

Is particulate air pollution a price we must pay for progress?

In January 2014, the *New York Times* published a news item indicating that the particulate air pollution in Delhi was higher than that in Beijing. Till that time Beijing was considered to be the most polluted city in Asia. This created a furore in Delhi and attempts were made to prove that the *New York Times* report was wrong. The pollution in any big city has large spatial variation. Hence one measurement in each city may not be a true indicator of the state of pollution in the city as a whole. The particulate pollution in Delhi has been increasing for the past ten years. This is in spite of the fact that all buses and taxis are compelled to use compressed natural gas (CNG) after a ruling by the Supreme Court. Why is particulate air pollution still increasing in Delhi? This is because the number of passenger cars running on diesel has increased dramatically during the past ten years. This increase is primarily on account of higher subsidy provided to diesel than petrol. This short-sighted populist policy has been followed without worrying about its impact on particulate pollution. The particulates emitted by diesel cars can be reduced by using filters in the exhaust, but this can be done only if diesel fuel has low sulphur content. There is a widespread adulteration of the diesel fuel in India, and hence, the particulate filters may not work well. Therefore, one has to resort to limiting the number of private vehicles using diesel fuel in big cities. This can be done if there is a good mass-transit system and strong disincentives to discourage the use of private cars. This has been done in Singapore, but there has been no serious attempt to take this path in India because most people think that pollution is a price we must pay for progress. Most Indians consider air pollution as a nuisance, which may cause asthma, but will pose no threat to their life. This misconception persists because of their lack of awareness about international research that has shown that particulate air pollution is directly linked to higher mortality and reduced life span.

Most of the research that relates particulate air pollution to mortality is based on statistical correlation between particulate concentration and incidence of cardiac problems and lung cancer. Many Indians hope that this statistical correlation may not be valid in India. Recent research has shown the pathway by which particulates

(smaller than 10 micron in diameter) cause hypertension, cancer and cardiac problems. Hence the connection between particulate air pollution and human health is not merely statistical. The most interesting work was based on the recording of electrocardiogram (ECG) of a cyclist as he moved around London. This work showed that the abnormalities in the ECG are directly correlated to the increase in particulate content in the air. In India there has been a dramatic increase in the incidence of heart attacks and this has been attributed to genetic factors, diabetes, sedentary lifestyle and obesity. Although these factors are important, there is a need to examine the impact of high particulate pollution on the incidence of heart disease and lung cancer in India. Last year the World Health Organization (WHO) classified particulate matter as carcinogen. WHO estimated that outdoor air pollution caused 1.2 million premature deaths in China in 2010. The impact of air pollution on health is obvious in China, where coal is used for residential heating. The villages located north of the Hai river in northern China were provided coal, free of cost, while those living to the south of the river did not receive this subsidy. The incidence of cancer among those living to north of the Hai river was much higher than those living in the south. The life expectancy of those living to the north of the river was 5.5 years less than those living to the south. People living to the north of the Hai river lost 2.5 billion years in life expectancy. The decision to give free coal was implemented with good intentions, but it did more harm than good. The impact of particulate air pollution on lung cancer was brought home dramatically last year when a 8-year-old girl was found to have lung cancer in the highly polluted Jiangsu Province of China. In eastern India, there is a serious problem with particulate air pollution in states that have adopted open-cast mining of coal. Most of the urban population which enjoys the benefit of electricity from coal-based power plants is not aware of the huge price paid by the people living close to the open-cast coal mines.

In India, Sundeep Salvi (Chest Research Foundation, Pune) has examined the impact of particulate air pollution on the incidence of congestive obstructive pulmonary disease (COPD). He has shown that the mortality caused

by COPD in India is much higher than that caused by TB, diabetes, HIV and malaria. His results are based on the data given in the 'The global burden of disease' report published by WHO in 2009. We spend, however, more money on combating TB, HIV, diabetes and malaria than controlling particulate air pollution.

Most of the research around the world has been on outdoor air pollution, but in India we have a more serious problem of indoor air pollution. This is on account of the use of coal and firewood for cooking. The carcinogens released during the incomplete combustion of coal and firewood in cook stoves pose a serious threat to women who spend a lot of time in the kitchen. There have been several attempts by the Government to provide more efficient cook stoves in rural areas, but these programmes have not been uniformly successful. The ideal solution would be to provide biogas or cooking gas in rural areas, but this poses many technical challenges. Solar cookers have been promoted, but have failed because they demand a change in cooking habits of the people. There are new cook stoves with a battery-operated fan that ensures clean combustion. These stoves are expensive and hence require subsidy. The Government has not taken this issue seriously, because the impact of smoke on the health of women in rural India has not been fully appreciated.

In India the media covers the threat of climate change much more than the threat of air pollution. Global climate

change will lead to more heat waves, changing rainfall patterns and rise in sea level. These threats are not immediate, but will become more prominent after a few decades. In the short term, we in India cannot do much about global climate change, because we contribute less than 6% to the global carbon dioxide emissions. The impact of air pollution is immediate and local. Therefore, we can take up local actions to mitigate the impact of particulate air pollution, because most sources of particulate matter are local.

During the past 67 years we ignored the impact of water pollution on our life and today we are dependent on bottled drinking water. If we ignore the threat of particulate air pollution, we will be forced to carry 'bottled clean air' in the near future. Many of those who determine the policies of the Government have their own 'clean environment'. They live in air-conditioned houses, and travel in air-conditioned cars on elevated highways to air-conditioned offices. They will not understand the impending crisis in particulate air pollution until it is too late.

J. Srinivasan

Divecha Centre for Climate Change,
Indian Institute of Science,
Bangalore 560 012, India
e-mail: jayes@caos.iisc.ernet.in