AQLI Air Quality Life Index®

India Fact Sheet

India is the world's second most polluted country. Air pollution shortens average Indian life expectancy by 5 years, relative to what it would be if the World Health Organization (WHO) guideline fine particulate pollution ($PM_{2.5}$) of 5 µg/m³ was met[1]. Some areas of India fare much worse than average, with air pollution shortening lives by almost 10 years in the National Capital Territory of Delhi, the most polluted city in the world.

KEY TAKE-AWAYS

- All of India's 1.3 billion people live in areas where the annual average particulate pollution level exceeds the WHO guideline. More than 63 percent of the population live in areas that exceed the country's own national air quality standard of 40 µg/m³.
- Measured in terms of life expectancy, particulate pollution is the greatest threat to human health in India, reducing life expectancy by 5 years. In contrast, child and maternal malnutrition reduces average life expectancy by about 1.8 years, while smoking reduces the average life expectancy by 1.5 years.
- Particulate pollution has increased over time. Since 1998, average annual particulate pollution has increased by 61.4 percent, leading to a further reduction in average life expectancy of 2.1 years. Since 2013, about 44 percent of the world's increase in pollution has come from India.
- In the Indo-Gangetic plains of Northern India, 510 million residents, nearly 40 percent of India's population, are on track to lose 7.6 years of life expectancy on average, if current pollution levels persist.[2] Residents of Lucknow stand to lose 9.5 years of life expectancy if pollution levels persist.

POLICY IMPACTS

In recent years, the residents of India are recognizing that air pollution is a major health threat and the government is beginning to respond. In 2019, the Government of India launched its National Clean Air Programme (NCAP). The goal of NCAP is to reduce particulate pollution by 20 to 30 percent, relative to 2017 levels, by 2024. The NCAP targets are non-binding. However, if India were to achieve and sustain this reduction, it would lead to remarkable health improvements. According to the AQLI, a permanent, nationwide reduction of 25 percent, the midpoint of NCAP's target range, would increase India's average national life expectancy by 1.4 years, and by 2.6 years for residents of the National Capital Territory of Delhi.

Figure 1 · Potential Gains in Life Expectancy through Permanently Reducing $PM_{2.5}$ from 2020 Concentration to the WHO Guideline

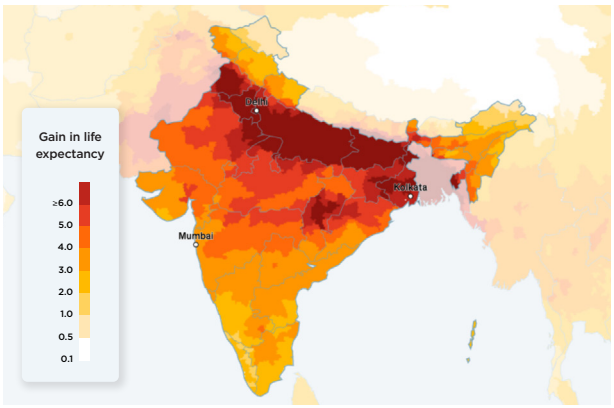
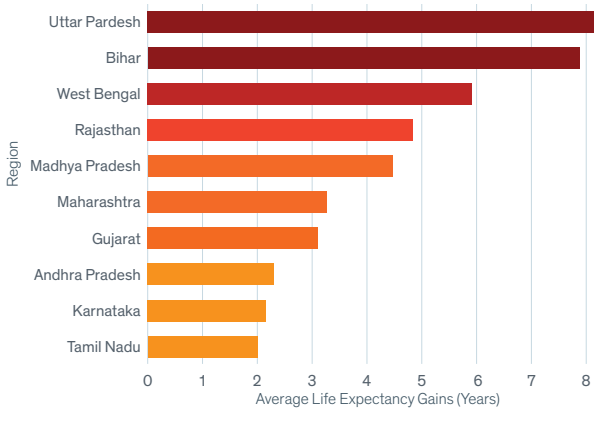


Figure 2 · Potential Gain in Life Expectancy from Reducing $PM_{2.5}$ to the WHO Guideline in the 10 Most Populous States of India



1 All average annual $PM_{2.5}$ values (measured in micrograms per cubic meter: µg/m³) are population weighted.

2 We define the Indo-Gangetic plain region as the following seven states and union territories: Bihar, Chandigarh, Delhi, Haryana, Punjab, Uttar Pradesh, and West Bengal. North India/Northern India/North Indian Belt are all different terms that refer to the exact same region: specifically, the Indo-Gangetic Plain.

Fine Particulate Pollution ($PM_{2.5}$) Concentrations and Life Expectancy Gains by State/UT.

State/UT	Population (Millions)	$PM_{2.5}$ Concentration, 2020 (µg/m³)	From 2020 Concentration to to WHO Guideline of 5 µg/m³	From 2020 Concentration to to the National Standard of 40 µg/m³	From 2017 Concentration by 25% per NCAP
Andaman and Nicobar	0.4	20.6	1.5	0	0.4
Andhra Pradesh	51.4	28.9	2.3	0	0.8
Arunachal Pradesh	1.5	14.8	1	0	0.4
Assam	33.7	33.1	2.8	0	0.8
Bihar	117.9	85.9	7.9	4.5	1.9
Chandigarh	1.1	46.3	4	0.6	1.1
Chhattisgarh	28.5	61.5	5.5	2.1	1.3
Dadra and Nagar Haveli	0.4	27.5	2.2	0	0.7
Daman and Diu	0.3	28.3	2.3	0	0.7
Goa	1.5	26.1	2.1	0	0.6
Gujarat	66.1	36.8	3.1	0	0.8
Haryana	27.9	80.8	7.4	4	1.9
Himachal Pradesh	7.2	28.3	2.3	0	0.7
Jammu and Kashmir	13.8	28.6	2.3	0	0.8
Jharkhand	36.7	61.6	5.6	2.1	1.3
Karnataka	65.3	27.4	2.2	0	0.7
Kerala	33	17	1.2	0	0.4
Ladakh	0.3	8.8	0.4	0	0.2
Madhya Pradesh	79.9	51	4.5	1.1	1.1
Maharashtra	120.4	38.7	3.3	0	0.9
Manipur	3.1	31.3	2.6	0	0.7
Meghalaya	3.5	33.5	2.8	0	0.8
Mizoram	1.2	35.7	3	0	0.8
Nagaland	1.9	26.3	2.1	0	0.6
NCT of Delhi	17.7	107.6	10.1	6.6	2.7
Odisha	44.4	45	3.9	0.5	1
Puducherry	1.3	22.3	1.7	0	0.6
Punjab	29.2	65.7	5.9	2.5	1.5
Rajasthan	75.8	54	4.8	1.4	1.2
Sikkim	0.6	40.3	3.5	0	0.9
Tamil Nadu	77.4	25.4	2	0	0.7
Telangana	36.4	34.4	2.9	0	0.8
Tripura	3.9	66.3	6	2.6	1.4
Uttar Pradesh	220.1	88.3	8.2	4.7	2.1
Uttarakhand	11.1	37.9	3.2	0	1
West Bengal	96.6	65.4	5.9	2.5	1.4

Figure 3 · Life Expectancy Impact of Fine Particulate Pollution ($PM_{2.5}$) and Unassociated Causes/Risks of Deaths

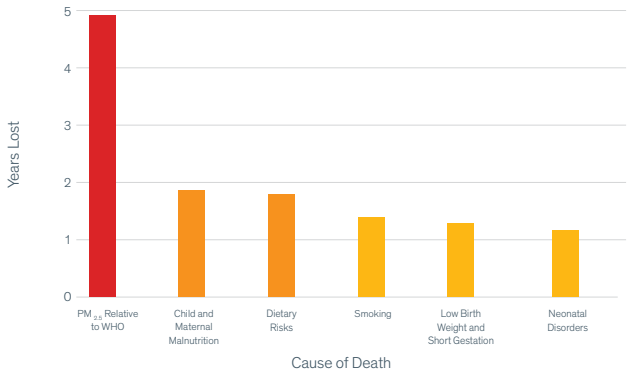
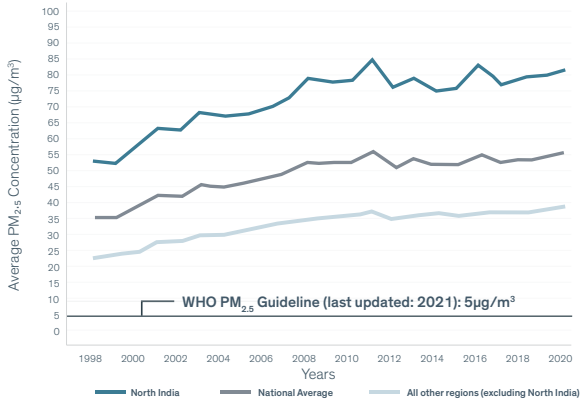


Figure 4 · Average $PM_{2.5}$ Concentrations in India, 1998 to 2020



ABOUT THE AIR QUALITY LIFE INDEX (AQLI)

The AQLI is a pollution index that translates particulate air pollution into perhaps the most important metric that exists: its impact on life expectancy. Developed by the University of Chicago's Milton Friedman Distinguished Service Professor in Economics Michael Greenstone and his team at the Energy Policy Institute at the University of Chicago (EPIC), the AQLI is rooted in recent research that quantifies the causal relationship between long-term human exposure to air pollution and life expectancy. The Index then combines this research with hyper-localized, global particulate measurements, yielding unprecedented insight into the true cost of particulate pollution in communities around the world. The Index also illustrates how air pollution policies can increase life expectancy when they meet the World Health Organization's guideline for what is considered a safe level of exposure, existing national air quality standards, or user-defined air quality levels. This information can help to inform local communities and policymakers about the importance of air pollution policies in concrete terms.

Methodology: The life expectancy calculations made by the AQLI are based on a pair of peer-reviewed studies, Chen et al. (2013) and Ebenstein et al. (2017), co-authored by Michael Greenstone, that exploit a unique natural experiment in China. By comparing two subgroups of the population that experienced prolonged exposure to different levels of particulate air pollution, the studies were able to plausibly isolate the effect of particulates air pollution from other factors that affect health. The more recent of the two studies found that sustained exposure to an additional 10 µg/m³ of PM_{10} reduces life expectancy by 0.64 years. In terms of $PM_{2.5}$, this translates to the relationship that an additional 10 µg/m³ of $PM_{2.5}$ reduces life expectancy by 0.98 years. To learn more about the methodology used by the AQLI, visit: aqli.epic.uchicago.edu/about/methodology