

COMMENTARY

Epidemiological research as a driver of prevention: the Sibaté study

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Although asbestos exposure and risks can be prevented, only five countries in Latin America have banned asbestos, including Colombia. Beginning in 2011, a collaboration between the Istituto Superiore di Sanità in Italy and Universidad de los Andes in Colombia was established, bringing together relevant expertise aiming to improve our understanding of the asbestos problem. An important result of this collaboration was a recently published study conducted in Sibaté, Colombia, a municipality where an asbestos-cement facility has operated since 1942. The evidence collected suggests the presence of a mesothelioma cluster in Sibaté. Landfilled zones with an underground layer of friable asbestos were also discovered in the urban area of the municipality. The importance of this type of collaboration can go beyond understanding the impact of asbestos at the local level, which is crucial, and may also contribute in solving unanswered questions of the problem in countries that banned asbestos decades ago.

Key words

- asbestos
- Colombia
- international cooperation
- mesothelioma
- global public health

INTRODUCTION

Asbestos is among the 120 agents classified by the International Agency for Research on Cancer as human carcinogens [1]. However, and this makes asbestos different compared to most carcinogens, asbestos exposure can be prevented because it is economically and technically feasible to substitute the material with non-carcinogenic agents, which is especially evident for both construction and automotive products (two of the major uses of asbestos in the world). Hence, more than 67 countries have banned asbestos (IBAS, International Ban Asbestos Secretariat; 2019. www.ibasecretariat.org). In Latin America, only five countries have banned asbestos: Argentina, Chile, Honduras, Uruguay, and Colombia (IBAS, International Ban Asbestos Secretariat; 2019. www.ibasecretariat.org). Currently Latin American countries represent 10% of the world asbestos consumption [2].

A decision of the Supreme Court of Brazil in November 2017 in theory banned asbestos, but the decision has not been fully implemented and is facing legal challenges (IBAS, International Ban Asbestos Secretariat; 2019. www.ibasecretariat.org).

In Colombia asbestos use has been historically concentrated in supplying products for two sectors: con-

struction and automotive. In construction, there have been 5 major asbestos-cement facilities, three of these owned by the same company, located in Sibaté, Cundinamarca (circa 1942), Cali, Valle (circa 1944), and Barranquilla, Atlántico (circa 1944) (Eternit, www.eter-nit.com.co/historia). The other two asbestos-cement facilities are located in Manizales, Caldas, owned by different companies (circa 1967 and 1982) (Etex, www.etex.com.co/acerca-de-etex; Toptec, www.toptec.com.co/index.php/quienes-somos). Among the asbestos-cement products distributed in the country there are corrugated sheets, pipelines, and tanks for water storage. All the asbestos-cement facilities previously described are still in operation, and they all claim they have finished the technology reconversion that allows them to manufacture asbestos-free construction products. In the automotive sector, an asbestos friction product facility located in Bogotá, DC, still produces asbestos containing brake pads, linings, and blocks, as well as asbestos-containing clutch disks (circa 1960) (Incolbest, www.incolbest.com/la-empresa/historia/). There is also an active chrysotile asbestos mine in Campamento, Antioquia. The recent asbestos ban in Colombia comes in force in January 1st, 2021, when the use, production, distribution, mining, and exports of asbestos mineral

and asbestos containing products will cease [3].

The negative legacy of asbestos containing products distributed in Colombia has not been fully quantified and understood. Between 2009 and 2016 asbestos consumption in Colombia ranged between 11 907 and 24 822 tons per year [4]. Information about how much asbestos has been distributed in the country comes mostly from industry itself: more than 5 million homes have asbestos-cement products, 300 million square meters of corrugated asbestos cement sheets have been installed, and more than 3 million vehicles use asbestos-containing friction products [2]. Over 75 years of operation of the asbestos industry in the country, 11 million tons of both corrugated asbestos cement sheets and pipelines have been introduced in the country [5]. The distribution of all these asbestos containing products (ACP) in the country has created a concerning risk of asbestos exposure for the entire population, resulting in a complex technological and economic challenge for the proper removal and disposal of these ACP.

THE RATIONALE FOR INTERNATIONAL SCIENTIFIC COOPERATION

A collaboration between researchers from Istituto Superiore di Sanità (ISS) and Universidad de los Andes (Uniandes) in Bogotá started in 2011 in the frame of the Latin American Chapter during the annual conference of the International Society for Environmental Epidemiology (ISEE). The asbestos issue has been identified as a key topic of common interest for bilateral scientific cooperation, because it represents a national and global public health threat in both countries. For a detailed discussion of this point the reader is referred to Marsili & Comba, 2013; Marsili *et al.*, 2014, Marsili *et al.*, 2017 [6-8]. In particular, the Italo-Colombian collaboration was motivated by the major past asbestos production and use in Italy, which caused heavy environmental and health impacts currently requiring public investments for environmental remediation and health prevention actions, and the history of asbestos production and use in Colombia, which represents an emerging public health threat and an environmental concern. In 2015, during the ISEE annual conference held in Brazil, we jointly organized a symposium on "Prevention of asbestos-related disease in Latin America", also with the contributions from Brazilian researchers. Since 2015, we have been strengthening our cooperation to make available scientific evidence of asbestos risks in Colombia with the goal of fostering the adoption of prevention initiatives shared with affected communities [2, 9] and scientifically support the prohibition of the use of asbestos in Colombia.

In 2017 we decided to formalize the scientific collaboration through a Memorandum of Understanding (MoU) between ISS and Uniandes (September 2017-September 2019) aimed to "Foster, coordinate, develop and promote scientific and technological multidisciplinary research, in order to contribute to research and outreach activities that pertain to environmental and public health issues of common interest between the two participating organizations, namely the prevention of asbestos related disease". The two partners agreed

in recognizing the mutual benefits of this cooperation, providing an institutional frame to the collaborative research, supporting training initiatives and exchanges of scientific information and documentation, fostering participation in research projects and co-authorship in scientific publications.

The recently published study concerning the Sibaté Municipality, one of the five locations of asbestos-cement industries in Colombia, [4] is a relevant example characterizing this international scientific cooperation, relying on the mutual recognition of knowledge and skills of the two cooperating partners, who work together sharing corroborated scientific methodologies in public health, environmental and social sciences. The common objective is creating awareness on an emerging public health issue in Colombia for the benefit of asbestos exposed communities and the improvement of environmental quality in the country.

THE SIBATÉ STUDY

Sibaté is a municipality located 25 km southwest from Bogotá, the capital of the country. An asbestos-cement facility located 5 km north of the urban area of Sibaté has been in operation since 1942, Ramos-Bonilla *et al.*, 2019 [4]. For years inhabitants from Sibaté have been complaining that a large number of asbestos related diseases (ARD) were being diagnosed in the town. An interdisciplinary group of researchers from Universidad de los Andes (Colombia), the Istituto Superiore di Sanità (Italy), the French National Research Institute for Development (IRD), Fundación Santa Fe de Bogotá (Colombia), and researchers from the Universities of Rome (La Sapienza), of Turin, and of Bologna, conducted the study that aimed to both determine if the evidence supported the health complaints of the community, and to identify potential asbestos exposure sources in the town [4].

Initially a survey to identify potential cases diagnosed with ARD was implemented door-to-door, in four neighborhoods that people reported were built in the proximity of landfilled areas that might contain asbestos. Three hundred and fifty five surveys were completed, and 29 self-reported mesothelioma cases were identified [4]. For validation purposes, it was possible to obtain copy of the medical records for 17 of these cases. All these cases had lived at some moment of their lives in Sibaté. A panel of 5 physicians from Fundación Santa Fe de Bogotá (i.e., 3 pathologists, a thoracic surgeon, and a radiologist), and a pathologist from the University of Rome La Sapienza examined the medical records following the guidelines of the Italian Mesothelioma Registry (ReNaM), and classified 15 cases as Certain Malignant Pleural Mesothelioma (MPM), one as Probable, and one as Not Mesothelioma [4]. Thirteen of the certain MPM cases were diagnosed between 2008 and 2017, and only two had experienced some type of past professional exposure. The young age of diagnosis was a unique and concerning characteristic, Ramos-Bonilla *et al.*, 2019 [4]. Among these 13 MPM cases, 9 were diagnosed while living in Sibaté. Based on these 9 cases, the age-standardized MPM incidence rate for Sibaté is 3.1×10^5 persons-year for males, and 1.6×10^5 persons-year

for females. Both figures are among the highest in the world compared to those reported by IARC [4].

Regarding potential sources of asbestos exposure, a soil sampling campaign was conducted in areas identified as potential landfilled zones. In three of the four points where soil samples were collected, an underground layer of friable asbestos was identified, at a depth ranging between 35 and 110 cm. It is estimated that the landfills were created between 1975 and 1990 [4]. On top of landfilled zones, a public school and sports facilities were built. The history, extension, and frontiers of this asbestos layer require further investigation. The evidence suggests that a cluster of MPM is present in Sibaté. It is urgent to elaborate a risk management plan for the town, including procedures for conducting excavations that could disrupt the asbestos layer.

When considering the possible contribution of the publication of the Sibaté study on the ongoing process of transition of the Colombian economy towards a model of economic development that does not require the use of asbestos, some comments are warranted. First of all, an economic model subsuming the presence of asbestos is economically viable for industry only if it does not imply recognition and quantification of environmental, health and social costs. Once the latter are estimated, the economic “convenience” of asbestos used is severely challenged. This was originally understood by the Nordic countries in Europe, namely by Sweden, when the use of asbestos was prohibited in 1982 (see for a historical reconstruction of that event the paper by Järholm and Burdorf, 2015 [10]). In a few words, in the mid Seventies the available scientific evidence was sufficient for understanding that the use of asbestos was simply not sustainable in a society that would not ignore its costs in terms of health impact and environmental cleanup.

Other countries, like Italy, did not reach this decision so timely as the Nordic countries. The Act that introduced the prohibition of the industrial use of asbestos came in 1992, after a long political debate, and, surprisingly enough, there was a peak of asbestos consumption in the last decade before the ban [11, 12]. This is believed to be the reason why we still experience an increasing rate of mesothelioma mortality in the Italian male population [13].

Even if the political decision to terminate asbestos use was not so timely and sharp, it reflected a societal change of perception about the sustainability of asbestos use, including the rejection of the false theory of its “safe use”. A major contribution to this shift of

paradigms came from a set of epidemiological studies published in the Eighties that brought to light two unexpected problems. First, the health impact of asbestos in the manufacture of asbestos-cement products was much worse than previously suspected [14]; second, there were unexpected excesses of asbestos-related diseases, namely of mesothelioma, in occupations where such impacts were not previously suspected, like in railway carriages production and repair [15] and in non-asbestos textile industries, because of the widespread use of jute bags, previously containing asbestos, to pack rags and other textiles to be recycled [16].

It is now too early to assess the contribution that the Sibaté study may have in the design of strategies to address the negative legacy of asbestos products distributed in Colombia, something that is required by the law that banned asbestos. This was the first study that analyzed the potential impact of asbestos at the population level, and could guide future studies in other Colombian communities settled in the area of influence of asbestos facilities. Some aspects of the Sibaté study, like the relatively young age of the mesothelioma cases and the highly demanding cleanup intervention needed for reducing risk of exposure in Sibaté, might turn out to motivate the public opinion in a most relevant way.

Even so, in this unavoidable uncertainty, one final notation appears to be warranted. Two recent Italian studies [17, 18] have shown that the (past) use of asbestos-cement byproducts in paving roads and courtyards is causally associated with the occurrence of mesothelioma in relatively young subjects without any occupational exposure. The Sibaté study has the potential to throw further light on this issue by addressing the etiological role of asbestos-cement byproducts and asbestos residues used to fill depressed areas and drain water intrusions of an adjacent reservoir, activities that were conducted within the urban area of the municipality. Thus the Sibaté study, besides assessing the health impact of asbestos in an industrial area of Colombia, might also contribute to a scientific debate ongoing in countries that have banned asbestos several decades ago.

Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias the conduct and findings of this study.

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