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Air pollution and human health

Air pollution, human health, climate change and you

George Thurston

The “co-benefits” of reducing air pollution on climate change and human health

The study by Ko *et al*¹ in this issue of *Thorax* (see page 780) provides an important new contribution to the growing body of evidence that the severe adverse health effects of air pollution, so well documented in Europe and North America, are also occurring in Asia. Indeed, a recent report by the Health Effects Institute (HEI) surveyed the available published literature on this topic as part of its Public Health and Air Pollution in Asia-Science Access on the Net (PAPASAN) study. They found hundreds of published studies showing adverse health effects of air pollution in Asia and summarised the results on the web (<http://www.healtheffects.org/Asia/papasan-home.htm>). These results show that a wide range of health effects are significantly associated with air pollution

exposures in Asia, including studies of respiratory and cardiovascular morbidity and mortality in a number of cities across Asia. In fact, the HEI report identified 69 published studies of the effects of air pollution on the health of populations in Mainland China, 16 in Hong Kong, 56 in Taipei, China, 8 in Indonesia, 2 in Malaysia, 6 in Singapore, 13 in Thailand, 30 in India, 46 in Japan and 33 in South Korea. The study by Ko *et al* now adds to this knowledge by identifying a susceptible population not studied extensively before in Asia—people suffering from chronic obstructive pulmonary disease, the fifth largest cause of death in Hong Kong.

Clearly, there is a large body of studies documenting an ever widening range of adverse health effects of air pollution in

Asia. As summarised in the HEI report, the increased cardiopulmonary risks found in Asia are similar in magnitude, per amount of pollution, to the relative risks found in other parts of the world.² But the importance of these increased risks for illness, hospital admissions and mortality are much greater than in Europe or North America because the levels of air pollution in Asia are usually so much higher. For example, the populations of Hong Kong and New York City are both about 8 million, but the annual average concentration of particulates with an aerodynamic diameter <2.5 μm (PM_{2.5}) in Hong Kong, as reported by Ko *et al*,¹ is nearly triple that found in New York (36 $\mu\text{g}/\text{m}^3$ vs approximately 14 $\mu\text{g}/\text{m}^3$). And, as shown in fig 1, Hong Kong has among the cleanest air of Asian cities. Air pollution represents a major, and growing, public health problem in Asia. Indeed, the World Health Organisation (WHO) has estimated that urban air pollution contributes each year to approximately 800 000 deaths and 4.6 million lost life-years worldwide.⁴ As the population and economic activity of Asia grows, and as the migration of residents from the rural countryside to the cities accelerates, the outdoor air pollution health problems will continue to worsen unless measures are taken to reduce emissions of air pollutants by industrial, motor vehicle and fossil fuel combustion sources.

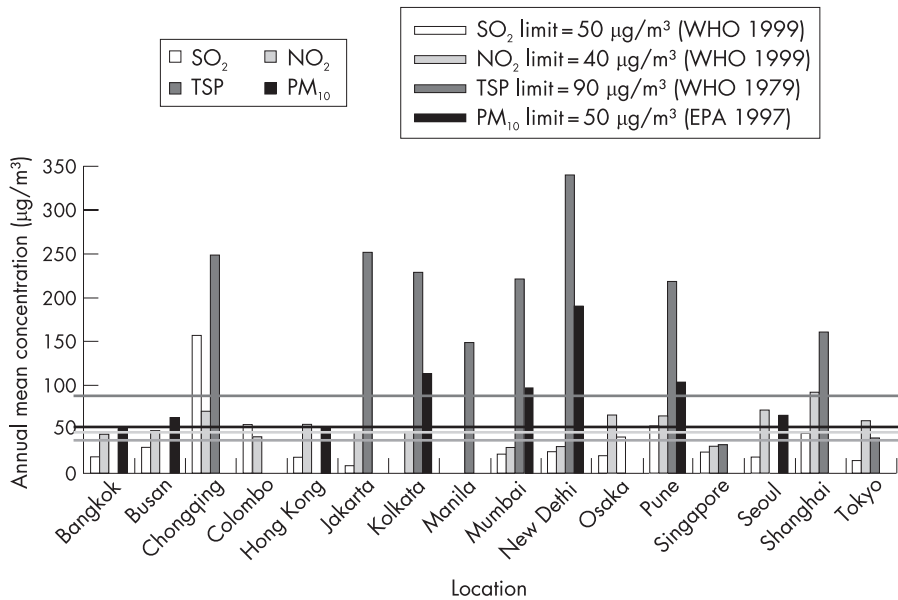


Figure 1 Comparative air pollution levels across Asia.² SO₂, sulphur dioxide; NO₂, nitrogen dioxide; TSP, total suspended particulate matter; PM₁₀, particulates with an aerodynamic diameter <10 µm. Reprinted with permission from the Health Effects Institute, Boston, USA.

The results of the work by Ko *et al*,¹ combined with past such studies, also have potentially critical relevance to the challenge of climate change that faces all nations of the world. The most recent Intergovernmental Panel on Climate Change (IPCC) report⁵ has concluded, in the most definitive terms yet, that global climate change is occurring, stating that: “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level”. The fact that the “man-made” contribution to the climate change pollutants is largely caused by the same activity that causes the air pollution discussed by Ko *et al* indicates that, if a city, state, or nation acts to reduce the combustion of fossil fuels and the air pollution caused by them, it will reap not only the climate change benefits but also the localised health benefits associated with that

reduction in air pollution. This point was brought home by a recent Policy Forum entitled *Hidden Health Benefits of Greenhouse Gas Mitigation* that appeared in the journal *Science*.⁶ The article concludes: “Policies to mitigate GHG can yield substantive and immediate benefits to the 3 billion people currently residing in urban areas throughout the world. Moreover, these largely unappreciated air pollution reduction-related health benefits could be a strong motivator for GHG mitigation action.” Thus, the greatest air pollution health benefits of climate control measures will go to the cities and countries that act most vigorously to control their combustion emissions of greenhouse gases. These locally enjoyed health “co-benefits” of reductions in air pollution should be a major inducement for individual governments to “sign on” to act to reduce climate change pollution. Public survey polls have shown that scientists and physicians, such as you who read this journal, are among the

people most respected by the general public. Not politicians, not lawyers—you. In addition to this credibility and stature, you now also have the information necessary to induce your own city, state and nation to go forward with reducing pollution from the combustion of fossil fuels; if they act to reduce this fossil fuel burning pollution, there will not only be long-term global climate change benefits but also immediate local health benefits that will be reaped from controlling this air pollution. You now have the facts: it is up to you to carry this simple message to your respective governments about air pollution, climate change and health effects: “Think globally, benefit locally”.

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