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SHOULD ROMANIANS BE CONCERNED WITH THE ASBESTOS BURDEN? RESEARCH OVERVIEW AND CONTEXT

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ABSTRACT. – Should Romanians Be Concerned with the Asbestos Burden? Research Overview and Context. Although the negative effects of airborne asbestos fibers upon human health had been known for a long time, asbestos was widely used all over the world. Between 1980 and 2010, many countries have banned asbestos production and trade; among them, Romania banned asbestos in 2007. Romania did not extract massive amounts of asbestos; however, the country's imports before the ban included large quantities of raw asbestos, which were later used for a wide variety of products. We have identified two peaks in the trend of raw asbestos imports, in the 1970s and the 1990s, which can be correlated to the socio-economic conditions in Romania. Lack of data availability is a real impediment to a complete estimation of the quantities of asbestos-containing products that have been used in the country. The 2007 asbestos ban did not imply the disposal of already installed such materials that could remain in place until the end of their service life. However, once removal and disposal of asbestos-containing products are needed, they come with great risks for the workers involved and the surrounding environment.

Keywords: *asbestos, asbestos-containing materials, health, ban, imports, production.*

1. INTRODUCTION

Asbestos is a term that refers to six fibrous minerals, namely: chrysotile - the "white asbestos", amosite, crocidolite, tremolite, actinolite and anthrophyllite. The most frequently used type was chrysotile, accounting for 90–95% of used asbestos in the world (Stayner *et al*, 2013; Frank, 2020). Asbestos was mainly used in constructions, in the making of asbestos-cement, insulation materials, pipes, flat and corrugated roofing sheets, elements and

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insulation for ships, accessories and parts of motor vehicles, textiles, ropes etc., having roughly over 3000 registered uses. Some of these uses are most unexpected, like filters for wine or beer, or small household appliances like hairdryers and toasters (Frank and Joshi, 2014).

Asbestos was so widely used due to its important qualities: strength, durability, resistance, insulation and fire protection properties, flexibility, capacity of being easily incorporated into composed materials (Virta, 2006; IARC, 2012) and its relatively low commercial price (Frank and Joshi, 2014).

However, its negative impacts upon health were beginning to be signaled as early as the 1920s, as some authors mention (Henderson and Leigh, 2011; Baur, 2017; Frank, 2020, etc). The International Agency for Research on Cancer (IARC) has classified asbestos as a human carcinogen since 1973 (WHO, 2012). Countless epidemiological studies have demonstrated the causality between exposure to airborne asbestos fibers and several types of cancer and other diseases (the most common ones being lung cancer, mesothelioma and asbestosis, but many other types being connected: laryngeal, ovarian, gastric cancer etc), and countless studies have shown the past and present incidence of such diseases in different countries around the globe (Lemen *et al,* 1980; Albin *et al,* 1999; Nishikawa *et al*, 2008; Olsen *et al,* 2011; Stayner *et al*, 2013; Baur, 2017, etc).

Every year, there are around 107,000 deaths by cancers caused by asbestos exposure (WHO, 2012). In Europe alone, there were 106,180 deaths caused by mesothelioma and asbestosis between 1994 and 2010 (Kameda *et al*, 2014).

The risk is present even for exposures to low doses (Nishikawa *et al*, 2008; Frank and Joshi, 2014), over brief periods of time (Frank, 2020) and for all types of asbestos (IARC, 2012). Although the incidence of diseases related to asbestos was typically higher among workers that handled asbestos fibers, the risks for people working with asbestos-containing materials (in shipbuilding, in constructions, in DIY renovation projects) and even for families of workers are very well documented in the medical literature (Lemen *et al*, 1980; Frank and Joshi, 2014; Frank, 2020, etc). And so are the many cases of environmental exposure, in villages or towns located near asbestos mining or production facilities. Some well-known and long studied cases are: Balangero, located near a mine in Piedmont, Italy, and Casale Monferrato, where the largest factory in Europe functioned and that was later part of the *Processo Eternit,* widely covered by the international media.

The specific feature of the diseases caused by asbestos exposure is represented by the very long time until they occur, of typically minimum 10 years, with a most prevalent period of 35-45 years since the exposure (Frank, 2020).

Therefore, the impacts of this asbestos epidemic are still to be shown in many parts of the world. In fact, more recent studies indicate larger figures, Furuya *et al* (2018) estimating 255,000 annual deaths by asbestos-related diseases.

Starting from these grim premises, the purpose of the present study is to look into and analyze some features of the past trends of import and consumption of asbestos in Romania, as a basis for further studies regarding the current and future challenges facing the (so far underestimated) national asbestos legacy.

2. MATERIALS AND METHODS

While documenting the present study, we have consulted a large number of publications regarding the spatial extent of asbestos use and bans, while also trying to identify a chronology of the measures taken in different countries, focusing then on Romania. In order to achieve that, we have consulted legislations, proposals and reports that we found for Romania and the European Union mainly; official released documents from the World Health Organization were also consulted, as well as several studies concerning the asbestos burden in different countries.

We have used two main data sources in the preparing of the graphic concerning the imports of asbestos to Romania: the United States Bureau of Mines and the British Geological Survey (BGS). We have used the indicated sources because in the annual statistics publications of Romania the trades are not broken down by specific materials, being recorded by general classes of products. However, both the United States Bureau of Mines and the British Geological Survey provide estimated data based on other countries' registries of trade. Thus, for the years 1961 to 1975 we have used data from the "United States Bureau of Mines (1963-1993) Minerals Yearbook Series", while for the 1976-2006 period, data from the "World mineral statistics data" of the BGS. Data regarding imports that can be retrieved from the United States Bureau of Mines stops at 1986 (we could only find production data up to 1993, which was not the case anyhow for asbestos), while data from the BGS is only available starting from 1970, and that is why we needed to use both data sets. For the years in which both data sets were available (between 1970 and 1986) we noticed that the figures are the same in some years, while in others they may differ, but we must mention that 1) in the United States Bureau of Mines' estimates, the imports from Russia are missing at that point, and therefore we preferred to use the British data, and 2) the differences are seldom high, while the overall trend is maintained, and therefore, it can serve our purpose of showing an evolution of quantities of raw asbestos brought into Romania.

3. RESULTS AND DISCUSSION

3.1. International context - Asbestos use and bans

Asbestos-containing materials were very popular, at different times, in different countries, with an asynchrony between the more economically developed countries, where the peak of consumption and the following bans came sooner, and the less developed countries where asbestos reached the peak of consumption later on, or where it is still being used (Frank and Joshi, 2014; Stayner *et al*, 2013 etc.). However, the highest peak of global asbestos production was reached in 1975, when 5.09 million metric tons were produced around the world (IARC, 2012).

After the carcinogenic nature of asbestos became a known fact, its use did begin to decline (Frank, 2014). However, the delay between the recognition and understanding of the hazard it represented and the taking of actual measures is omnipresent. Still, bans began to be put in place; some countries began by only banning some types of asbestos, but not chrysotile (for example, the UK, which banned the use of crocidolite and amosite in 1986 and of chrysotile in 1999, or Hungary that first banned the non-chrysotile asbestos and only later chrysotile), others only banned certain asbestos uses at first (like Denmark, that banned uses of asbestos except asbestos-cement roofing in 1980, to later ban that as well, in the late 1980s), while other countries banned all forms of asbestos at once (Iceland, Norway, Sweden – which banned all asbestos in the 1980s).

In Europe, the most important action was taken by The Commission Directive 1999/77/EC, when the use of asbestos was banned in the European Union, as of 1st of January, 2005. The directive prohibited the selling and use of raw asbestos and asbestos-containing materials. However, the asbestos-containing products that were already in use at that time could be used until safe disposal or until they reached the end of their product life circle.

Table 1. Countries in Europe and bans on asbestos-containing products

Asbestos status	European countries
Banned before 2000	Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Netherlands, Norway, Poland, Slovenia, Sweden, Switzerland, United Kingdom.
Banned after 2000	Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Luxemburg, Malta, Portugal, Romania, Serbia, Slovakia, Spain, Turkey.
No ban in place	Albania, Andorra, Belarus, Bosnia and Herzegovina, Montenegro, Moldova, Russia, San Marino, Ukraine.

Source: author's own compilation

Even now, asbestos is still used in many countries on the globe, the majority of the world population living in a country that has not yet banned asbestos use. In general, the main importers of such materials are countries of low and middle income, developing countries, which lack in laws and regulations for population health, workers' safety and environmental protection (Frank and Joshi, 2014; Henderson and Leigh, 2011).

International calls for a global ban of asbestos continue, while scientists proceed in providing proofs that a total ban is the viable solution for reducing the number of asbestos-related disease cases (Nishikawa *et al*, 2008; Stayner *et al*, 2013; Frank and Joshi, 2014; Frank, 2020).

3.2. Asbestos use in Romania and the 2007 ban

Asbestos had been mined in Romania, but the country was not among the relevant producers of Europe. However, data regarding the resulting quantities is scarce; we did not find available data, neither in Romanian sources, nor in available documents from the United States Bureau of Mines or the British Geological Survey (although an observation that Romania produced asbestos appears in these documents). The only reference we have found on the matter is provided by Albin et al (1999) that mention an estimated production of 4,600 tons for the year 1989. It is a figure that roughly matched the imports of that precise year, but no further specifications can be made based on it.

In what regards the mining locations, Jakab and Peti (2018) mention the Eibenthal asbestos mining site opened in 1948, from where asbestos was transported firstly to the crushing facility in Dubova, and later to Orşova town. This mine continued its functions and was later shut down, in 1994. Two other former exploitation sites in Almăj Mountains (Caraş-Severin County) and along Crişul Alb Valley (Arad County) are mentioned by Balzamo *et al* (2007).

However, large quantities of asbestos were imported to Romania, mainly from Russia and from Canada (after 1969), and smaller quantities from West Germany, United States, Italy and Yugoslavia. Since import records could not be found in sources from the Romanian authorities, data is scarce and only available from sources which have compiled available data from countries that had exported asbestos to Romania, thus having a certain dose of inconclusiveness. As stated before, the main data sources are reports from the United States Bureau of Mines and the British Geological Survey. We must also note that data was not available in any consulted sources for the period before 1961 (with the exception of few years presented below), thus, we cannot reasonably estimate a total quantity that has been imported to Romania.

Looking at the statistics presented by Virta (2006) we can note that asbestos was not very popular in Romania before the Second World War. In 1920, while Western European countries imported rather large quantities (21,291 tons imported by the UK, 6,828 tons by Germany, 3,966 tons by Italy), Romania imported only 14 tones. A similar situation was recorded in 1930, when Romania was importing 68 tons, while the UK was bringing in 23,938 tons, Belgium and Luxemburg 19,050 tons, Germany 14,107 tons, and in 1940, with Romania importing 61 tons, while in the West, the UK was reaching over 95,392 tons, and France and Germany over 10,000 tons each.

After the Second World War, the global asbestos industry took off towards a historical peak reached in the 1970s. In Romania, the asbestos situation followed the same trend, imports started to rise and by 1970, Romania was importing 19,287 tons of raw asbestos. 84.5% of imported asbestos came from the Soviet Union and the rest from Canada. Imported quantities would then grow continuously until the 1973 peak, of 46,600 metric tons (fig. 1).

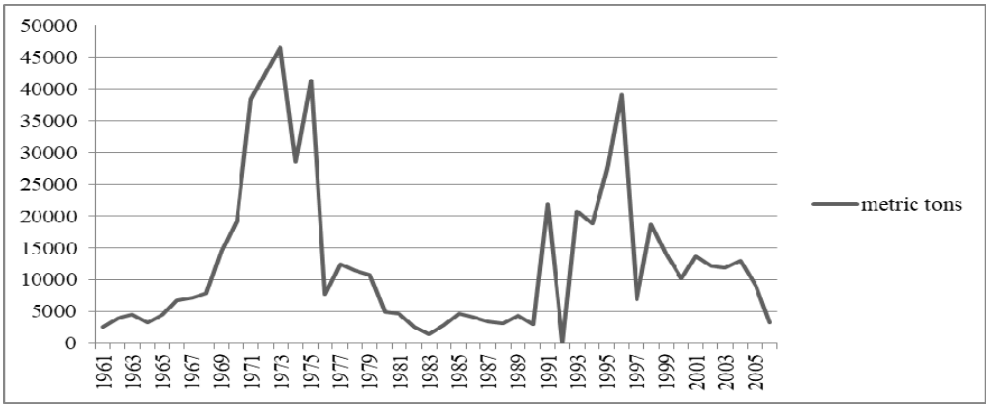

Fig. 1. Variation of asbestos imports to Romania.
Data source: United States Bureau of Mines and the British Geological Survey

However, after 1975, asbestos quantities imported by Romania registered a steep decline, until reaching 3,000 tons in 1990. The 1980s were, in many ways, a period of restraint in Romania, determined by the central authorities' struggle to attenuate Romania's foreign debt. Romanian economy had yearly ups and downs, but generally failed to meet the yearly targets, industry advancement was severely hindered and all exports were somewhat limited.

In Romania, this was a period in which all industry sectors were blooming, large cement factories were being built or extended and new asbestos-cement production lines were being opened in small towns like Aleşd, Fieni, Medgidia or Bicaz.

By 1975, quantities imported by European countries had increased tremendously. Romania was still importing over 40,000 tons (after a lower level in 1974) while the other countries in the area were also registering high values: Hungary registered 32,604 tons, Bulgaria 28,812 tons, Czechoslovakia 43,494 tons, Poland 94,412 tons, while hundreds of thousands of tons were imported in the western countries - the U.K., France, Spain and West Germany being the main importers (on a side note, 1975 was also the year in which the Soviet Union exported 1.9 million tons of asbestos).

After the fall of the communist regime and when entering the transition period, the trajectory began to change again. As described by a 2001 Economic Commission for Europe report, the housing market in Romania began to develop after 1990 and construction of new homes was very frequent in the rural areas (where individual homes represented 98.5% of housing options). This created an expanding market for cheap products like asbestos-containing roofing sheets, especially since the generally high prices of construction materials were among the main factors influencing the affordability calculations (as it appears in the same report). In that period, asbestos imports began to rise again.

Thus, by 1995, Romania was again bringing in 27,425 tons of raw asbestos and thereafter reached a second peak in 1996, of 39,130 imported tons of raw asbestos. In that year, Romania actually had the highest figures for asbestos imports among the European and former Soviet Union states. It was followed by Russia with 31,366 tones, Spain with 27,030 tons, France with 20,576 tones etc. After an abrupt fall the following year, asbestos imports had some yearly fluctuations but generally decreased starting from 1998, while still remaining above 10,000 tons.

This was a period in which, in Western Europe, asbestos imports dropped abruptly also due to the fact that more and more countries were beginning to ban asbestos use. Therefore, in 2003, Romania remained among the leading consumers of asbestos in Europe, after Ukraine. In 2004 Romania was also the second importer among the new members and candidate countries to the European Union. Only Turkey had higher imports (13,509 tons), while the next countries had much lower quantities: Croatia and the Czech Republic having around 3,000 tons, and Bulgaria importing 196 tons.

It was only in 2005 that asbestos imports decreased to less than 10,000 tons (9,077 tons) and continued to drop in 2006 (3,272 tons). But these are still substantial quantities considering that the Treaty of Accession of Romania and Bulgaria to the European Union had been signed earlier, in April 2005, and Romania was going to join the EU starting from the 1st of January 2007, at which point, Romania had to align and ban the trade and use of asbestos and asbestos-containing materials.

In some years, Romania also seems to have exported asbestos, but in very modest quantities, generally below 100 tons/year, with one year standing out, 1984, when Romania exported 646 tons of crude asbestos (mentioned in the Minerals Yearbook, Vol. 3, 1986). However, when related to the amounts of imported asbestos, one can note that the overall "apparent" consumption in Romania had been rather high.

This is just the situation of the raw/crude asbestos trade, but trade with prefabricated asbestos-containing products was also present. Due to the lack of available data, at this point we are unable to provide a complete analysis of the matter. We could only find sparse data that can offer more of a preview of such trades. Mateș (2012) mentions the import of 104,813 tons of corrugated asbestos-cement sheets in 2002 and of 107,880 tons in 2004. A similar value appears for the year 2005 when there were 104,580 tons of imported asbestos-containing products reported in a document referring to the "National situation of asbestos-containing products and waste" (available at the National Environment Protection Agency). 99.47% of these products were asbestos-cement sheets. Such values are easily comparable to the national production figures; Mateș (2012) also refers to the production of 87,621 tons of corrugated asbestos-cement sheets in 2001 and 97,000 tons in 2004.

The construction industry was the main recipient of raw asbestos imported to Romania. There were eight main factories in Romania that produced asbestos-containing materials: FIBROCIM Aleșd and CONGIPS Oradea in Bihor County, MOLDETERNIT Bicaz in Neamț County, AZBOCIM Fieni in Dâmbovița County, ETERMED Medgidia in Constanța County, FERMIT Râmnicu Sărat in Buzău County, FIBROCIM Târgu-Jiu in Gorj County, and IZOLATORUL in Bucharest.

According to documents from the National Environment Protection Agency, while the factories in Bicaz, Râmnicu Sărat, Medgidia and Bucharest were technologically upgraded to produce non-asbestos-containing materials, the factories in Aleșd and Fieni had a profile conversion (although in 2005 AZBOCIM Fieni was asking for clearance for closing, and was later becoming an area of waste disposal), and the factories in Oradea and Târgu-Jiu were closed by the 1st of January 2007.

When the ban on asbestos went into effect, the list of asbestos-containing products was long and worrisome, containing many different products alongside the omnipresent asbestos cement sheets and pipes: toys, smoking gadgets, asbestos sprays for coating, paint, construction and finishing materials for buildings (from insulation materials to decorative wall panels and flooring etc), filters, textiles, etc (Annex 2 of the HG 124/2003). There were 136 companies that were using or trading these asbestos-containing products in Romania before the 2007 ban on asbestos (Mateș, 2012).

The same fluctuations shown for the imports of raw materials can be observed for the internal use of asbestos. Between 1920 and 1970, the average asbestos use in Romania was 0.62 kg/capita/year (Kameda *et al*, 2014), a figure that was lower than those indicated by the same authors for Western European countries (Belgium, for example, having 3.08 kg/capita/year, Austria 1.17 kg/capita/year, Denmark 2.16 kg/capita/year), but still higher than other neighboring countries (Bulgaria having 0.14 kg/capita/year and Serbia 0.25 kg/capita/year).

In their analysis of trends in the use for asbestos, Nishikawa *et al* (2008) noticed an overall decline in the use of asbestos in Romania between the 1970s, when the use of asbestos in kg/capita/year was 1.08, and the 1980s when it was 0.19. In the same study, we observe that asbestos use in Romania grew again in the 1990s, to 0.52 kg/capita/year and 0.55 kg/capita/year in the 2000s (however, when looking at the value for the 2000s, one must keep in mind the accentuated demographic decline that Romania experienced after 1989).

It is important to have estimates of these data because, as Nishikawa *et al* (2008) pointed out, the per capita asbestos use is a useful tool in the estimation of health impacts of asbestos use.

4. CONCLUSIONS

Considering the high amounts of consumed asbestos and asbestos-containing products all over the world, bans are only the first, but essential step. Countries that have banned asbestos use are currently dealing with the high burden of asbestos products that are still in place in many parts of the world. The health effects of past exposures are showing even now, while new exposures are still happening due to products still being in place, not just in industrial settings, but in residential or other public buildings as well. For example, in Italy, Marsili *et al* (2017) showed that 75% of asbestos that had been used until the 1992 national ban on asbestos is yet to be recovered and removed.

Romania has had its ups and downs in terms of asbestos imports and consumption; there were large quantities of raw asbestos brought into the country, mostly in the 1970s and 1990s. There were many products manufactured in Romania in which asbestos was used, and many other asbestos-containing products that were imported as such (for which we still do not have a clear situation). Many of those products can still be seen around, the asbestos-cement roofing (with flat and corrugated sheets) being among the most visible such legacy. When the ban went into effect, such roofs were everywhere from public buildings (even hospitals) to blocks of flats, individual houses, factories, farms, etc.

The more degraded the material of such roofs, the higher the risk of airborne fibers and the more dangerous it is. Asbestos-containing materials represent a hazard when disturbed for repairs, renovations or demolitions. The risks extend from removal workers to encapsulation workers, to waste disposal workers or drivers evacuating the materials, and even to unaware DIY-ers. Therefore, information and awareness campaigns are still important, as well as the enforcement of the law in terms of workers' safety (Directive 2009/148/EC).

Enforcement of regulations regarding the correct disposal of asbestos-containing wastes is also crucial, since such materials represent a hazard for human health and a lasting environmental burden.

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