

Air pollution myths and realities

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For long, debates on air pollution have centred around PM2.5 and PM10 levels, even as an invisible killer remains unnoticed

Another winter has arrived and the discourse has invariably turned towards [air pollution](#), especially in the metro cities. Of course, the centre of discussion is New Delhi which is considered to be a hotspot for air pollution. The situation is precarious because it is home to a large population of the diplomatic community and many foreigners who remain more concerned about bad air days than Indians in general because the most serious effect it has on an individual's health.

Many diplomatic corps now consider Delhi's pollution crisis as the new capital punishment. Increasingly, we come across new studies that estimate the number of Indians who would die early due to air pollution or those who will have to set aside a large part of their budget for health, to take care of the diseases arising due to the foul air we breathe. The same is true for increased Government health expenditure — the reimbursement cost under Ayushman Bharat or treatment cost in Government hospitals will be very high due to pollution-related diseases.

In hindsight, it must be mentioned that the entire discourse on air pollution in the Indian context centres around the mean concentration of particulate matter (PM)10 (particles smaller than 10 microns) and PM2.5 (particles smaller than 2.5 microns, about 25 to 100 times thinner than a human hair). This is solely due to the fact that India's Central Pollution Control Board has the facility to monitor only PM2.5/PM10 pollutants in Delhi or elsewhere. As a result, we are probably missing the bull's eye in respect of measuring air pollution levels. Consequently, we are probably underestimating the deleterious effects of air pollution by tonnes.

Let us be clear. There also exists other pollutants in the atmosphere that are more harmful than PM10/PM2.5 but are usually not talked about. These are nanoparticles that are sources of both natural and man-made processes — soil erosion, dust storms, burning of unprocessed fuel and industrial and mechanical processes. All of these release several million tonnes of nanoparticles in the air that have an adverse affect on one's health.

While studies have extensively researched on the health impacts of PM2.5 and PM10 exposure, evidences on the toxic effects of nanoparticles on human health are insufficient and beyond the scope of a single discipline. The study calls for an interdisciplinary research team of scientists, health professionals and epidemiological researchers who must be convinced about the scientific composition, transmission and exclusive effects of nanoparticles on human health.

The large surface area and chemically reactive nature of nanoparticles make risk assessment highly uncertain. Inhalation is the most common route through which people get exposed to nanoparticles. Ingestion and dermal contact of engineered nanoparticles are also popular transmission mechanisms. Inhaled particles can enter the blood circulation from where they can be carried to different health organs, such as heart, kidney and liver. This can give rise to cardiovascular, pulmonary diseases and respiratory illnesses.

Evidences show that nanoparticles, accumulated in the vascular sites, can clot the blood vessels, and hence increase the likelihood of a heart attack or a stroke. Occupational exposure to these toxic elements can increase the risk of lung cancer, and long-term exposure to higher concentrations of nanoparticles can even lead to deaths. For patients with pre-existing heart or pulmonary conditions, the situation can get worse when exposed to elevated particle concentrations. Infant mortality, neonatal complications and birth defects are also likely to increase with ever increasing concentrations of matters smaller than 10 µm.

Incidentally, while pollution masks are available in the market, they provide protection against PM10/PM2.5. The same is not true in the case of pollution from nanoparticles. Moreover, with no mechanism available to record the extent of air pollution from nanoparticles, the risk arising from the same is now a black box. Thus, there is an urgent need for the Government to raise awareness on the dangers of nanoparticles. Monitoring stations must also measure the same. Without quantifiable statistics, we may not be able to move ahead in highlighting the dangers of air pollution.

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