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## Industrial accidents in China: risk reduction and response

Accidental industrial disasters are often associated with illegal and unethical industrial and commercial practices. A warehouse explosion on Aug 12, 2015, in Tianjin, a major port city in China, caused 158 deaths and 698 hospital admissions.<sup>1</sup> Post-disaster investigations at the explosion site reported illegal storage of dangerous chemical substances comprising 1300 tonnes of oxide and nitrate compounds (mainly potassium nitrate and ammonium nitrate), 500 tonnes of flammable materials (consisting of metallic sodium and magnesium), and 700 tonnes of highly toxic substances (mainly sodium cyanide).<sup>2</sup> In addition to the fatalities, injuries, and adverse mental health effects on survivors caused by the blast, release of chemical pollutants could cause immediate health risks such as burns, and toxic effects ranging from asphyxiation to neurotoxicity. Long-term environmental hazards in the air, soil, water, and food supply could affect the wellbeing of nearby residents for years to come.

Coordination of emergency responses and prevention efforts are important for the protection of communities from such disasters. The Chinese Government was able to mount an efficient response to the Tianjin incident. Although the explosion took place at around midnight, more than 1000 clinical staff were deployed and ten emergency shelters were set up within 4 h of the blast.<sup>3</sup> Additionally, the National Health and Family Planning Commission sent more than 66 medical rescue experts to support the relief effort within the first 72 h.<sup>4</sup>

The rapid emergency response is the result of the strengthened capacity of emergency responses in China after the severe acute respiratory syndrome outbreak in 2003. The State Emergency Management Office was established in 2006, and the Emergency Response Law was enacted the following year to coordinate and support disaster responses.<sup>5</sup> Responses to emergency incidents in China are coordinated according to protocols set out under four main emergency categories: natural disaster, accidental disaster, public health incident, and social safety incident. 39 laws, rules, and regulations were established under this national protocol to help with emergency response coordination and post-disaster risk management of accidental disasters, such as the Tianjin warehouse explosion.<sup>6</sup> These items of legislation include WHO disaster health risk management recommendations on chemical safety, such as locating chemical facilities

away from residential areas, restrictions on the amount of toxic and flammable chemicals that can be stored in one location, and specific regulations for the storage of dangerous chemical substances.<sup>7</sup>

Although top-down policy efforts have improved disaster response capacities, epidemiological patterns of industrial disasters in China have evolved. Disaster prevention and disaster risk reduction were major challenges in previous decades. Accidental industrial disasters, many of which took place in economic and heavy industrial areas between 1995 and 2005, generally affected poor and vulnerable people employed in high-risk occupations (eg, miners) with poor occupational safety protection.<sup>8,9</sup> Between 2005 and 2015, major industrial accidental disasters were often reported in urban, residential, middle-class communities, as well as in industrial, suburban communities. The fire and blast incident in Changchun City in Jilin Province (2013),<sup>10</sup> the oil spill blast incident in Qingdao City in Shandong Province (2013), and the blast incident in Kunshan City in Jiangsu Province (2014) are examples of disasters in urban areas that each resulted in more than 100 casualties, affected thousands of inhabitants, and caused economic losses of millions of yuan. Likewise, patterns of mortality have changed from predominantly affecting industrial workers to disaster responders, such as firefighters and policemen.<sup>1</sup> Such epidemiological patterns could be reduced by timely prosecution of people implicated in illegal industrial or commercial practices and by bridging gaps in disaster prevention knowledge, attitudes, and practices of industry, responders, and the community, where the adverse effects are most likely to be reported.

In addition to support for the medical and mental health needs of victims of the Tianjin explosion and their families, proactive communication, monitoring, and management of the dynamic environmental health risks will be crucial in the coming months to protect the health of residents from chemical pollutants. Although clean-up operations are in progress and cofferdams have already been installed at the Tianjin blast sites,<sup>2</sup> members of the public have expressed major concerns about further release of chemical pollutants. Despite these challenges, the Tianjin incident provides an important opportunity for China to improve its



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resilience by upgrading the training of emergency responders in handling specific disaster hazards, and educating the public about environmental health risks of chemical incidents. If the Chinese Government shows zero tolerance of illegal industrial practices and holds the relevant stakeholders accountable for such practices, the Tianjin incident could become a historical milestone for improvement of disaster risk reduction in China.

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We declare no competing interests.

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## Smoking cessation for Chinese men and prevention for women

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Tobacco use is the largest preventable cause of death worldwide. It is estimated that more than 6 million people die every year from tobacco use, and that this growing toll will lead to more than a billion deaths in the 21st Century.<sup>1,2</sup> China is at the epicentre of the global tobacco epidemic and accounts for 1 million of these deaths annually.<sup>3</sup> If current rates of smoking in China continue unabated, 2 million people in China will die per year in 2030, contributing greatly to the global burden of disease. Complicating any efforts to reduce the public health burden of tobacco is the fact that China is the world's largest grower, manufacturer, and consumer of tobacco and has the largest workforce devoted to tobacco farming, manufacturing, and sales. Being a government monopoly, China Tobacco (the Chinese National Tobacco Corporation) provides over 7% of the Central Government's annual revenue through both taxes and net income.<sup>4</sup>

In *The Lancet*, the study by Zhengming Chen and colleagues<sup>3</sup> reveals the extent of the tobacco challenge in China, its peculiar characteristics, and most importantly future implications unless aggressive public health actions are taken to promote smoking cessation in men.

The study examines national trends in prevalence in two large cohorts during a period of about 14 years. Given the multi-year latency period from tobacco exposure to onset of various smoking-associated diseases, careful data-based projections of future burden are crucial for the planning, implementation, and assessment of policies aimed at smoking prevention and control.

A striking characteristic of the tobacco epidemic in China is its gender distribution: 68% of men and 3.2% of women were smokers in Chen and colleagues' study<sup>3</sup> (defined as ever regular users from the 2004–08 second cohort study). This distribution produces a correspondingly large effect on tobacco-attributed mortality, which is rising in men and falling in women. This effect has several implications. While men are at substantial risk of death and disease from active smoking, women are at risk from passive exposure at home and in the workplace.<sup>5</sup>

Although female smoking rates are associated with older ages, young Chinese women remain an attractive target for the tobacco industry, with the allure of increasing sales by crafting appeals based on themes of independence, glamour, sophistication, sexuality, and social acceptance. Such a focus on attracting female smokers has been