AQLI Air Quality Life Index®

India Fact Sheet

In 2019, India's average particulate matter concentration was 70.3 µg/m³ -the highest in the world and 7 times the WHO's guideline of 10 µg/m³. Air pollution shortens average Indian life expectancy by 5.9 years, relative to what it would be if the World Health Organization (WHO) guideline was met; 3.0 years relative to what it would be if pollution were reduced to meet the country's own national standard. Some areas of India fare much worse than average, with air pollution shortening lives by 9.7 years in Delhi and 9.5 years in Uttar Pradesh, the most polluted states.

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. .
- Particulate pollution has increased over time. Since 1998, average annual particulate pollution has increased 15 percent, cutting .9 years off the life of the average resident over those years.
- Nearly 40% of India's population is exposed to pollution levels not seen in any other country, with 510 million residents of northern India on track to lose 8.5 years of life expectancy on average, if pollution levels persist.
- The annual average $PM_{2.5}$ concentration in the cities of Allahabad and Lucknow in Uttar Pradesh is 12 times the WHO guideline. Residents of Lucknow stand to lose 11.1 years of life expectancy if these pollution levels persist.
- India's capital Delhi is also highly polluted. Residents of Delhi could see up to 10 years added to their lives if pollution were reduced to meet the WHO guideline; up to 7 years if pollution met India's national standard.

POLICY IMPACTS

In recent years, the people of India are recognizing that air pollution is a problem, and the government is beginning to respond. In 2019, the central government declared a "war on pollution" and announced the National Clean Air Programme (NCAP). The goal of the Programme is to reduce particulate pollution by 20-30 percent relative to 2017 levels by 2024. Though the NCAP's goals are non-binding, if India does achieve and sustain this reduction, it would lead to remarkable health improvements: a nationwide reduction of 25 percent, the midpoint of the NCAP's target, would increase India's national life expectancy by 1.8 years, and by 3.5 years for residents of Delhi.

Figure 1 · Potential Gains in Life Expectancy through Permanently Reducing $PM_{2.5}$ from 2019 Concentration to the WHO Guideline

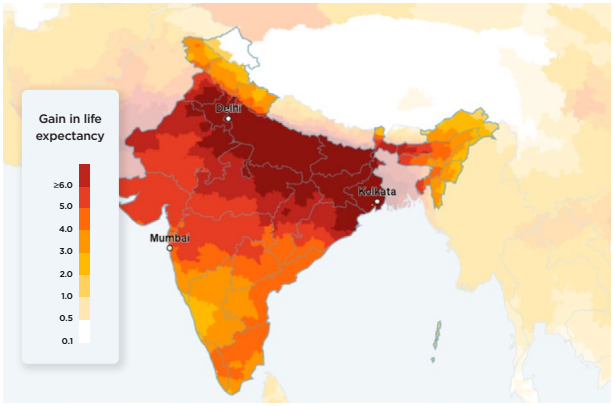
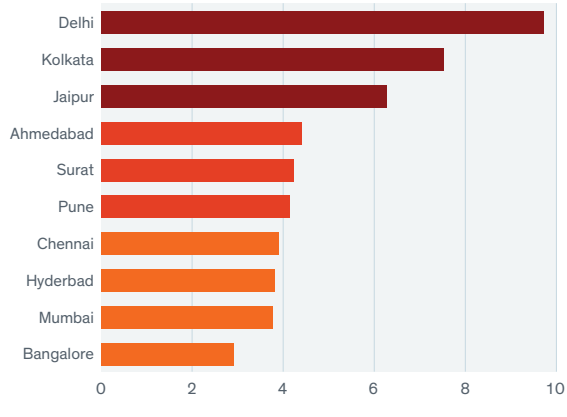


Figure 2 · Potential Gain in Life Expectancy through Permanently Reducing $PM_{2.5}$ from 2019 Concentration to the WHO Guideline in 10 Largest Cities



Note: The WHO changed its particulate pollution guidance on September 22, 2021. The data here reflects the previous guidance.

$PM_{2.5}$ Concentrations and Life Expectancy Gains by State.

State/UT	Population (Millions)	$PM_{2.5}$ Concentration, 2019 (µg/m³)	From 2019 Concentration to WHO Guideline of 10 µg/m³	From 2019 Concentration to the National Standard of 40 µg/m³	From 2017 Concentration by 25% per NCAP
Andaman and Nicobar	0.4	19	0.9	0.0	0.3
Andhra Pradesh	51.4	44	3.3	0.5	1.1
Arunachal Pradesh	1.5	27	1.7	0.0	0.6
Assam	33.7	50	3.9	1.1	1.1
Bihar	117.9	100	8.8	5.9	2.3
Chandigarh	1.1	66	5.5	2.5	1.9
Chhattisgarh	28.5	66	5.5	2.5	1.4
Dadra and Nagar Haveli	0.4	51	4.0	1.1	1.2
Daman and Diu	0.3	49	3.8	0.9	1.2
Goa	1.5	29	1.9	0.0	0.8
Gujarat	66.1	55	4.4	1.5	1.2
Haryana	27.9	96	8.4	5.5	2.6
Himachal Pradesh	7.2	40	2.9	0.2	1
Jammu and Kashmir	13.8	36	2.5	0.1	1
Jharkhand	36.7	85	7.3	4.4	1.9
Karnataka	65.3	35	2.5	0.0	1
Kerala	33.0	38	2.8	0.1	0.9
Ladakh	0.3	12	0.3	0.0	0.3
Madhya Pradesh	79.9	70	5.9	3.0	1.4
Maharashtra	120.4	50	4.0	1.0	1.2
Manipur	3.1	32	2.2	0.0	0.8
Meghalaya	3.5	47	3.7	0.7	1.2
Mizoram	1.2	33	2.3	0.0	0.8
NCT of Delhi	17.7	109	9.7	6.8	0.8
Nagaland	1.9	32	2.2	0.0	3.1
Odisha	44.4	65	5.4	2.5	1.5
Puducherry	1.3	40	2.9	0.2	1
Punjab	29.2	67	5.6	2.6	1.9
Rajasthan	75.8	67	5.6	2.7	1.5
Sikkim	0.6	42	3.1	0.3	0.9
Tamil Nadu	77.4	42	3.2	0.3	1.1
Telangana	36.4	48	3.7	0.8	1.2
Tripura	3.9	53	4.2	1.2	1.4
Uttar Pradesh	220.1	107	9.5	6.5	2.5
Uttarakhand	11.1	48	3.7	1.0	1.3
West Bengal	96.6	79	6.7	3.8	2.1

"During a truly unprecedented year where some people accustomed to breathing dirty air experienced clean air, and others accustomed to clean air saw their air dirty, it became acutely apparent the important role policy has played and could play in reducing fossil fuels that contribute both to local air pollution and climate change. The AQLI demonstrates the benefits these policies could bring to improve our health and lengthen our lives."

Michael Greenstone, The Milton Friedman Distinguished Service Professor in Economics, the College, and the Harris School; Director, EPIC

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 PM10 reduces life expectancy by 0.64 years. In terms of PM2.5, this translates to the relationship that an additional 10 µg/m3 of PM2.5 reduces life expectancy by 0.98 years. To learn more about the methodology used by the AQLI, visit: aqli.epic.uchicago.edu/about/methodology