Toxic air endangers 600 million people in South Asia

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Smog in Delhi. The average air quality index (AQI) in the city rose to 376 during November, forcing the closure of schools. Credit: Sumitmpsd, (CC BY-SA 4.0)

With another smoggy winter hanging over the vast and thickly populated Indo-Gangetic plains, there are fears of serious health consequences to more than 600 million people living in northern India and Nepal as well as in eastern Pakistan and Bangladesh.

Delhi, the biggest city in the region, showed an average air quality index (AQI) of 376 in November forcing the closure of schools that had just begun to reopen after COVID-19 restrictions.

Last year, the November AQI average for the region was 327 while for the same month in 2019 it was 312, indicating a rising trend that attracted the ire of the Supreme Court.

Delhi saw 11 'hazardous' air quality days last month, the worst since the Central Pollution Control Board began the AQI measurement system in 2015. The hazardous category indicates an AQI of 301–500. The 'good' category is 0–50 which is followed by 'moderate' at 51–100 while anything in the 101–301 AQI range is considered unhealthy.

"We feel that nothing is happening… the pollution keeps increasing," India's chief justice N.V. Ramana said during a hearing on 2 December on deteriorating air quality in New Delhi and other north Indian cities. "If as many efforts as you (government) are claiming have been made, then why is pollution increasing?"

While wrangling goes on year after year over the source of the high levels of toxic pollutants in Delhi's air and who is to be held responsible, there appears to be little public awareness of the consequences of inhaling particulate matter and other constituents of smoggy air.

Vipul Gupta, chief of Neurointerventional Surgery Unit, says: "There is little awareness that most of the harm caused by air pollution is to the cardiovascular system—epidemiological studies have shown a strong association between air pollution and cardiovascular diseases including stroke."

Particulate matter that is smaller than 2.5 microns in size (PM 2.5) can increase risk of blockage of the carotid artery, the main blood vessel

supplying the brain, says Gupta. "Even short-term exposure to PM 2.5 can lead to hospitalization and death due to stroke."

The WHO's global air quality guidelines issued in September recommend tolerance levels for PM 2.5 at an annual average of five micrograms per cubic meter. Delhi's average PM 2.5 levels in 2020 was 93 micrograms per cubic meter—16.8 times the WHO limit—according to a paper released by the Council on Energy Environment and Water in June.

The Air Quality Life Index, released by the Energy Policy Institute, University of Chicago, in September, describes South Asia as "consistently the most polluted region with the people there seeing their lives shortened by an average of five years relative to what it would be if the region met the WHO guidelines."

India alone has more than 510 million people living in the Indo-Gangetic plains who are on track to lose more than nine years of life expectancy if 2019 pollution levels persist, the report said.

For Bangladesh, residents may live 5.4 years longer if pollution levels meet the WHO guidelines, while residents of its capital city Dhaka could live 7.7 years longer. Those living in the polluted Terai region of Nepal stand to gain 6.7 years. In Lahore, Pakistan's second-largest city, residents may live five years longer if the WHO guidelines are followed.

"While the exact source of smog over the Indo-Gangetic plains is still being investigated, it is evident that residents of the region, including Kathmandu, are severely affected by respiratory and cardio-vascular ailments during winter," says Bhupendra Das, a pollution researcher at the Institute for Advanced Sustainability Studies, in Potsdam and at Tribhuvan University, Kathmandu.

"The winter months see 'temperature inversion' which traps particle pollutants and prevents the dispersion," he adds. "If the pollutants come from burning plastic waste they are likely to release chlorides, including dioxins and furans which are among the most toxic substances known to man."

The WHO says particulates cause health problems according to source, size and physical and chemical properties and that the wide variability makes research difficult. Additionally, airborne particulate matter is constantly on the move and undergoes chemical and physical changes in the atmosphere.

Some of the complexity of studying PM 2.5 is evident in research conducted by the Indian Institute of Technology—Madras and published January in *Nature Research* that showed how pollution over Delhi is different from that in other cities for its high chloride content that was responsible for the haze, lowered visibility and health impacts.

The authors suggest that local concentrations of hydrochloric acid, emitted from burning plastic, contributed significantly to reduced visibility. "Our work implies that identifying and regulating gaseous hydrochloric acid emissions could be critical to improving visibility and human health in India."

In 2019, the Indian government declared a "war on pollution" and launched a National Clean Air Programme with a declared goal of reducing particulate pollution by 20–30 percent by 2024 from 2017 levels, although the situation has only worsened since.

In August the local state government in Delhi began installing smog towers at key areas of the city to vacuum up particulate matter and pollutants. However, these 24-meter high structures have not performed at the claimed 80 percent efficiency with readings for late November

and December showing efficiency rates of less than 40 percent.

In fact, one tower showed the filtered air bearing 300 milligrams of particulate matter per cubic meter—a far cry from the safe limit of five micrograms per cubic meter prescribed by the WHO, making little difference to the number of years of life expectancy that Delhi residents stand to lose.

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