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Asbestos exposure: a potential driver of rising lung cancer incidence in China

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Abstract
Despite sustained reductions in smoking prevalence and improvements in ambient air quality, lung cancer incidence in China continues to rise, suggesting that important risk factors remain insufficiently recognised. Asbestos is a well-established carcinogen, yet its contribution to China's lung cancer burden has received limited attention, particularly given the continued use of chrysotile and widespread legacy asbestos-containing materials. This review highlights how non-specific clinical presentation, incomplete exposure documentation, and limitations in surveillance systems contribute to systematic underestimation of asbestos-related lung cancer. Diverse exposure scenarios, including occupational, para-occupational, and environmental pathways, further complicate etiologic attribution beyond traditionally defined asbestos workers. A comprehensive asbestos ban represents an important long-term strategy to reduce the future burden of asbestos-related disease in China.

Keywords Asbestos-related lung cancer · China · Chrysotile · Public health · Complete ban

Introduction

Lung cancer was the most commonly diagnosed cancer in China in 2024, with 1.176 million new cases, accounting for 22.8% of the total new cancer cases nationally [1]. Actually, our group found that the data from China Statistical Yearbook Serial and the Global Burden of diseases (GBD) consistently indicate a sharp increase in new cases of lung cancer in China for both men and women (Fig. 1).

Cigarette smoking and air pollution, particularly exposure to fine particulate matter ($PM_{2.5}$), are well-established risk factors for lung cancer [2]. In China, cigarette smoking prevalence has shown a clear downward trend in recent years following the implementation of comprehensive tobacco control policies after the ratification of the Framework Convention on Tobacco Control (FCTC) in 2005 [3]. In parallel, PM2.5 has experienced a significant decline over the past decade, largely due to the implementation of key air quality policies [4, 5]. Despite substantial progress in tobacco control and air quality management over recent decades, our finding of the aforementioned sharp increasing trend of new lung cancer cases in China over last 3 decades suggests that additional

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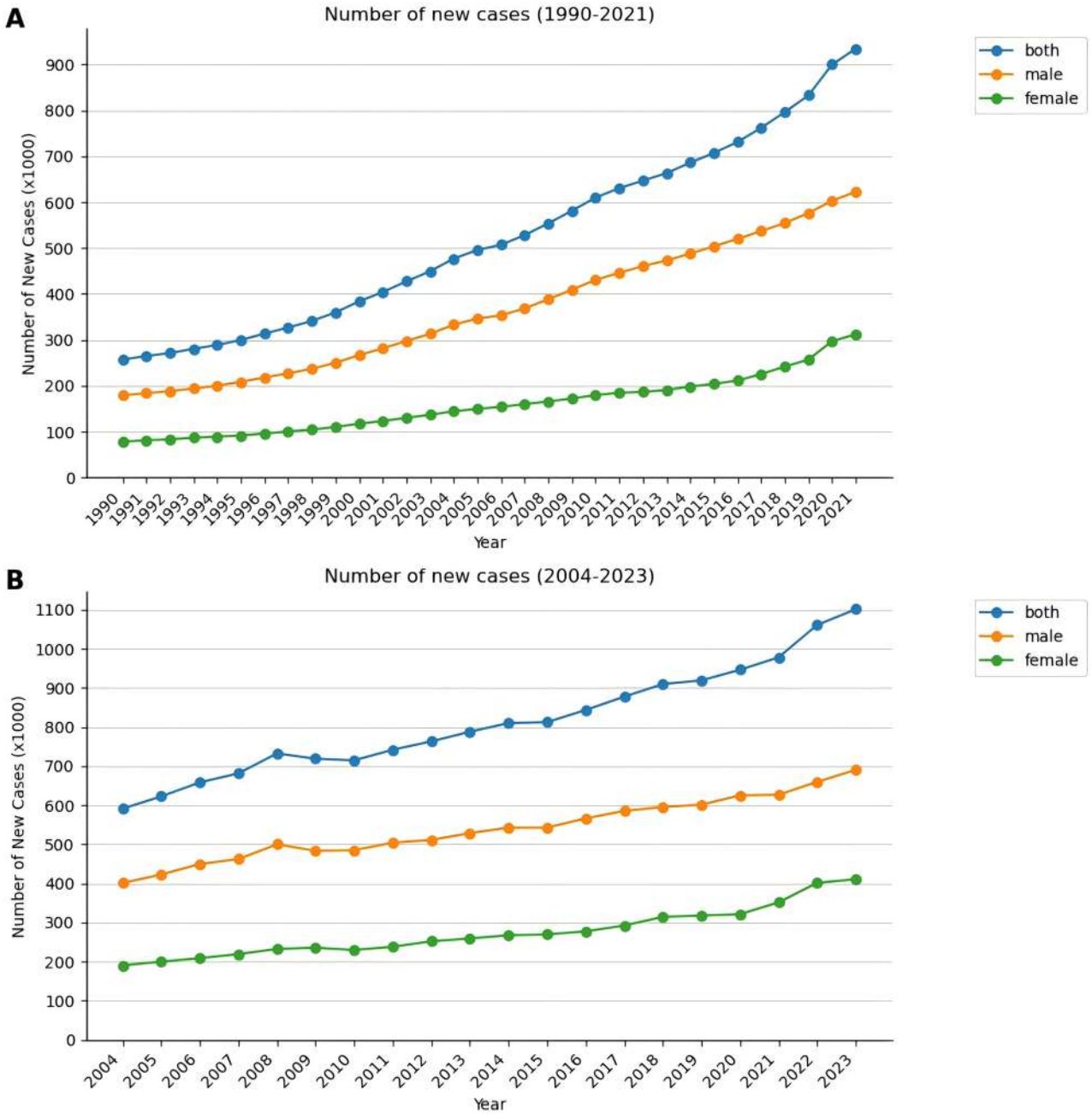

Fig. 1 New cases of lung cancer in China. (**A**) Incident new cases of lung cancer in China during 1990–2021 using data from GBD 2021. (**B**) Incident new cases of lung cancer in China during 2004–2023 using data from China Statistical Yearbook (2004–2023) and China Cancer Registry Annual Report (2004–2019)

risk factors, beyond smoking and ambient air pollution, may be contributing to the persistent and growing lung cancer burden. Given the long latency between exposure to cigarette smoking and air pollution and the development of lung cancer, current lung cancer incidence patterns may still partly reflect behaviours and exposures from previous decades. However, the continued increase in incident lung cancer cases despite sustained declines in smoking prevalence and improvements in air quality suggests that additional risk factors may also be contributing to the evolving disease burden.

These factors may include population ageing, occupational exposures, indoor air pollution, radon exposure, changes in smoking patterns, and advances in diagnostic imaging and cancer detection. While the relative contribution of these factors remains difficult to quantify, asbestos exposure represents one factor that may contribute to the evolving lung cancer burden in China. Asbestos has been classified by the International Agency for Research on Cancer (IARC) as a Group 1 carcinogen with sufficient evidence linking exposure to lung cancer, malignant mesothelioma, and other malignancies [6]. Although the carcinogenicity of asbestos is well established, different asbestos fiber types may exhibit varying carcinogenic potential and biological behaviour. Amphibole fibers are generally more biopersistent and have often been associated with higher carcinogenic potency [7]. Although chrysotile fibers are generally considered less biopersistent than amphibole asbestos, chrysotile exposure has been consistently associated with an increased risk of cancer of the lung, larynx and ovaries, and mesothelioma [6]. Evidence from a cohort study of Chinese chrysotile textile and mining workers demonstrated a clear exposure–response relationship between cumulative fiber exposures and lung cancer mortality, with hazard ratios exceeding 8 and 11 in the highest exposure categories after adjustment for age and smoking [8]. In addition, amphibole contamination has been reported in some Chinese chrysotile samples [9].

While asbestos use has been completely banned in many countries and regions worldwide (Table 1), China remains the second-largest consumer and third-largest producer of asbestos globally [10]. Notably, both the incidence and mortality of malignant mesothelioma—an asbestos-specific malignancy—have risen steadily in China over the past several decades, and this upward trend is expected to continue [10]. As malignant mesothelioma is widely regarded as a sentinel tumour of asbestos exposure, these trends provide indirect support for the continued population-level impact of asbestos in China. Importantly, unlike lung cancer, mesothelioma is not causally associated with cigarette smoking, making temporal mesothelioma patterns particularly informative when evaluating the potential contribution of asbestos exposure to cancer burden. A pooled analysis of asbestos-exposed cohorts estimated that, in chrysotile-exposed populations, the ratio of asbestos-related lung cancer to mesothelioma deaths is approximately 6.1:1 [11]. Given the shared etiologic pathways and long latency periods of mesothelioma and asbestos-related lung cancer, the continued use of chrysotile raises concern regarding the potential contribution of asbestos to future lung cancer burden in China.

Despite the well-established carcinogenicity of asbestos, its contribution to the overall lung cancer burden in China may be systematically underestimated. The prolonged latency (10–40 years) between asbestos exposure and disease occurrence, challenges in clinical diagnosis, incomplete documentation of exposure histories, and limitations within cancer registration and surveillance systems can all obscure the attribution of lung cancer cases to asbestos exposure [12].

In this context, we aim to synthesize existing evidence to examine why and how asbestos-related lung cancer may be underestimated in China, focusing on diagnostic challenges, data and surveillance gaps, and patterns of asbestos use and regulation. By systematically reviewing these mechanisms and identifying key research gaps, this review seeks to inform future research priorities and public health considerations aimed at mitigating the health risks associated with asbestos in the Chinese population.

Burden of asbestos-related lung cancer is likely underestimated in China

Diagnostic challenges and attribution difficulties

Attributing lung cancer incident cases to asbestos exposure remains a major diagnostic challenge, particularly in settings where detailed exposure histories are unavailable. Histologically, asbestos-related lung cancer is indistinguishable from lung cancers of other etiologies, most commonly presenting as adenocarcinoma without distinctive pathological markers [13]. While asbestos bodies may be observed in lung tissue, their absence—especially in cases involving chrysotile exposure—does not rule out asbestos-related disease, as chrysotile fibers are more soluble in acidic environments and less likely to form visible asbestos bodies due to lysosomal degradation [14].

Table 1 Timeline of complete asbestos bans by country/region

Countries/ Regions	Year of first regulation	Year of complete ban	Countries/ Regions	Year of first regulation	Year of complete ban
Algeria	2009	2009	Korea	2015	2015
Argentina	2000	2014	Kuwait	1995	1995
Australia	2003	2003	Latvia	2001	2001
Austria	1990	1990	Liechtenstein	1990	1990
Bahrain	1996	1996	Lithuania	1998	2005
Belgium	1998	1998	Luxembourg	2002	2002
Brazil	2000	2023	Macedonia	2014	2014
Brunei	1994	2014	Malta	2002	2005
Bulgaria	2005	2005	Mauritius	2004	2004
Canada	2016	2018	Monaco	1997	2016
Chile	2001	2001	Mozambique	2010	2010
Colombia	2019	2019	Nauru	2024	2024
Cyprus	2005	2005	Netherlands	1991	1991
Czech Republic	1998	2005	New Caledonia	2007	2007
Denmark	1972	1986	New Zealand	2002	2016
Djibouti	1999	1999	Norway	1984	1991
Egypt	2005	2005	Oman	2001	2017
Estonia	2000	2005	Poland	1997	1997
Finland	1992	1993	Portugal	2005	2005
France	1996	1996	Qatar	2010	2010
Germany	1993	2011	Romania	2005	2008
Gibraltar	2007	2007	Saudi Arabia	1998	1998
Greece	2005	2005	Serbia	2011	2011
Greenland	2010	2010	Seychelles	2009	2009
Honduras	2004	2004	Slovakia	2002	2005
Hong Kong	1996	2014	South Africa	2004	2008
Hungary	1988	2005	South Korea	2009	2016
Iceland	1983	1996	Spain	2002	2002
Iran	2021	2022	Sweden	1973	1986
Iraq	2016	2016	Switzerland	1989	1989
Ireland	2000	2000	Taiwan	2008	2023
Israel	1980	2011	Turkey	2010	2010
Italy	1992	1994	Ukraine	2017	2022
Ivory Coast	1996	1996	United Kingdom	1986	1999
Japan	1995	2012	United States	1973	2024
Jordan	2005	2006	Uruguay	2002	2002

Source: International Ban Asbestos Secretariat (revised October 31, 2025)

Current diagnostic criteria in China rely heavily on documented occupational exposure history. According to "Diagnosis of Occupational Tumor (GBZ 94–2017)" issued by the National Health Commission, a minimum of 15 years of asbestos exposure is typically required to support attribution. This administratively defined threshold, while operationally clear, may exclude a wide spectrum of at-risk individuals, including workers with intermittent or undocumented exposures, as well as family members of asbestos workers who experience secondary exposure through contaminated clothing or household dust [15, 16].

Attribution is further complicated by the well-established synergistic carcinogenic effect between asbestos exposure and tobacco smoking [17]. Evidence suggests that the combined effect of asbestos exposure and smoking is greater than the sum of their individual effects. A large meta-analysis of case-control studies demonstrated that, among men across all smoking categories and major lung cancer subtypes, lung cancer risk increased with increasing asbestos exposure, while among women, current smokers also exhibited a significantly elevated risk [18]. Such interactions have also been reported among populations predominantly or exclusively exposed to

chrysotile asbestos, including a nested case-control study of Chinese chrysotile workers [19]. In clinical practice, however, when a patient has a documented smoking history, lung cancer is frequently classified as smoking-related by default, and coexisting asbestos exposure is often overlooked. Moreover, many physicians may not routinely inquire about occupational or environmental exposures unless prompted by the patient [20, 21]. Consequently, even when asbestos exposure is a plausible etiologic factor, lung cancer cases are frequently recorded as sporadic or non-specific, leading to systematic underestimation of asbestos-related lung cancer burden.

Incomplete exposure documentation

Occupational cancer monitoring in China continues to rely on passive reporting, with low numbers of occupational cancers reported relative to expected disease burden, indicating ongoing gaps in occupational exposure documentation [22]. Underreporting is common when patients fail to apply for occupational disease diagnosis for various reasons, resulting in substantial loss of eligible cases within the surveillance system. These limitations are further compounded by highly mobile and seasonal labor patterns, which disrupt employment continuity and hinder long-term exposure documentation when occupational records are incomplete or absent [23].

Documentation gaps are exacerbated by the long latency period of asbestos-related lung cancer [24]. Over such extended intervals, workers may change occupations multiple times, retire, or migrate across regions, while enterprises may be restructured, renamed, or dissolved, making retrospective reconstruction of exposure histories increasingly difficult. Consequently, even when patients have experienced substantial asbestos exposure, such information may not be available at the time of diagnosis or registration, thereby hindering etiologic attribution at both the individual and population levels.

Importantly, exposure ascertainment is further compromised by deliberate or structural obscuring of asbestos-related enterprise information. In China, a substantial proportion of asbestos-related companies do not explicitly include the term “asbestos” in their registered names, instead adopting general designations such as “construction materials company” [25]. Among 1611 asbestos-related companies in 2010 and 1936 in 2019, only 9.8% and 9.4% respectively referenced asbestos in their corporate names [25].

Screening and detection bias

Low-dose computed tomography (LDCT) screening has been widely adopted to enhance early detection of lung cancer in China [26]. Nonetheless, its expanding use also introduces additional layers of detection and selection bias. Current screening eligibility criteria are largely centered on age and smoking history, while occupational and environmental exposure histories are rarely incorporated into risk stratification [27]. As a result, individuals with substantial past asbestos exposure but limited or no smoking history are less likely to be included in screening programs.

Moreover, the rapid expansion of screening programs may paradoxically obscure the relative contribution of asbestos exposure at the population level [28, 29]. As screening increases the overall number of detected lung cancer cases, interpreting the relative contribution of specific risk factors, including asbestos exposure, may become more challenging at the population level. Without systematic integration of exposure information into screening and diagnostic pathways, improvements in detection alone are therefore unlikely to fully address the structural under-recognition of asbestos-related lung cancer.

Importantly, according to GBD estimates, both the number of incident cases and deaths from lung cancer in China have increased substantially over the past decades, with mortality trends broadly paralleling incidence trends [30]. While this pattern suggests that the observed rise in incidence cannot be fully attributed to improved case ascertainment or reporting alone, the relative contributions of asbestos exposure, population ageing, and other risk factors remain uncertain.

Context-specific asbestos exposure and policy environment in China

Continued use of chrysotile asbestos in China

Owing to its low cost, heat resistance, tensile strength, and durability, chrysotile remains an attractive industrial material, particularly in settings where economic considerations outweigh long-term health risks [31]. Chrysotile-containing products continue to be widely used in construction, shipbuilding, automobile manufacturing, and various consumer goods, encompassing thousands of applications in both industrial production and daily life [32].

China possesses abundant asbestos resources, with exploitable reserves estimated at 62–90 million tons, predominantly distributed across northwestern provinces such as Qinghai, Xinjiang, Gansu, and Sichuan [33]. Chrysotile accounts for approximately 99% of these reserves and is currently the only asbestos type permitted for commercial mining and use in China. According to recent data from the United States Geological Survey (USGS), China produces approximately 200,000 tons of asbestos annually, while domestic consumption remains higher, at around 284,000 tons, representing more than one-fifth of global asbestos consumption [34]. Time-trend data on asbestos production and consumption suggest that current disease patterns likely reflect the long latency between exposure and clinically manifest cancer (Fig. 2).

Notably, a 2024 report highlighted the mixed-ownership reform of a major chrysotile enterprise in Qinghai Province as a successful industrial case, emphasizing substantial growth in production and sales [35]. The report further noted that the company had recruited dozens of newly graduated university and master's degree holders in recent years, indicating that employment opportunities within the asbestos industry continue to attract a young workforce.

In addition to domestic use, asbestos contamination has been identified in multiple categories of Chinese-manufactured export products in recent years. These include children's play sand shipped to Australia and New Zealand, which triggered widespread public concern in 2025, as well as lift brake pads supplied to the energy sector and sourced from Chinese manufacturers [36, 37]. In addition, the extensive use of Chinese-made components in the shipbuilding and shipping sectors has been associated with recurrent reports of asbestos presence. Several

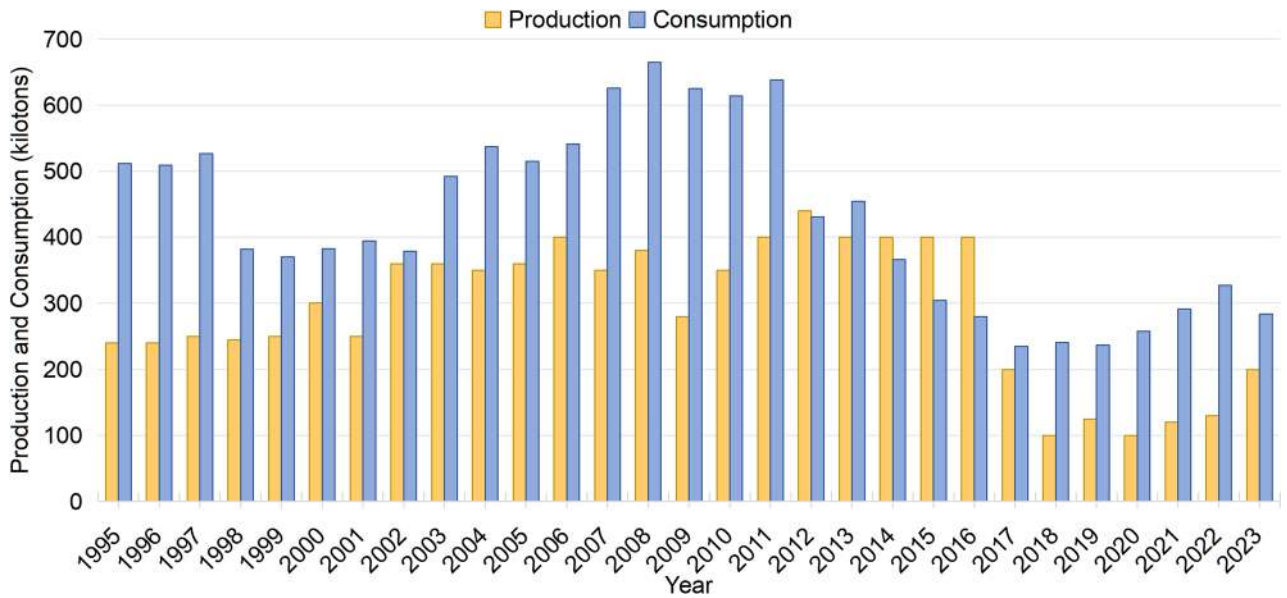

Fig. 2 Asbestos production and consumption for China, 1995–2023

Table 2 Asbestos-containing materials, use scenarios, and potential exposure pathways

Product category	Representative products	Asbestos type	Use settings	Potential exposure mechanisms
Building materials	Roofing sheets; wall and ceiling panels; pipes; waterproofing materials	Chrysotile; crocidolite	Existing and older buildings	Demolition, renovation, drilling, cutting, and material aging
Automotive parts	Brake pads; clutch pads; exhaust pipe gaskets; engine heat shields	Chrysotile; amphibole	Vehicles, repair shops, dismantling yards	Brake repair, component replacement
Industrial insulating materials	Boiler and pipe insulation; high-temperature gaskets; kiln linings	Chrysotile; amosite	Power plants, chemical plants, steel mills, shipbuilding facilities	Insulation degradation, maintenance, removal
Textiles and fire protection materials	Fireproof clothing; fireproof blankets; fire curtains; fire ropes; high-temperature sealing ropes	Crocidolite; amosite	Firefighting facilities, welding workshops, steel mills	Material degradation, abrasion, combustion
Household products	Insulation in old electric heaters; hair dryer insulation (pre-1970s); iron base plate coatings	Chrysotile	Homes, second-hand markets	Repair, disposal
Other industrial products	Laboratory crucibles; anti-corrosion coating additives; plastic or rubber reinforced fibers	Chrysotile; tremolite	Laboratories, chemical plants, rubber product workshops	Cutting, sanding, aging

of these products were reported to have undergone standard certification procedures, suggesting that existing certification processes may not reliably preclude the presence of asbestos [38].

Major exposure scenarios beyond traditional occupational settings

The continued use and widespread circulation of chrysotile-containing materials have resulted in a broad range of exposure scenarios that extend well beyond traditional occupational settings (Table 2) [39–42].

One of the most pervasive non-traditional exposure pathways arises from the construction sector, where the widespread use of chrysotile-containing materials creates multiple opportunities for fiber release, particularly during renovation and demolition of older buildings. These exposure events are typically short-term and intermittent, yet may involve high-intensity fiber release [43]. Importantly, individuals engaged in such activities are not always formally classified as asbestos workers, particularly in small-scale or informal settings with limited regulatory supervision, exposure assessment, and protective measures [33].

Beyond the workplace, para-occupational exposure represents an additional and frequently overlooked pathway. Exposure potential in such settings has been estimated at approximately 0.2–6.5% relative to primary workplace exposure [44]. Family members of asbestos-exposed workers, including spouses and children, may be exposed through contact with contaminated clothing, tools, or household dust transported from worksites into the domestic environment. Although fiber concentrations are generally lower than those encountered in primary workplaces, exposure may be chronic and prolonged.

Environmental exposure further expands the population at risk, particularly among residents living near asbestos mines, manufacturing plants, waste disposal sites, or areas where asbestos-containing materials are heavily used or degraded [45, 46]. Asbestos fibers may be released into ambient air and settled dust through material weathering, improper disposal, or mechanical disturbance. In urban contexts, environmental exposure may also occur during large-scale infrastructure renewal or redevelopment projects, where legacy asbestos-containing materials are disturbed. These exposures are rarely captured by occupational disease surveillance systems and may disproportionately affect vulnerable populations, including the elderly and children.

Sex-specific exposure patterns also require consideration when evaluating asbestos-related disease burden. Previous studies have revealed notable differences between male and female patients regarding various types of asbestos exposure, including primary occupational exposure and secondary exposure through domestic or environmental sources [47]. Most males experience primary asbestos exposure, whereas females exhibit significantly higher rates of secondary asbestos exposure. Consequently, occupational asbestos exposure among women may have been consistently underestimated because of the historical predominance of men in traditionally recognized

high-risk occupations and the lack of gender-sensitive exposure assessment approaches [16]. However, evidence from China suggests that asbestos exposure among female workers remains an important issue that should not be overlooked [48].

Regulatory framework for asbestos in China

China's asbestos governance has gradually evolved from complete permissiveness to partial prohibition and tighter industrial regulation, while still allowing the controlled use of chrysotile. Overall, this policy trajectory has prioritised phasing out the most hazardous forms of asbestos and improving engineering controls in designated industries, rather than pursuing comprehensive elimination of all asbestos-containing materials.

The first major milestone was the inclusion of amphibole asbestos in the Catalogue for the Elimination of Outdated Production Capacity, Techniques and Products in 2002 [49]. This measure prohibited the production, import, and use of amphibole asbestos, reflecting growing recognition of its high carcinogenicity. In contrast, chrysotile was exempted and remained legally available for mining and industrial applications under the premise of "safe use."

In 2011, the National Development and Reform Commission issued the Guidance Catalog for Industrial Structure Adjustment, which encouraged the adoption of non-asbestos alternatives, such as synthetic mineral fibers, aramid fibers, and other high-performance friction and sealing materials [50]. These measures signalled a policy intention to gradually shift away from asbestos-dependent technologies in selected sectors. However, the catalogue primarily functioned as an industrial steering document; it did not establish binding timelines for phasing out chrysotile nor set explicit targets for reducing asbestos-containing products already in use.

A further step was taken in 2014 with the Admittance Standards for the Chrysotile Asbestos Industry issued by the Ministry of Industry and Information Technology [51]. These standards sought to regulate the chrysotile supply chain by specifying minimum requirements for production capacity, environmental protection, dust control, and occupational health management.

In parallel with industrial policies, occupational health regulations have defined workplace exposure limits for asbestos. Current Chinese standards cap time-weighted average asbestos concentrations at 0.8 fibers/cm^3 in occupational settings [52]. Employers are formally responsible for implementing engineering controls, providing personal protective equipment, and keeping asbestos exposure levels as low as possible. For comparison, the current European Union occupational exposure limit is 0.01 fibers/cm^3 (8-hour time-weighted average), which is substantially lower than the corresponding Chinese standard [53]. This difference highlights the relatively higher levels of occupational asbestos exposure that remain permissible in China.

In addition to occupational and industrial regulations, recent environmental and waste-management policies have started to treat asbestos-containing waste as a priority hazard. In the National Catalogue of Hazardous Wastes, asbestos wastes are classified under category HW36, covering wastes from asbestos mining and processing, asbestos-containing building materials, vehicle brake components, ship dismantling, and demolition or maintenance of asbestos-insulated structures [54]. At the subnational level, some provinces have also introduced technical specifications for the pollution control of asbestos tailings, setting requirements for their transport, storage, disposal and utilisation, as well as associated environmental supervision [55]. These developments indicate that regulators increasingly acknowledge the long-term environmental risks posed by legacy asbestos.

Future research directions and policy implications

Future research on asbestos-related lung cancer in China should move beyond descriptive ecological correlations and prioritize study designs that allow stronger causal inference. Province- or county-level analyses that jointly examine lung cancer incidence, mesothelioma trends, and indicators of historical asbestos use could help mitigate ecological fallacy and clarify spatial heterogeneity in risk. Particular attention should also be given to lung cancer

patients without a smoking history, as this population may provide valuable insights into the role of occupational and environmental asbestos exposures in lung cancer development.

At the population level, well-designed cohort and case–control studies incorporating detailed occupational, para-occupational, and environmental exposure assessment are urgently needed. Similar approaches have been successfully implemented in several well-characterized asbestos-exposed populations, including the Quebec chrysotile miners and millers cohort, the British asbestos workers cohort, and the Australian Wittenoom asbestos cohort [56–58]. These studies demonstrate that long-term epidemiological investigation of asbestos-related diseases is feasible despite challenges posed by extended latency periods, complex exposure histories, and potential confounding factors.

International population-based studies have demonstrated that occupational carcinogens may contribute substantially to lung cancer burden in the general population. For example, a case–control study from Italy estimated that occupational exposure to asbestos accounted for 18.1% of male lung cancer cases, highlighting the potential value of quantitative approaches for estimating the contribution of occupational exposures to lung cancer burden [59].

Latency-aware analytical frameworks also represent a critical research priority. Given the long latency period of asbestos-related lung cancer, distributed-lag models, birth-cohort analyses, or age–period–cohort approaches integrating historical asbestos consumption and production data may offer valuable insights into the temporal relationship between exposure and disease burden.

From a clinical and surveillance perspective, improving exposure documentation and diagnostic attribution is essential. Current reliance on administratively defined occupational exposure thresholds risks systematically excluding individuals with intermittent, undocumented, or non-occupational exposure. Integrating standardized exposure history modules into cancer registries and routine clinical workflows—covering occupational histories, household contact, and residential proximity to asbestos industries—would substantially enhance etiologic attribution. Implementing these measures will require additional clinical, administrative, and registry resources, including personnel training and modifications to existing cancer registry systems. Nevertheless, these challenges are unlikely to outweigh the potential benefits for understanding the long-term burden of asbestos-related disease.

Improving mesothelioma surveillance is equally important. Enhanced pathology capacity and systematic reporting of mesothelioma cases through population-based cancer registries would improve ascertainment of this sentinel asbestos-related malignancy. Experiences from dedicated mesothelioma surveillance systems, such as the Italian National Mesothelioma Registry (ReNaM), demonstrate the value of systematic case ascertainment and exposure reconstruction for understanding the long-term health consequences of asbestos exposure [60]. In parallel, wider access to advanced fiber detection methods, such as transmission electron microscopy, could support more accurate identification of chrysotile exposure, particularly in research and medico-legal contexts [61].

For future policy development, it is important to recognise that occupational exposure limits for asbestos are pragmatic administrative thresholds rather than guarantees of safety. Epidemiological and toxicological evidence has not established an exposure threshold below which asbestos-related cancer risk can be considered absent, and even relatively low cumulative doses have been associated with increased risks of asbestos-related diseases [6, 12]. This implies that strategies relying solely on controlled use and compliance with workplace limits are unlikely to eliminate asbestos-related lung cancer in the long term. Instead, the World Health Organization and the International Labour Organization have consistently emphasized that the progressive elimination of all forms of asbestos, together with systematic management of legacy asbestos-containing materials, represents the most effective approach to primary prevention.

For China, a transition toward comprehensive prohibition would require coordinated planning, including support for industrial substitution, protection of affected workers, safe management of existing asbestos-containing materials, and continued efforts to improve public awareness of asbestos-related health risks. Strengthening the evidence base through rigorous epidemiological research will be crucial for informing this transition and ensuring that policy decisions are grounded in both public health impact and social feasibility.

Conclusion

Despite sustained reductions in smoking prevalence and ambient air pollution, lung cancer incidence in China continues to rise, indicating that additional risk factors remain insufficiently recognised. This review highlights asbestos exposure—particularly the continued use of chrysotile and the widespread presence of legacy asbestos-containing materials—as a likely but underappreciated contributor to China's lung cancer burden. Non-specific clinical presentation, incomplete exposure documentation, and structural limitations in surveillance systems collectively contribute to systematic underestimation of asbestos-related lung cancer.

Globally, asbestos-related diseases continue to impose a substantial and largely preventable public health burden. According to the WHO/ILO Joint Estimates, occupational asbestos exposure remains responsible for more than 200,000 deaths annually worldwide, accounting for over 70% of work-related cancer deaths [62]. International experience indicates that progressive elimination of all forms of asbestos represents the most effective long-term strategy. For China, advancing toward this goal will depend on coordinated policy planning informed by a strengthened evidence base on asbestos-related cancer burden. While further epidemiological research is needed to better quantify the contribution of asbestos exposure to lung cancer trends in China, a comprehensive asbestos ban represents an important long-term strategy to reduce the future burden of asbestos-related disease.

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Data availability No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication Not applicable.

Competing interests The authors declare no competing interests.

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