How To Clean Air

As we transition from the monsoon to winter, the temporary respite in air pollution is over. A combination of festivals, post-harvest crop burning, firing of brick kilns and reduced wind speed will soon increase the level of particulate air pollution in India. The Global Burden of Disease study estimates that, in India, ambient air pollution is responsible for 3,283 premature deaths every day.

Half of the top 20 polluted cities in the world are in India. India has seen the steepest increase in air pollution since 2010. Although China achieved global notoriety some years ago, it is India that has experienced a nearly 150 per cent increase in ozone-attributable deaths over the past 25 years. In comparison, the number of people who died due to diseases caused by pollution in China did not increase much in the same period.

Till now, almost all air pollution-related deaths were thought to be due to lung diseases. Evidence, however, is accumulating that links short and long-term exposure to air pollution with other diseases - these include heart attacks, stroke, diabetes, chronic kidney disease and cancer. In fact, the highest proportion of pollution-related deaths, especially those related to particulate matter, may not be because of diseases of lungs, but due to these other conditions.

Studies have shown that ultrafine particulate matter, which accounts for over 90 per cent of the particles emitted by road traffic, rapidly enters the bloodstream after being inhaled. These particles then interfere with the normal reactivity of blood vessels, and are distributed to many organs including the kidneys. Even when it does not kill, air pollution reduces the number of years lived in full health by aggravating asthma attacks, eye and skin disorders, and increasing the risk of development of high blood pressure, obesity, Parkinson's and Alzheimer's diseases, psychiatric disorders and frailty. Air pollution affects all stages of life, starting from pre-conception to old age. Exposure of a mother while pregnant causes abnormalities that increase the lifetime risk of chronic diseases in the baby. These associations have been shown in large population-based studies, done either in a cross-sectional manner - that is, examining the differences based on residence in areas with different levels of pollution - or in a longitudinal manner, where changing levels of pollution in the same area is associated with increasing disease risk after all other factors are accounted for.

On the positive side, remedial measures have shown reduction in the number of individuals with adverse outcomes, including improved life expectancy in several parts of the world. Policy interventions before the Beijing Olympics in China led to significant reduction in pollution, and this, in turn, reflected in significant improvement in people's physiology.

This will be a long battle. We need better urban planning starting with proper land-use assessment, reducing major transport activity close to communities, relocating traffic sources (roads, airports) from crowded areas, avoiding the mixing of industrial and residential areas, making better roads, reducing uncovered areas in cities by planting more grass and plants, improving transport technologies, and increasing awareness of the societal burden imposed by air pollution. Interdisciplinary academic groups including experts in toxicology, environmental health, analytical chemistry, applied physics, healthcare researchers, economists, and social scientists should evaluate the full range of impacts of air pollution on human health, develop tools to identify pollutants, find origin of particles, and develop culturally-appropriate solutions.

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