

India, Nepal most exposed to high concentrations of pollution

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Traffic jam in Delhi. Vehicular emissions is one of the main sources of PM_{2.5} in South Asia. Credit: NOMAD CC BY 2.0

Not only are India and Nepal exposed to the world's highest concentrations of PM_{2.5}, the problem is worsening, warns the State of Global Air 2020 report.

India, said the 21 October report, has been recording steadily increasing

PM2.5 pollution over the past decade. The report put India on top of countries showing high exposure to PM2.5 concentration at 83.2 micrograms per cubic meter of air, followed closely by Nepal with 83.1 micrograms per cubic meter.

WHO's [Air Quality Guideline](#) level for PM2.5 is only 10 micrograms per cubic meter. Niger, Qatar and Nigeria occupy the next top three places after Nepal.

PM2.5, or particles smaller than 2.5 micrometers in diameter (less than a 30th of the diameter of a human hair and capable of entering the bloodstream via the lungs), are emitted by vehicles, coal-burning power plants, industrial activity, waste burning, and other human activities such as cooking.

According to the report, exposure to high concentrations of PM2.5 over several years has been the most consistent and robust predictor of mortality from cardiovascular, respiratory, and other types of diseases. The report calculates that in 2019, aerial pollutants over India contributed to over 1.67 million of the 6.67 million deaths worldwide.

Nearly all of India's 1.3 billion people live in areas where PM2.5 levels are higher than WHO guidelines. Nepal's vast Himalayan landscapes notwithstanding was not far behind, with 98% of its 30 million population living in areas that exceed WHO standards.

"The report presents a comprehensive analysis of levels and trends of air quality, including [health effects](#), worldwide. Long-term exposure to air pollution, especially PM2.5, is a serious but poorly recognized issue. South Asian countries—Bangladesh, India, Nepal and Pakistan—are most vulnerable," says Bhupendra Das, researcher on air quality at the Institute for Advanced Sustainability Studies, Potsdam, Germany and Tribhuvan University, Kathmandu.

Das tells SciDev.Net that it is noteworthy that the report shows "the trend of ambient air pollution increasing in South Asia, whereas indoor or household air pollution seems to be declining."

"From my own studies, I can say that the increase in PM2.5 in South Asia is mainly due to vehicular emissions, solid waste open burning, crop residue open burning, coal-fired power plants, brick kilns, industrial activities, and other anthropogenic and natural sources," Das says.

"It is important to note factors like lack of legal mandate to implement [environmental policies](#), lack of action plan or strategies, lack of better air quality management plan, low-grade vehicle engines, insignificant proportion of efficient and smart technologies, and concerns and actions limited to cities only," Das observes.

The report—released by the US-based Health Effects Institute and the international research program Global Burden of Disease—relied on [data](#) from ground monitors and remote-sensing satellites to estimate average PM2.5 exposure. Globally, of 87 health risk factors, air pollution stood fourth after high blood pressure, tobacco and diet.

In terms of ozone exposure, Qatar recorded the highest followed by Nepal and India. Of the 20 most populous countries, India recorded the highest increase (17%) in ozone concentrations over the past decade.

On average, global exposure to ozone increased from about 47.3 parts per billion (ppb) in 2010 to 49.5 ppb in 2019. Ozone a major respiratory irritant, is released directly into the air and also formed in chemical interactions between nitrogen oxides and volatile organic compounds in the presence of sunlight.

India did, however, reduce the number of people exposed to household air pollution, mainly through subsidized distribution of clean cooking

fuels. India reduced its population exposed to household air pollution from 73% to 61% over the past decade, while China achieved a corresponding reduction from 54% to 36%.

The good news is that although Asia, Africa and the Middle East saw the highest annual average exposures to PM 2.5 last year, 14 out of the 20 most populous countries of the world experienced a drop in levels of the pollutant. But "countries with some of the highest exposures in the world—India, Pakistan, and Bangladesh—continue to see increases," the report said.

Globally, an estimated 476,000 infants died from exposure to air pollution in 2019. "Infants born in sub-Saharan Africa and South Asia have the highest rates of neonatal deaths attributable to air pollution, from 9,000 to 13,100 per 100,000 live births," the report says.

Mukesh Sharma, professor and specialist in environmental engineering at the Indian Institute of Technology at Kanpur, India, tells SciDev.Net that replacing wood, crop, coal and dung with LPG for cooking and elimination of diesel power generation were "soft options" to reduce chronic toxicity from PM2.5, which differs according to source.

A study that Sharma and colleagues conducted in Delhi, published April in *Chemosphere*, showed PM2.5 in road dust, vehicular emissions, coal, dung, wood and coal [power plants](#) having high toxicity because of the presence of heavy metals as also arsenic and carbon monoxide.

More information: State of Global Air 2020 report:
[www.stateofglobalair.org/sites ... soga-2020-report.pdf](http://www.stateofglobalair.org/sites...soga-2020-report.pdf)

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