 workers have been cross examined.

I took voluntary retirement in 2006 after fighting the company's illegal closure of the Ghatkopar factory. I have a family of four to support. The money I got through voluntary retirement is my only source of income.

PREFACE MANGABHAI N. PATEL



In 1965, I joined Ahmedabad Electricity Corporation (now known as Torrent Power) as a casual worker. I was given a job as helper in the boiler room of the company.

I am an illiterate person. I come from Chandkheda, a small village near Gandhinagar. I was 25 years old when I came to Ahmedabad city looking for work. We had a large family and needed to support them. So I took the first job I got.

My job was to assist the skilled masons in the boiler room who did the insulation work on boilers. We used to remove or add the white insulation material packed around the boilers. There were 10-15 casual workers working with me in this section. In 1980, I was given permanent job status in the factory.

When I joined the company, I and my co-workers had no knowledge of asbestos or its effect. No one ever told us anything about it. Certainly the company did not. The only thing we knew was our factory generated electricity from coal. In fact, we used to casually handle the "white material." Due to poor maintenance in many places the insulation lining was exposed. We used to playfully throw handfuls of this "white material" at our co-workers.

The company never gave us any training for safety or protection. And as a casual worker, you cannot even ask for anything, your job is very insecure. Casual workers are treated very badly, given low wages and the most dangerous kinds of jobs in factories. They are not allowed to even unionize.

For the first 15 years of my job in the factory, while I was a casual worker, I did not get the benefit of medical check-ups that the company conducted every 2-3 years for permanent workers. After I became a permanent worker, there were medical check-ups done, but I and my colleagues never knew what the company doctors did with our reports or what were the findings. In 1990, I started developing breathing problems. I could not lift heavy objects, working, walking, talking everything became a problem. Every breath I took was painful. The company did a health check-up and said I was fine, there was no problem with me. Then why can't I breathe properly, why does it hurt so much? I did not understand.

I went to Raghunathbhai Manwar, a trade union representative in our factory, who took me to see a retired doctor, Dr. Arthur C. Clarke. They told me about asbestos and its effect on workers who get exposed to it. Dr. Clarke helped me to get a proper diagnosis of my medical condition; he also did health check-ups of my co-workers. Raghunathbhai helped to identify other workers in a similar situation. We learned we had a disease called "asbestosis." We did not know what it was, but understood that we have got this disease because of that "white material" we worked with. Finally, in 1995 I had to quit work in the boiler room due to my failing health and started working in the office on menial jobs.

In 1996, a lawyer named Rani Advani from the Consumer Education and Research Centre helped 8 of us, who were diagnosed with asbestosis, file a case in Gujarat High Court for compensation. The Court ordered the National Institute of Occupational Health to examine us. Two of the workers died before the NIOH could examine them. Two of us were diagnosed with asbestosis by the NIOH. While the High Court kept deliberating our case, my colleague Kishan Goplani died. The court ordered an interim compensation of Rs10,000 (US$ 250) be paid to me in 1997.

Meanwhile my failing health, need for medical attention and on top of that my inability to do any work was putting a lot of burden on my family. They threw me out of my own house. So I started begging near Ramji Temple to support myself. From an able-bodied worker, I was reduced to an infirm old man.

In February 2008, I received Rs160,000 (US $4000) from the company as an out-of- court settlement. I guess I was lucky to get this money. But many of my co-workers, at least 15-20 of them, who were with me in the boiler room, were not. They died quietly, painfully and in penury.

Laurie-Kazan Allen,
IBAS Coordinator, email: laurie@lkaz.demon.co.uk

INTRODUCTION LAURIE KAZAN-ALLEN

"Historically the burden of industrial pollution has reached the developing world much faster than the fruits of industrial growth," writes Dr. Sanjay Chaturvedi. This statement is well illustrated by the evolution of the asbestos industry in India. In the frantic rush for economic development, there has been a pervasive lack of concern for the health of workers and the contamination of the environment. Sacrificing the lives of the few for the "good" of the many, the Indian Government has knowingly colluded in this sad state of affairs.

"It cannot be disputed that no development is possible without some adverse effect on the ecology and environment ... The comparative hardships have to be balanced and the convenience and benefit to a larger section of the people has to get primacy over comparatively lesser hardship."[1]

Elected representatives and civil servants have been encouraged to turn a blind eye to "Dickensian" working conditions thereby exposing generations of workers to the debilitating and deadly diseases caused by asbestos.[2]

"while the machines were in operation the dust would fly and at the moment they were stopped, they would sweep out the dust and collect it to one side, with their hand... the naked hand. Just be swept up."

Mumbai factory worker

Research conducted for this monograph has revealed that between 1960-2006, 4.8 million tonnes of asbestos were used in India;[3] although data is unavailable for 2007-2008, based on figures from 2006, it is not unreasonable to estimate that cumulative asbestos consumption in India between 1960-2008 will top 5.5 million tonnes.[4] As there is no safe level of exposure to asbestos and as even minimal precautions have been lacking, phenomenal numbers of workers have received hazardous exposures. The fallout from India's asbestos mining and processing will be measured in lives lost, communities blighted and infrastructure contaminated. National and state governments in India maintain a stony silence on the collateral damage caused by the widespread use of asbestos; virtually nothing has been done to quantify the effects of environmental pollution in the wider community. The objective of this monograph is to give the people working on these issues the opportunity to present the evidence they have collected; the papers which follow constitute a damning indictment of a government that has prioritized the interests of the corporate sector above all else.

Decades of Economic Growth and Hazardous Exposures

Things could have been very different. India's commercial exploitation of asbestos began in earnest in the 1970s. Over the next 30 years, national usage grew by nearly 300%. That this industry was allowed to flourish at a time when the occupational, environmental and domestic hazards of asbestos exposure were firmly established is scandalous; that the Government of India made no attempt to track the health effects of asbestos use on at-risk workers is unforgivable. Companies like Turner & Newall, Hindustan Composites, Visaka Industries, Eternit Everest, Hyderabad Industries, Utkal Asbestos, Ramco Industries and others have profited from the manufacture of asbestos-containing products in India. As the authors of the prefaces which precede the introduction point out, employers did not inform their workforces of the nature of the raw material they were handling; neither did they provide protective clothing or equipment. The situation in asbestos textile manufacturing is described as follows by Ravindra Ganpat Mohite: "company officials did not tell us anything about the dangers of asbestos or safety measures that we need to take to protect ourselves from exposure."

In the power stations things were no better according to Mangabhai N Patel:

"When I joined the company, I and my co-workers had no knowledge of asbestos or its effect. No one ever told us anything about it. Certainly the company did not... The company never gave us any training for safety or protection."

Despite the reassurances of industry stakeholders that asbestos is being used "safely under controlled conditions," living with asbestos in India is a "dangerous existence" according to the paper by Anup Srivastava and Vipul Pandya; these authors highlight the risks to "millions of construction workers who may be exposed during maintenance, renovation and demolition activities in buildings that contain asbestos." P. Madhavan's graphic photographs confirm that hazardous conditions continue in today's workplaces while Nick Clarke's discussion of the fallout from the increasing use of asbestos-cement roofing material in India leaves the reader in little doubt as to the capacity this material has to liberate fibers in domestic settings, especially urban slums.

The Indian Government has been guilty of malign neglect in its failure to act on the asbestos hazard. Long after the health consequences of occupational exposure were known, asbestos dust counts of up to 15f/cc were recorded at Hindustan Ferodo, a British-owned company that produced asbestos textiles, jointings, millboard and brake linings in Mumbai (1978). Footage of this factory which appeared in a landmark television documentary showed clouds of asbestos dust emanating from the plant "contaminating the streets and railway tracks around the factory." A factory worker described extremely dusty conditions in the carding department: "while the machines were in operation the dust would fly and at the moment they were stopped, they would sweep out the dust and collect it to one side, with their hand... the naked hand. Just be swept up."

In the "golden corridor" of Gujarat State, occupational exposure to asbestos has been a routine occurrence for decades in a multitude of industrial sectors: power generation, ship-breaking, production of cement, insulation, chemicals, pharmaceuticals, friction materials and safety equipment. Examples of ignorance and superstition emanating from this situation are legendary such as the comment by one Chief Inspector of Factories who said that workers in Gu-

jarat were immune to asbestos: "Had it not been so," he said "large numbers of workers in Gujarat would have died of asbestos looking at the poor work conditions in Gujarat." State officials believe that Gujarat residents receive divine protection: "God is here in Gujarat... (if workers and industry) believe in God, trust in God and work with God, then production, health and safety would be in a good condition." In her paper "*Monitoring" Environmental Pollution and Asbestos Exposure in Gujarat,* Dr. Linda Waldman explains:

"Having spirituality means that, even if unsafe conditions prevail, the workers will be 'well aware' and accidents will not happen. Telepathy and sensors in their bodies will enable workers to guess that something is going to happen and to take preventative action. Following this line, some State doctors argue that the majority of illness is psychosomatic and stems from the stressful conditions workers experience. But if they can achieve a mental balance and supreme energy from their spirituality, then they will be in a much better position to deal with this. Termed 'Disaster Management with a new and unique approach,' this approach means that workers are themselves to blame for their illness and therefore should seek compensation through their beliefs and increased religious piety."

If one were to subscribe to the religious technique of disaster management as described previously, then faith must be lacking in the country's ship-breaking yards as asbestosis is rife amongst the workforce, many of whom "are migrant and casual workers driven by poverty to the Alang yards." India has attracted widespread condemnation for its willingness to import hazardous waste contained on board redundant ships, such as the Blue Lady and the Riky. By doing so, they not only expose ship-breaking workers and their families to a cocktail of toxins including asbestos, PCBs and radioactive waste, but also jeopardize the health of local people such as the 30,000 villagers in Gujarat's Bhavnagar district who have the misfortune to live in close proximity to Alang.

Miners and workers from asbestos processing units and factories in Rajasthan and Maharashtra have elevated levels of asbestosis and obstructive lung disease from occupational asbestos exposures. As described in the paper *Health Hazards Due to Asbestos Exposure in India*, Dr. Qamar Rahman observed the use of obsolete technologies, a total lack of protective clothing or equipment, poor housekeeping practices and "little concept of the proper disposal of asbestos waste" at workplaces she inspected whilst conducting a survey for the Central Pollution Control Board.

Medical Failures: Ignorance Compounded by Bias

India's medical community has not covered itself in glory in its treatment of patients with asbestos-related disease. According to Dr. Murlidhar:

"'Occupational Health' is taught as part of the much-maligned subject of Community Medicine, and students rarely have access to standard ILO radiological plates, mandatory for asbestosis diagnosis, even in the top medical colleges... there is no postgraduate degree on occupational health available at any of the major medical colleges... Consequently, even a first-ranking radiology physician, lacking the expertise to diagnose asbestosis unambiguously, may be compelled to certify an X-ray as normal when it is not."

In Gujarat this certainly happens, as shown by a case reported by Jagdish Patel in his paper *The Struggle against Asbestos-Related Diseases in Gujarat*. Workers with suspected asbestosis were adjudged to be able-bodied by the Employees State Insurance Corporation (ESIC),[5] a contributory health insurance scheme tasked with treating and compensating injured workers. When asked by the Supreme Court to clarify the criterion used to arrive at this finding, an ESIC spokesman explained "that since they had neither expertise nor any equipment to diagnose asbestosis, they issued 'fit to work' certifications." The failure of medical professionals to issue asbestos-related diagnoses, which constitutes a major roadblock to victims' attempts to obtain compensation from negligent employers, is due to multiple factors including class bias and pressure from industry and/or government to downplay the incidence of occupational illnesses by misdiagnosing asbestos-related diseases as tuberculosis or bronchitis.[6]

Company screening programs consisting of periodic X-raying of selected parts of the workforce did nothing to safeguard workers' health. Test results and health reports were nearly always withheld from workers. As far as one employer was concerned (Turner & Newall), the results of the X-rays were considered "the property of the management." In his paper, Dr. Tweedale relates the story of one Indian chest physician who:

"recalled reviewing Hindustan Ferodo films in the late 1980s and found that up to nearly a third had lung damage consistent with asbestos exposure. When he tried to take it up with the company he was told his diagnoses were wrong. It was reported that court action against the company had been totally ineffectual."

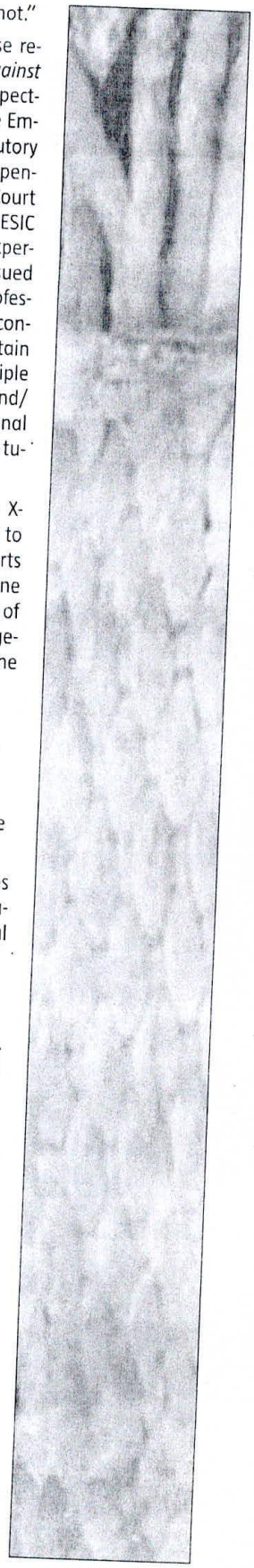
Discussions with workers from the Hindustan Composites factory were reported by Dr. Rakhal Gaitonde and Madhumita Dutta who confirmed the futility of corporate medical check-ups:

"chest X-rays and medical examinations were performed every year, they (workers) were never told of the significance of these procedures, nor were they given any results. They told us that in the early days (1960s and 1970s) chest X-rays were done even every six months and for every one without fail, but as time went by especially after the 1990s, the whole system became haphazard; if you were not present on the given day you might go without an X-ray for the entire year. It seems that the company was providing the X-ray facility to satisfy bureaucratic demands – not out of any genuine concern for the workers' health."

So much for in-house corporate healthcare at asbestos factories.

Information Black Hole: No One Knows, No One Cares

It is hard to believe that in a country with such a sophisticated judicial system, where public interest litigation to establish the rights of asbestos workers can be brought before the Supreme Court, the lack of data on asbestos-related diseases can be anything other then intentional. As Dr. Sudhakar Kamat reports in his paper *Asbestos-Related Disease in India*:



"Although mesothelioma and asbestos-related lung cancer are recognized around the world, in India neither one of these diseases is commonly reported. This is not surprising as in India, cancer is not a notifiable disease. While there are some regional cancer registries, poor data collection and inadequate death certificate registration combined with other factors result in a spectacular underestimate of asbestos-related cancer. According to data from regional cancer registries in India, between the years of 1993-1997 there were a total of 56 mesotheliomas."

As there is a powerful interaction between exposure to asbestos and cigarette smoking in the causation of asbestos-related lung cancer and as there are 120 million smokers in India, the continued use of asbestos, an acknowledged carcinogen, is no doubt contributing to a massive loss of life in India.[7]

"The question of health does not appear to be a concern in some countries where life expectancy is only 35... most people die by age 35 of other causes than old age or of a cancer that takes 35 or 40 years to grow."

President of the (Canadian) National Asbestos Society

In his discussion about *The Difficulties in the Diagnosis of Asbestosis in India*, Dr. V. Murlidhar points out that:

"Like many chronic occupational diseases asbestosis exists in a climate of uncertainty, concerning exposure controls, diagnoses and assessment of disability. Exposure limits and disability assessments are often influenced by socio-political factors, while reliable diagnoses depend on access to suitable diagnostic tools and appropriate training of clinicians. There is frequently uncertainty about the precise source of asbestos exposure, and about the nature and speed of the disease processes – despite the public perception that medicine is an exact science. This uncertainty is compounded by the lack of a clear regulatory framework and the lack of understanding among concerned parties about the limited legal regulations."

If those who contract these diseases are not counted, does their suffering count? Does anyone care about them or the bereaved families they leave behind? That former employers don't care can be surmised by their failure to pay compensation; that the government doesn't care is evinced by its failure to even acknowledge their existence.

Compensation Process: Too Little, Too Late!

Despite High Court rulings, Supreme Court orders, grassroots campaigning and detailed legislation, obtaining compensation for an asbestos-related disease in India requires the stamina of an Olympic athlete and the patience of a saint; qualities lacked by people experiencing shortness of breath and severe pain on a daily basis. Overcoming the formidable hurdles to obtaining an accurate diagnosis however is child's play compared to surmounting the barriers blocking access to compensation. Successful claimants are few and far between; those who manage to navigate their way through the system receive paltry sums:

- Rs 10,000 (then around $800) in 1984 for the death of Sri Dhiraj Sonaji, a worker in an asbestos-cement factory;
- Rs 170,000 ($4,250) paid by instalments of Rs 10,000 in 1997 and Rs 160,000 in 2008 to Mangabhai Patel, a former power plant worker incapacitated by asbestosis;
- Rs 150,000 (then $4170) in 1996 to the daughter of the late Kishan Goplani, who had worked at the Ahmedabad Electricity Company.

In Gujarat, the ESIC has compensated eight individuals for asbestos-related disease, all of whom were workers at Digvijay Cement; not one claim for these diseases has been paid out in Gujarat under the Workmen's Compensation Act. The intransigence of asbestos companies when it comes to compensating those they have injured is well known. The Manager of the Ghatkopar plant of Hindustan Composites wrote to a trade unionist:

"the conclusions drawn by you, that workmen listed are affected by asbestosis are far fetched, not supported by sound medical inferences and are with certain motives.... The company has qualified Medical Practitioners for regular check ups and maintains the records as per the rules and regulations as laid down by the Directorate of Industrial Safety & Health."

The Fix is In: Industry Control of the National Asbestos Debate

The economic interests of India's asbestos industry are furthered by strategies well-honed by international tobacco companies, including the use of industry propaganda, the commissioning of junk science masquerading as "scientific research" and personal and professional attacks on critics. It is ironic that even as big tobacco provides a role model for asbestos moguls, the synergistic effect of combining tobacco and asbestos is condemning many Indians to an early grave. A sustained and nationwide disinformation campaign designed to protect the asbestos sector from adverse publicity and unwelcome regulation has been ongoing for decades. Turner & Newall, the British-owned company which "led the way" in opening up asbestos markets in India, drew on its experience at home to advise company officials in Mumbai (1937) not to introduce dust control in the factory as to do so might create suspicions: "once the word gets around that asbestos is a dangerous occupation, it may seriously affect our labor force at some future date."[8] As in the UK, Turner & Newall executives lied to factory inspectors in order to "avoid tiresome regulations and the introduction of dangerous occupation talk." The depth of concern asbestos executives had for their workers is revealed in a statement made by T&N's Chairman Ralph Bateman in 1971:

"in many of these (developing) countries the life expectancy is so low... that the question of the very, very small risk of mesothelioma that may exist in exposure to asbestos in some situations, is totally outweighed by the contribution that asbestos pipe and other products can make..."

Canadian asbestos exporters to India agreed that the risks to Indian workers could be ignored. In 1982, Daniel Perlstein, President of the (Canadian) National Asbestos Society (Société Nationale de 'Amiante) said:

"The question of health does not appear to be a concern in some countries where life expectancy is only 35... most people die by age 35 of other causes than old age or of a cancer that takes 35 or 40 years to grow."[9]

The well-resourced and unfettered public relations campaign mounted in India by asbestos stakeholders has provided fruitful material for several authors in this monograph:

- Dr. Sanjay Chaturvedi describes a 2003-2004 media blitzkrieg by the asbestos lobby which included special supplements, "news stories," full page features and advertisements in magazines and national newspapers such as The Indian Express exonerating chrysotile asbestos;
- Madhumita Dutta presents a detailed analysis of current attempts by industry to sabotage government research into the health effects of exposure to asbestos; she categorizes the continuing use of asbestos in India as a "Crime Against Humanity";
- Dr. Richard Lemen deconstructs current global asbestos propaganda initiatives describing them as "smoke and mirrors... illusion and confusion but not fact"; he dissects the epidemiological and scientific flaws in the ongoing attempt in India to "whitewash the effects of chrysotile asbestos," citing factual errors, inappropriate methodologies, incorrect sampling techniques and unrepresentative cohorts.

Betrayal of Civil Society by the Political-Industrial Establishment

In developed countries, you can't even give asbestos away nowadays; there are laws which prevent society's use of this poisonous substance.[10] To absorb the fall in global demand for chrysotile, asbestos pushers have aggressively targeted consumers in countries with booming economies and lax health and safety regulations. They found a ready market in India as well as ruthless entrepreneurs willing to exploit a substance regardless of the potential harm it poses.

India's asbestos lobby, coordinated by the Asbestos Information Centre (AIC) and the Asbestos Cement Products Manufacturing Association, has plenty of money to throw around; business is, after all, booming as evinced by a steady increase in national chrysotile consumption. Working with stakeholders at home and abroad, asbestos events are planned and initiatives are mounted to convince Indian officials and consumers that chrysotile is indispensable; the fact that safer alternatives are available, as discussed in Nick Clarke's paper: *Potential Health Hazards of Asbestos Cement Roofing for India's Poor*, is consistently denied by vested interests. Links between Indian asbestos trade associations and their international counterparts were uncovered by Canadian emails and briefing documents obtained in 2002 by researcher Ken Rubin under the Canadian Access to Information Act:

"Over the past decade, the (Canadian) Asbestos Institute in cooperation with the Indian Asbestos Information Center (AIC), a member of the Asbestos International Association which represents the interests of the asbestos industry worldwide, has been very active in promoting and ensuring the safe use of chrysotile asbestos in India."[11]

The "Rubin dossier" contains details of a meeting between Brigadier Sethi of the AIC and Martin Barratt, Second Secretary (Commercial) of the Canadian High Commission in India in New Delhi on October 8, 2002:

"I met with Brig. Sethi of the Asbestos Information Centre this afternoon. We discussed AIC participation in the workshop on November 11 or a separate get together on November 12. Do you have any further information on whether Mine Jeffrey or LAB (Canadian asbestos mining companies) are participating in this mission? The AIC membership is meeting this Friday (Oct. 11) and Sethi will gauge interest in setting up one on one meetings for the 12th. I also advised him that some of the delegation will be in Hyderabad or Kolkata and he will inform me of interest in those cities as well."[12]

The Canadian files document steps taken by Canadian chrysotile suppliers to influence India's asbestos debate:

"Since the Indian market is well known by LAB and the client base well established, these dinners are not expected to result in additional business. What is essential at this time is to ensure continued market access for chrysotile asbestos. As you know, the Indian iron and steel industry as (sic) been undermining the continued use of chrysotile asbestos cement products in the wake of the European asbestos ban. The (Canadian) Minister's presence in India gives us the opportunity to reinforce the Indian government's resolve to pursue the controlled-use of chrysotile asbestos."[13]

Canadian enthusiasm for cultivating a close relationship with allies in India is easily explained:

Environmental health survey in asbestos cement sheets manufacturing industry

F. A. Ansari, V. Bihari,* S. K. Rastogi,* M. Ashquin, and I. Ahmad

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INTRODUCTION

Go to:

Asbestos is a fibrous mineral occurring in natural deposits. Asbestos fibres are divided into two classes, serpentine and amphibole, on the basis of their crystal structure.[1] Chrysotile is a fibrous hydrated magnesium silicate mineral [$Mg_3Si_2(OH)_4$], which is used, in about 3,000 commercial products.[2] In reference of the situation persisted few decades earlier, presently the exposure to asbestos fibre is restricted in developed and industrialized countries and pressure has started mounting in the developing countries.[2] The delay between exposure and manifestation of diseases is however, still escalating in both developed and undeveloped countries. Chrysotile, the commercial variety of asbestos is known to cause mesothelioma.[3] Although, chrysotile is the most common variety of asbestos, it accounts for over 95 per cent of the world production and is exploited in more than 40 countries. AC industry is the largest user of chrysotile asbestos through out the world and AC products are made stronger by the addition of approximately 5% to 10% of chrysotile asbestos during mixing of cement[4] because asbestos provides the desired strength to the products. The most important products based on chrysotile fibres are AC sheets and AC pipes as mentioned earlier however, while other products of major importance are friction materials, insulation boards, millboard and brake - shoe etc.

Asbestos - cement makes up 85 per cent of all commercial applications[5] and these products are also being used as low-cost building materials.[6] Currently, manufacturing of chrysotile products is undertaken in more than 100 countries and production is about 27 to 30 million tons annually. India consumes about one lakh tons of chrysotile every year, mostly imported from Canada, Brazil, Kazakhstan, Russia and South Africa.[7] AC products are manufactured mostly in wet process.

Although, air pollution levels of asbestos were reported to be elevated in the areas surrounded by asbestos industries.[8] The emission of asbestos may be negligible to significant depending on its rate of emission and the fibre control measures and technology.[8] Other little possible emission sources during the processing of these products may be feeding of asbestos fibres into mixing, blending the mixture, cutting and finishing of end products. Cement particles, asbestos fibres and agglomerates of particles and fibres are therefore, released in the surrounding and may be dispersed in air and water in large amounts.[9]

Dave and Beckett, 2005 reported in the past in India there have been nearly 673 small - scale asbestos mining and milling facilities and 33 large - scale asbestos manufacturing plants, (17 AC product manufacturing plants and 16 other than AC product plants). In India, about two to three million active workers are suffering from exposure to asbestos and other dusts or fibres.[10] It is well reported that occupational exposure of asbestos may cause simple inflammatory reactions, asbestosis, to bronchogenic carcinoma.[11]

An environmental health survey was conducted in and around the surrounding area of asbestos-cement sheets manufacturing industry to observe the occupational asbestos exposure burden. The monitoring and analysis of the asbestos concentration and its type around the asbestos industries address many questions regarding source, distribution and transport. Assessment of all these parameters in any occupational environment where asbestos is present is thus relevant.[12] The information obtained on the levels of asbestos concentration and its type in the occupational and ambient environment can be used to assess the asbestos fibre exposure and its burden in the vicinity of the industry.

MATERIALS AND METHODS

Go to:

Study design

Asbestos burden in and around the industry was assessed in AC sheets manufacturing industry, India. As per the information provided by the industry staff; industry is a large - scale with production capacity of 36,000 metric tons per annum of asbestos - cement sheets and asbestos - based moulded goods. The ingredients used

are cement, fly - ash and chrysotile asbestos (imported from Russia) in quantity (Metric tons) 20,000, 12,000 and 4,000 per annum respectively. In this study a total of 71 subjects in asbestos exposed and 69 control groups were appraised.

Manufacturing process

- The products are processed in wet mode technically known as "Hatschek Process".
- Pressure packed impermeable polythene bags of chrysotile are opened by semi - automatic machine through mechanical process and milled in Hydro Disintegrator (mill), transferred to a mixing tank via close system. The binding material (cement and fly-ash) mixed with water to make slurry, which is fed to the Cylinder Vat (a tank with a sieve cylinder covered by mesh cloth help to sieves the slurry) through the Homogeniser Feeding Cone. Cylinder rotates leaving a thin film of stock deposited at its surface and film was transferred on to endless felt, which remains in contact with the top cover of the sieve cylinder.
- Excess water was being removed from the felt by means of vacuum boxes placed under the felt as it travels towards sheet formation drum in continuous operation until the sheet prepared to build up the desired thickness. The sheets are then knifed along a groove in the sheet formation drum roll and peeled to a moving rubber conveyor belt, which collect the sheet clear from the machine.
- In the sheet corrugation and demoulding section, the wet plain sheets are corrugated by means of template. The corrugated wet sheets stacked on a trolley and allowed for initial maturity of 15-18 hours. After that sheets demoulded i.e., stripped off from the templates. Finally at Curing Section, these sheets are stacked vertically and water poured on them here, sheets covers 25-28 days to develop optimum strength before being dispatched.
- Negative pressure in all these process equipments is maintained by induced draft fan. Discharge of the fan were connected at air pollution control device i.e., counter current scrubber such that if the particulate travels along with air (sucked for maintaining negative pressure) finally trapped by automized water spray in the scrubber device.

Fibre monitoring, sampling devices and methodology

Asbestos sampling was done according to the standard procedure of Bureau of Indian Standard - 11450. Air monitoring for asbestos was done by using a 25 mm diameter, ester cellulose filter (0.8-1.2 μm pore size) at constant flow rate per liter per min. Sampler Model XX5700000 and Low Volume Vacuum/ Pressure Pump Model XX 5600002 attached with filter holder (cowl) MAWP 025AC (Millipore Corporation, USA) were used for the collection of air samples. In both the subjects, filter holders were kept in downward position during sampling to avoid the contamination of heavy particles on filters.[13]

Sample transportation, preparation and analysis

The collected samples were stored in upward position with sealed boxes and transferred to the laboratory for further analysis as per acetone triacitin technique.[14] The mounted samples were analyzed for the presence of asbestos fibre at a magnification of 400x by using phase contrast and polarized light microscope. Asbestos fibres (>5 μm length, < 3 μm in diameter and length to diameter ratio 3:1) were considered for counting and scanned under the phase contrast microscope (LABROX, Germany).[14,15]

Clinical examination

Subjects working in asbestos industry (exposed) and subjects not exposed (control) to such environment have been appraised with the scope of the study and consent was received from each of them. The care was taken during the selection of subjects from asbestos exposed environment and subjects not exposed to such environment (matching controls) are of same socio-economic status. Each subject was given to answer a complete set of questionnaire based on the modified British Medical Research Council[16] to assess an accurate medical history, habits, past and present occupation, duration of exposure along with medical history (previous and present) and respiratory history. A history of cough, sputum production, wheezing and chest pain, occupational history, domestic exposure, smoking, alcohol consumption and nutritional habits were also recorded. Each subject was thoroughly examined by a medical staff having graduation in medical science and special emphasis was given on respiratory system.

Pulmonary function test

Pulmonary function tests were performed by forced spirometry in a total of 64 exposed subjects out of total 71 subjects and 50 control subjects out of total 69 subjects using OHD - KoKo Spirometer, USA, following the guidelines of American Thoracic Society.[17] Spirometry is a medical test that measures volume of the air inhaled or exhaled by the subject at a function of time. The appropriate time for this test is recommended between 10 - 12 noon, was followed for Spirometry. In this test, firstly the vital capacity (VC) was measured followed by Force vital capacity (FVC); both the tests are measured in standing position.[18] These tests were performed at least three times and the best of the three was selected for the data analysis. Age, height and weight of the subjects were recorded to predict the normal values of pulmonary function test.

Roentogenic studies

Chest X-ray (PA View) of 55 subjects was taken on 300 MA machine. A panel of three specialists (a radiologist, a chest physician and a specialist in industrial medicine) studied each X-ray. While studying the chest X-ray, occupational history and clinical findings were also taken into consideration. Diagnosis of each subject was made after complete review of clinical history, occupational history, X-ray findings and clinical examination following the criteria of International Labor Organization[19] especially for the presence of (a) Linear shadows of varying thickness, (b) Pleural thickening, (c) Pleural plaques, (d) Bilateral or unilateral pleural calcification, (e) Honey combing, (f) Reticulo - nodular pattern and (g) Prominent broncho - vascular marking.

Sputum analysis

Sputum samples were collected in clean sterilized bottles from the deep of the throat (preferably early morning sample) of the suspected subjects for AFB analysis by Ziehl-Neelsen staining[20] and asbestos bodies analysis following the standard methodology.[21]

RESULTS

Go to:

The concentrations of asbestos fibres (f/cc) at ingredient feeding site, sheet-producing site, fibre godown site and factory gate were 0.079 ± 0.00, 0.057 ± 0.01, 0.078 ± 0.01 and 0.071 ± 0.01, respectively [Table 1]. All the values were found less than the proposed Threshold Limit Value (0.1 f/cc). Fibres, analyzed by phase contrast and polarized light microscopy, were found to be of chrysotile variety (white asbestos). Personal characteristics of subjects such as age, height, weight, smoking habit, alcohol consumption, food habit, domestic fuel exposure and family type are pooled in the Table 2.

Table 1
Concentration of asbestos fibre in the occupational and ambient environment

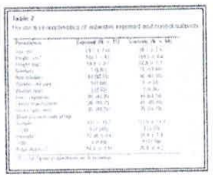
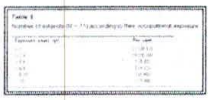


Table 2
Personal characteristics of asbestos exposed and control subjects

The subjects exposed to asbestos (total years including previous) are sub-grouped depending upon their occupational exposure [Table 3]. Significantly higher number of asbestos-exposed subjects were in the sub-grouped of two to four years and minimum number in eight to 10 years and more than Ten years. The observed morbidity pattern is mentioned in the Table 4. The prevalence of hypertension in exposed subjects was 16.9 per cent while in control 5.79 per cent. Upper respiratory tract infection (URTI) levels were almost 10% in both the populations. The prevalence of musculo-skeletal morbidity was 7.04 per cent, among them 5.63 per cent due to pain in joints and 1.4 per cent from backache in exposed population. In controls no subject has pain in joints while the prevalence of backache and bodyache were 5.79 per cent and 5.79%, respectively. Hypertension was 16.90% and 5.79% in the exposed and unexposed populations, respectively. Other morbidities listed in the Table 4 were also insignificantly higher in the exposed population.

Table 3



Number of subjects (N = 71) accordin
occupational exposure

Table 4
Morbidity pattern of study subjects

Lung function impairments were recorded 6.25 % of obstruction and 25% of restriction in asbestos-exposed subjects against 8.62% of obstruction and 31.03% of restriction in control subjects which may be due to higher smoking pattern in control subjects [Figure 1]. Out of total 71 asbestos-exposed subjects 55 cooperated for chest radiography and found them normal whereas no one cooperated for X-ray amongst control. Out of 71 asbestos-exposed subjects only 32 subjects whereas 37 out of 69 control subjects cooperated for sputum analysis for the presence of acid-fast bacilli (AFB) and asbestos body. Notably, all were negative including exposed subjects.

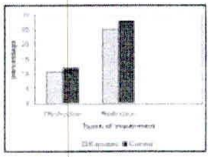


Figure 1
Pulmonary function impairment in
exposed and control subjects

DISCUSSION

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The asbestos fibre concentration was measured in the ambient environment of the AC industry because asbestos mainly presents risk in airborne condition. It is well reported that exposure to asbestos caused serious health effects on the population handling and or living near the sources.[22] In the asbestos processing and handling, the fibres released and remain suspended in the ambient air for long period due to small size and lightweight. The presence of the fibres in the ambient environment may be due to emissions of asbestos fibres during improper handling and processing and also may be from transportation and waste disposal.[23] In our study analysis of fibres under phase contrast and polarized light microscopy reported chrysotile asbestos, which acts as carcinogen and co-carcinogen.[3,11]

In India, an estimated one-lakh people are exposed to asbestos at work place.[24] The processing for manufacturing of Asbestos-based products increases the air pollution levels in the areas surrounded by the asbestos - based industries[25,26] and health risk to the workers. Moreover, adverse health effects are interrelated to dust exposure in workplace.[27] The people residing in the vicinity of the asbestos-based industries may be exposed to higher levels of asbestos fibre concentration.[8]

The environmental profiles of asbestos was observed ranging from 0.057 to 0.079 f/cc including work zone area. The lowest concentration (0.057 f/cc) was observed at sheet producing site and the evident reason might be a complete wet process. This showed healthy industrial hygiene conditions, as the fibre levels are well within the proposed Indian and International Standards (0.10 f/cc). Although exposure to low level of asbestos for long term period can register bioaccumulation and biopersistance in the biological systems including respiratory.[28]

The increasing risk of developing a variety of lung diseases in asbestos exposed workers is a major health concern.[29] Epidemiological and experimental studies have proven that the presence of predisposing factors such as cigarette smoke and bio-mass fuel exposure play an important role in biopersistence of asbestos fibres in lung which resulted enhanced pulmonary inflammatory reactions that accelerate the asbestos induced disease processes.[30,31] Occupational or environmental exposure of asbestos fibres mainly concerns to lung diseases such as bronchogenic carcinoma.[29]

The relatively higher respiratory problems of 10.14% were observed in control subjects as compared to asbestos-exposed subjects of 9.85%, which might be due to their exposure at domestic level in indoor environment. The lung function impairments were relatively higher in controls that might be due to higher smoking habits and wood exposure at domestic level during the cooking in indoor environment. The synergistic interaction of asbestos and unprocessed biomass fuels play an important role in asbestos-related malignancies[32] and in our study as most of the workers were nonsmokers. Clinical studies suggested that the use of cow dung and wood is associated with functional changes of airway function.[33]

Radiological examinations reveal no positive case in asbestos-exposed subjects. Radiological abnormalities have already been well demonstrated in asbestos-exposed subjects.[34] Earlier studies also suggested that the functional abnormalities resulting due to exposure of asbestos precede radiographic changes[35] that appear on the postero - anterior view of chest X-ray film. Reticulo-nodular infiltrates and presence of calcified pleural plaques with increased bronchovascular markings are the suggestive feature of exposure to asbestos.[36]

Sputum was also collected from the subjects to analyze the asbestos bodies and AFB. Asbestos bodies in sputum samples are considered as hallmark of asbestos exposure.[37] No one was reported with positive finding of asbestos bodies and AFB.

CONCLUSION

Go to:

The industrial hygiene status of AC sheets manufacturing industry was in accordance with the National and International Standards. The conclusion is derived from our observations on the environmental levels of asbestos, appropriate pollution control engineering devices, less exposure period due to new establishment of plant, absence of asbestos bodies in workers sputum and radiological negative chest data. Though, prevalence of smoking in industrial workers was lower than the controls, there should be some mechanism for gradual reduction to zero level as smoking accelerates the disease process induced by asbestos. Perhaps incentive in some form, to nonsmoking workers may be a suitable option in this regard. Occupational exposure to asbestos even of its levels within standard limit does not completely eliminate the risk of asbestos-mediated diseases. Notably, it takes about 15-25 years after exposure for the development of asbestosis and related malignancies. Asbestosis is an irreversible disease, which can further advance even after the cessation of asbestos exposure.

ACKNOWLEDGEMENTS

Go to:

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Footnotes

Go to:

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Conflict of Interest: None declared.

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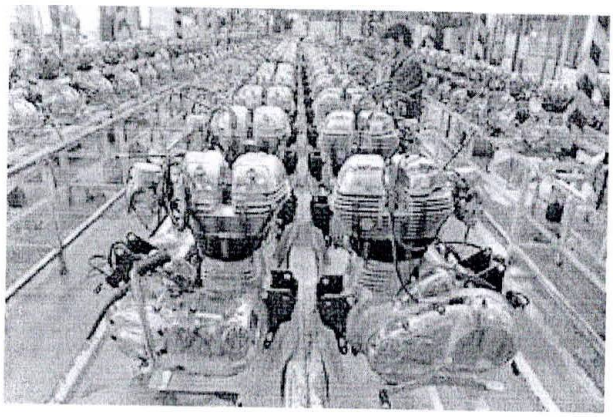
World rings asbestos alarm, India ignorant about cancer-causing agent

By *Vishwa Mohan, Amin Ali*, TNN | Updated: Jul 24, 2016, 09.21 AM IST



There is no restriction on use of asbestos in auto components in India.

DELHI: Even as environmental protection agencies across the world are pushing for a complete ban on usage of asbestos in auto parts that put millions of auto technicians, repair mechanics and commuters at risk of contracting fatal diseases, India's environment ministry has claimed to be unaware of the problem in absence of any specific study on the issue.

Though the ministry has general guidelines in place since 2010 for carrying out environmental impact assessment of the asbestos-based industries, it mainly talks about emission limit and ways of disposal of asbestos waste by the user agencies.

While most auto companies adhere to strict guidelines to meet emission norms of their export vehicles, the same variants in India are fitted with asbestos parts. The after-sales auto component market specially brakes, clutches and brake linings are full of asbestos products and their handling and disposal puts technicians and commuters at risk.

"The ministry of environment, forests and climate change (MoEFCC) has no information on use of asbestos in auto components such as brake, clutches and heat seals", Bishwanath Sinha, joint secretary in the ministry , told TOI.

Asked why should this practice continue in India , Sinha said, "There are no peer reviewed study reports on the subject commissioned by concerned administrative ministry or its subordinate organisation, in the government of India, based on which a tangible course of action may be taken on merit".

The joint secretary , therefore, noted that the question of banning usage of asbestos in auto products in India did not arise in absence of such scientific study .

Various studies in the past had highlighted that mesothelioma, a deadly form of cancer, is caused due to

asbestos exposure and therefore many countries had subsequently taken steps to ban its use.

The US is implementing a new chemical safety act that is meant for tackling everyday carcinogens such as asbestos while the EU outlawed usage of asbestos products. New Zealand too has banned asbestos products.

Incidentally, the Central Pollution Control Board (CPCB) in India had spoken about hazards of asbestos use in its report in 2008. Its observation got a mention in the environment ministry's environmental impact assessment (EIA) guidance manual on asbestos based industries in 2010. But, it does not appear to get a traction beyond controlling emission limits in organised industries.

Asked how does the ministry monitor the use of asbestos in the country, Sinha said, "Implementation of emission limits of asbestos fibres from the stack, notified under the provisions of the Environment (Protection) Act, 1986, for industries uses asbestos is carried out by the concerned State Pollution Control Boards".

The 2010 EIA guidance manual on asbestos based industries, prepared by the Hyderabad-based Administrative Staff College of India, noted that though the asbestos-cement industry (sheets, pipes etc.) is by far the largest user of asbestos fibre worldwide accounting for about 95% of all uses, asbestos is also incorporated into friction materials like brake linings, clutch pads and similar products.

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