AQLI Air Quality Life Index®

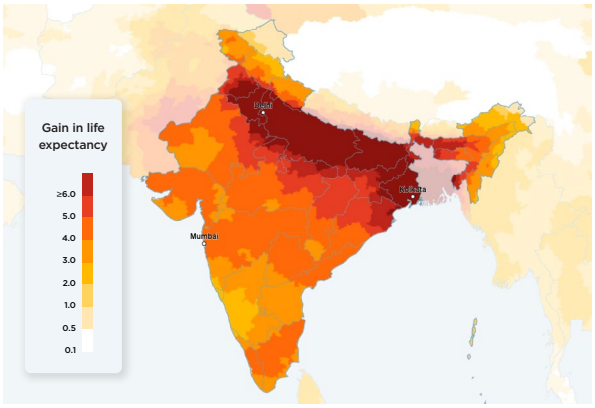
India Fact Sheet

India is today the world's second most polluted country. Air pollution shortens the average Indian life expectancy by 5.2 years, relative to what it would be if the World Health Organization (WHO) guideline was met; 2.3 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 9.4 years in the capital of Delhi and 8.6 years in Uttar Pradesh, the most polluted state.

KEY TAKE-AWAYS

- All of India's 1.4 billion people live in areas where the annual average particulate pollution level exceeds the WHO guideline. Eighty-four percent live in areas where it exceeds India's own air quality standard.
- Particulate pollution has sharply increased over time. Since 1998, average annual particulate pollution has increased 42 percent, cutting 1.8 years off the life of the average resident over those years.
- A quarter of India's population is exposed to pollution levels not seen in any other country, with 248 million residents of northern India on track to lose more than 8 years of life expectancy if pollution levels persist.
- Lucknow, the capital of India's northern state Uttar Pradesh, has the highest level of pollution in the country, with pollution 11 times greater than the WHO guideline. Residents of Lucknow stand to lose 10.3 years of life expectancy if pollution persists.
- India's capital Delhi is also highly polluted. Residents of Delhi could see 9.4 years added to their lives if pollution were reduced to meet the WHO guideline; 6.5 years if pollution met India's national standard.

Figure 1 · Potential Gains in Life Expectancy through Permanently Reducing $PM_{2.5}$ from 2018 Concentration to the WHO Guideline



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 nonbinding, 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 1.6 years, and by 3.1 years for residents of Delhi.

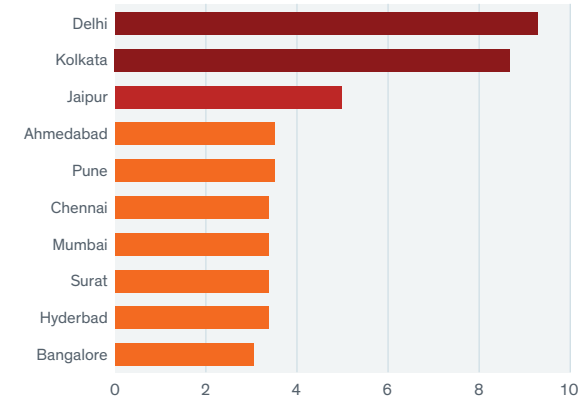
"The legacy of environmental improvement in former pollution capitals is evidence that today's pollution does not need to be tomorrow's fate. As countries navigate the dual challenges of sustaining economic growth and protecting the environment and public health, the AQLI shows not only the damage caused by pollution but also the enormous gains that can be made with policies to address it."

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

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

State/UT	Population (Millions)	PM2.5 Concentration, 2018 (μg/m³)	Years of Life Expectancy Gain through Reducing $PM_{2.5}$: From 2018 Concentration to WHO Guideline of 10 μg/m³	From 2018 Concentration to the National Standard of 40 μg/m³	From 2017 Concentration by 25% per NCAP	From 2018 Concentration by 40%
Andaman and Nicobar	**0.4**	**16**	**0.6**	0.0	0.3	0.6
Andhra Pradesh	50.7	40	3.0	0.2	1.1	1.6
Arunachal Pradesh	1.5	26	1.5	0.0	0.6	1.0
Assam	33.3	52	4.1	1.3	1.1	2.0
Bihar	116.6	88	7.6	4.7	2.2	3.4
Chandigarh	1.1	71	6.0	3.0	2.0	2.8
Chhattisgarh	28.2	51	4.0	1.1	1.3	2.0
Dadra and Nagar Haveli	0.4	40	2.9	0.0	1.1	1.6
Daman and Diu	0.3	39	2.8	0.0	1.0	1.5
Goa	1.5	27	1.6	0.0	0.7	1.0
Gujarat	65.4	42	3.1	0.2	1.0	1.6
Haryana	27.6	91	8.0	5.0	2.6	3.6
Himachal Pradesh	7.1	42	3.1	0.4	1.1	1.6
Jammu and Kashmir	13.6	39	2.8	0.2	1.0	1.5
Jharkhand	36.3	70	5.9	2.9	1.9	2.7
Karnataka	64.6	33	2.3	0.0	0.9	1.3
Kerala	32.6	39	2.8	0.1	1.0	1.5
Ladakh	0.3	14	0.4	0.0	0.3	0.6
Madhya Pradesh	79.0	53	4.2	1.3	1.3	2.1
Maharashtra	119.0	42	3.1	0.2	1.1	1.6
Manipur	3.1	37	2.6	0.1	0.8	1.4
Meghalaya	3.4	52	4.1	1.2	1.1	2.0
Mizoram	1.2	37	2.6	0.1	0.8	1.4
Nagaland	1.9	33	2.2	0.0	0.8	1.3
NCT of Delhi	17.5	106	9.4	6.5	3.1	4.2
Odisha	43.9	57	4.6	1.7	1.4	2.3
Puducherry	1.3	39	2.8	0.1	0.9	1.5
Punjab	28.8	65	5.4	2.4	1.9	2.5
Rajasthan	75.0	51	4.0	1.1	1.3	2.0
Sikkim	0.6	39	2.8	0.1	0.9	1.5
Tamil Nadu	76.4	42	3.1	0.2	1.0	1.6
Telangana	36.1	42	3.1	0.2	1.1	1.6
Tripura	3.9	64	5.3	2.4	1.3	2.5
Uttar Pradesh	217.6	97	8.6	5.6	2.5	3.8
Uttarakhand	11.0	55	4.4	1.6	1.3	2.2
West Bengal	95.6	82	7.1	4.2	2.1	3.2

Figure 2 · Potential Gain in Life Expectancy through Permanently Reducing PM2.5 from 2018 Concentration to the WHO Guideline in 10 Largest Cities



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 Dinstinguished 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