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Public-health risks of melamine in milk products

News stories about the contamination of milk with melamine in China first emerged on Sept 11, 2008, and the situation has since become an international health scare.¹ Melamine (also known as tripolycyanamide) is an industrial chemical in the production of melamine resins, which are used in laminates, glues, adhesives, and plastics. When added to milk, melamine increases the nitrogen concentration, which suggests a false increase in protein concentration. Melamine has low oral acute toxicity but excessive exposure in animals causes renal stones. When consumed by human beings, babies and children are affected the most because of their dependence for nutrition, compounded by immaturity of their organs, which renders them vulnerable to chemical damage.²

The practice of mixing preservatives and chemicals, including antibiotics, with milk to make it last longer, taste better, and record higher protein values reflects an inadequately regulated and managed supply-chain and an agricultural industry in need of reform. Chinese people have only recently started to appreciate milk products and many producers are small farmers, under pressure to maximise milk yield in the face of rising grain prices. Middlemen between milk producers and some of the big dairy companies have been selling substandard milk at discount prices.³ Although China has a monitoring system for nutritional contents, there is no regular

reporting system for the concentration of common chemicals (illegal preservatives), veterinary antibiotic use, and carcinogenic components in dairy products. The Government has now recognised the need for support, training, and investment in the industry to safeguard potential risk to public health.⁴

Meanwhile, by Sept 22, the Chinese authorities had reported that 52 857 children had been treated for renal complications. At least four children have died as a direct result. By Sept 28, in Hong Kong where 95% of food is imported, much of it from the mainland, 15 017 children had attended designated clinics. Five of these children were found to have kidney stones, and four of these five had a history of living in the mainland.⁵ Because infant formula has been supplied to a large number of countries as far afield as Burundi, Yemen, and Tanzania, the UN has issued a worldwide alert and the European Union banned China-made baby-food.⁶ In the UK, all products from China containing more than 15% milk as an ingredient will be subject to documentary, identity, and physical checks and those products containing more than 2.5 mg melamine per kg will be destroyed.⁷ The USA has advised those travelling to China with small children to take their own baby-food and formula.⁸

The Chinese Government's response has been to curb the risks, punish the perpetrators, and help the victims. The Government has enacted the Emergency Public Health Response Regulations drawn up in 2003 in response to the outbreak of severe acute respiratory syndrome (SARS).⁹ This plan formulates a contingency response for major emergencies. However, the plan was drafted for infectious diseases such as SARS, and there are no clear guidelines or regulations which govern responsibilities and liabilities in a case such as that of melamine contamination. The Minister of Health has promised care will be provided free to affected children and the Government is providing screening to reassure anxious parents. However, for those with permanent clinical problems and affected children beyond China's borders, financial compensation and long-term follow-up is less certain and questions of liability are as yet unresolved.

Public concern was raised after New-Zealand-based food-giant Fonterra learnt from its Chinese partner Sanlu Group that infant formula was contaminated.

The printed journal
includes an image merely
for illustration

Sanlu, working with the Chinese health authorities, then instituted a full public recall of affected formula.¹⁰ Unfortunately, melamine contamination is not the first instance of unsafe milk formula in China. In 2003, 12 children died of malnutrition in Anhui Province as a result of being fed infant formula of poor quality.¹¹ 55 different infant formulas, 40 corporations, and ten provinces were involved in these incidents, which exposed key public-health gaps in food safety and public protection.

China is now facing not only the requirement to respond to the needs of sick children, but also the need to radically reform its milk-production processes and restore public confidence. Engaging local-level bureaucracies, addressing corruption and malpractice, and providing financial support to the many farmers whose livelihood is affected are all essential for public-health protection, as is the need for open and transparent processes for surveillance and monitoring of food quality with community engagement at all levels to ensure good practice in the future. But the underlying ethics of a society in which profit motive over-rides public good also needs to be addressed. To quote Premier Wen Jibao, "Many factories and milk dealers are lacking the most fundamental business morals and social responsibility. They are just cold blooded. Therefore we will investigate them leaving none to escape".¹²

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We declare that we have no conflict of interest.

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Effect on health from smoking and use of solid fuel in China



Although mortality rates from cardiovascular and cerebral vascular diseases are increasing, chronic obstructive pulmonary disease (COPD), lung cancer, and tuberculosis continue to rank in the top-ten leading causes of death in China.¹ Prevalence of COPD remains high, affecting 8.2% of the population older than 40 years (12.4% in men, 5.1% in women). Incidence of lung cancer has also increased rapidly in recent years.²

Little doubt exists that smoking and use of solid fuels are the two most important risk factors contributing to COPD, lung cancer, tuberculosis, and related deaths. Liu and colleagues³ reported a highly significant association between COPD and exposure to biomass fuel for cooking in a subpopulation of non-smoking women in rural Yunyang, southern China. Prevalence of COPD

was two times higher⁴ and mortality from lung cancer six times higher⁵ in smokers than in non-smokers.

In today's *Lancet*, Hsien-Ho Lin and colleagues⁶ used validated methods to predict deaths from COPD, lung cancer, and tuberculosis. With several scenarios, they showed that reducing smoking and solid-fuel use would significantly lower the social burden of these diseases in China between 2003 and 2033. These findings are important as a serious warning for policy makers. However, it would be difficult to predict a picture after 30 years, in view of rapid changes in living standards, rural-to-urban transformation, and better drugs, as well as the methods they used for predictions.

For instance, because urban areas are expanding rapidly, about 40–45% of the population in

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