AQLI Air Quality Life Index® | Bangladesh Fact Sheet

Bangladesh is the world's most polluted country. The average Bangladeshi resident could live 5.5 years longer if particulate pollution ($PM_{2.5}$) met the World Health Organization (WHO) guideline of 5 µg/m³ (Figure 1).[1, 2] In the most polluted areas of Bangladesh, such as the Gazipur, Narayanganj, and Dhaka districts, individuals could gain more than 6.5 years of life expectancy.

KEY TAKE-AWAYS

- Air pollution is the greatest external threat to life expectancy in the country. While particulate pollution takes 5.5 years off the life of the average Bangladeshi, tobacco use takes off 2 years, and child and maternal malnutrition take off 1.4 years (Figure 2).
- All of Bangladesh's 166.8 million people live in areas where the annual average particulate pollution level exceeds both the WHO guideline and the country's national standard of 35 µg/m³. Even in the least polluted district of Lalmonirhat, particulate pollution is 7 times the WHO guideline.
- Between 1998 and 2023, particulate concentrations in Bangladesh increased by 66.2 percent, further reducing life expectancy by 2.4 years (Figure 3).
- In the most polluted divisions in the country—Dhaka and Chittagong—76.2 million residents or 45.6 percent of Bangladesh's population could potentially gain 6.2 years of life expectancy if particulate concentrations were reduced to meet the WHO guideline (Figure 4).
- In Dhaka—the most populous district in Bangladesh—an average resident could potentially gain 6.9 years of life expectancy if air quality met the WHO guideline. In Chittagong—the country's second most populous district—residents would gain 6.2 years. If pollution levels in Dhaka and Chittagong met Bangladesh's national standard, life expectancy in these districts would still increase by 4.1 and 3.3 years, respectively.

Figure 1 · Potential gain in life expectancy from permanently reducing $PM_{2.5}$ from 2023 concentration to the WHO guideline

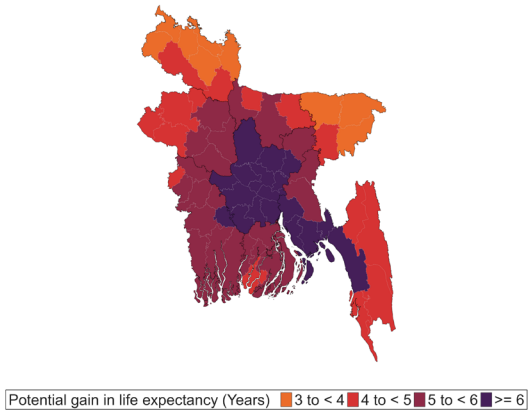
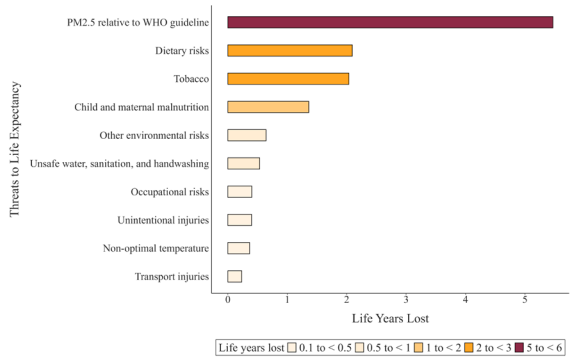


Figure 2 · Top 10 external threats to life expectancy



Sources: Global Burden of Disease (https://vizhub.healthdata.org/gbd-results/) level-2 causes and risks data and WHO Life Tables (https://apps.who.int/gho/data/node.main.LIFECOUNTRY?lang=en) were combined with the Life table method to arrive at these results. "$PM_{2.5}$ relative to WHO Guideline" bar displays the reduction in life expectancy relative to the WHO guideline as calculated by the latest AQLI (2023 $PM_{2.5}$ concentrations) data.

1 World Health Organization. WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide. Geneva: World Health Organization, 2021. https://iris.who.int/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1.

2 This data is based on the data used in AQLI Annual Update 2025 and considers $PM_{2.5}$ concentrations for 2023. All annual average $PM_{2.5}$ values (measured in micrograms per cubic meter: µg/m³) are population weighted and exclude the dust fraction from natural dust and sea-salt.

Potential gain in life expectancy from particulate pollution reductions in the 25 most populous districts of Bangladesh

District	Population (Million)	Annual Average 2023 $PM_{2.5}$ Concentration (µg/m³)	Life Expectancy Gains from reducing $PM_{2.5}$ from 2023 concentration to WHO $PM_{2.5}$ guideline of 5 µg/m³ (in years)	Life Expectancy Gains from reducing $PM_{2.5}$ from 2023 concentration to National $PM_{2.5}$ guideline of 35 µg/m³ (in years)
Dhaka	13.89	76.4	7.0	4.1
Chittagong	8.71	68.3	6.2	3.3
Comilla	6.16	65	5.9	2.9
Mymensingh	5.86	61.1	5.5	2.6
Cox'S Bazar	4.38	54.6	4.9	1.9
Tangail	4.15	69.2	6.3	3.4
Gazipur	4.02	77.4	7.1	4.2
Sylhet	3.93	40.3	3.5	0.5
Bogra	3.9	58	5.2	2.3
Noakhali	3.56	69.6	6.3	3.4
Sirajganj	3.55	64.6	5.8	2.9
Dinajpur	3.44	46.1	4.0	1.1
Kishoreganj	3.35	63.3	5.7	2.8
Rangpur	3.35	43.5	3.8	0.8
Brahamanbaria	3.28	62.4	5.6	2.7
Narayanganj	3.18	72.8	6.6	3.7
Jessore	3.17	61.3	5.5	2.6
Rajshahi	3	53	4.7	1.8
Naogaon	2.99	53.2	4.7	1.8
Pabna	2.9	62.6	5.6	2.7
Sunamganj	2.82	44.5	3.9	0.9
Chandpur	2.75	72.2	6.6	3.6
Gaibandha	2.73	50.7	4.5	1.5
Khulna	2.65	66.1	6.0	3.0
Jamalpur	2.65	57.2	5.1	2.2

Figure 3 · Annual average $PM_{2.5}$ concentrations in Bangladesh, 1998-2023

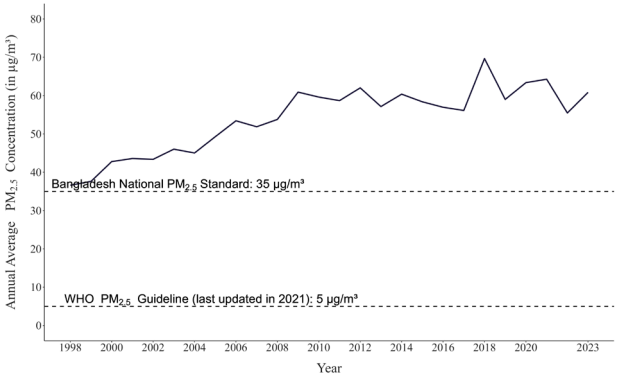
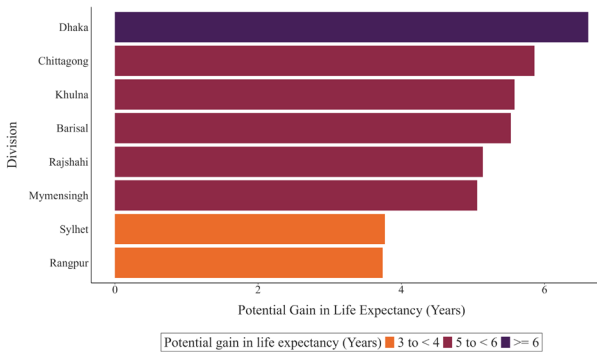


Figure 4 · Potential gain in life expectancy from reducing $PM_{2.5}$ from 2023 levels to the WHO guideline in all the divisions of Bangladesh



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 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, satellite measurements of global particulate matter ($PM_{2.5}$), yielding unprecedented insight into the true cost of 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 particulate air pollution from other factors that affect health. Ebenstein et al. (2017) 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. This metric is then combined with sea-salt and mineral dust removed satellite-derived $PM_{2.5}$ data. All 2023 annual average $PM_{2.5}$ values are population-weighted, and AQLI's source of population data is https://landscan.ornl.gov/. We are grateful to the Atmospheric Composition Analysis Group, based at Washington University in St. Louis, for providing us with the satellite data. The original dataset can be found here: https://sites.wustl.edu/acag/datasets/surface-pm2-5/. To learn more deeply about the methodology used by the AQLI, visit: aqli.epic.uchicago.edu/about/methodology.