

Pakistan is today the world's fifth most polluted country. Air pollution shortens the average Pakistani's life expectancy by 2.7 years, relative to what it would have been if the World Health Organization (WHO) guideline was met. Some areas of Pakistan fare much worse than average, with air pollution shortening lives by more than 4 years in the most polluted areas.

KEY TAKE-AWAYS

- All of Pakistan's 212 million people live in areas where the annual average particulate pollution level exceeds the WHO guideline. Ninety-nine percent live in areas where it exceeds Pakistan's own air quality standard.
- Particulate pollution has increased over time. Since 1998, average annual particulate pollution has increased 22 percent, cutting 0.7 years off the lives of the average Pakistan resident over those years.
- The most polluted areas of the country are in southern Punjab and northern Sindh, where residents would gain more than 4 years of life expectancy if particulate pollution were permanently reduced to the WHO guideline.
- In Karachi, Pakistan's largest city, residents would gain 2.3 years. In Lahore, the second largest city, as well as in the capital of Islamabad, residents would gain 3.2 years.

POLICY IMPACTS

The dual challenges of economic growth and environmental quality faced by Pakistan today are no different from those once confronted by other countries during periods of industrialization. Nor is this dynamic limited to the world's wealthiest countries.

China has made tremendous progress since declaring a "war against pollution" in 2014, with cities cutting particulate pollution by about 40 percent—improving life expectancy by 2 years if the reductions persist. Pakistan has the opportunity to experience the same progress. If Pakistan were to achieve the same reduction in pollution experienced by China, its residents could live 1.5 years longer.

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

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

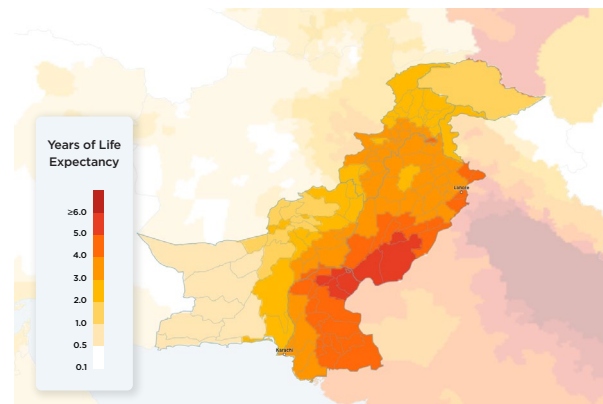
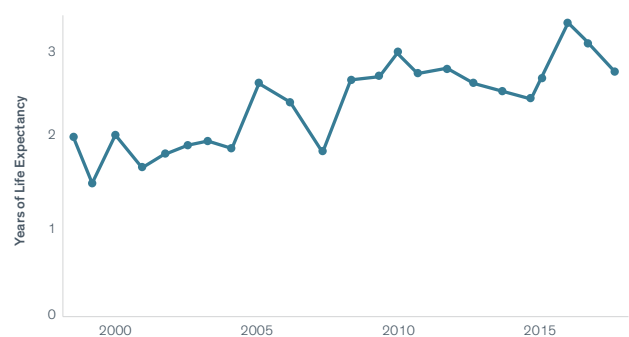


Figure 2 · Average Years in Life Expectancy Lost due to PM_{2.5} Relative to the WHO Guideline, 1998-2018



PM_{2.5} Concentrations and Potential Life Expectancy Gains in Most Populous Districts.

Years of Life Expectancy Gain through Reducing PM_{2.5} from 2018 Concentration

Province	District	Population (Millions)	PM _{2.5} Concentration, 2018 (µg/m ³)	To WHO Guideline of 10 µg/m ³	By 25%	By 40%
Sindh	Karachi City	24.8	34	2.3	1.8	1.3
Punjab	Lahore	8.1	43	3.2	2.8	1.7
Punjab	Faisalabad	6.2	35	2.5	2.0	1.4
Punjab	Rawalpindi	5.1	40	2.9	2.5	1.6
Punjab	Multan	5.1	50	3.9	3.4	1.9
Punjab	Bahawalpur	4.6	51	4.1	3.6	2.0
Punjab	Rahim Yar Khan	4.4	55	4.4	3.9	2.1
Punjab	Muzaffargarh	4.2	48	3.8	3.3	1.9
Khyber Pakhtunkhwa	Peshawar	4.1	40	2.9	2.4	1.6
Punjab	Gujranwala	3.9	38	2.8	2.3	1.5
Punjab	Sargodha	3.8	33	2.3	1.8	1.3
Punjab	Bahawalnagar	3.4	43	3.2	2.8	1.7
Punjab	Sialkot	3.1	46	3.5	3.0	1.8
Punjab	Jhang	3.1	30	2.0	1.5	1.2
Punjab	Gujrat	3.0	40	2.9	2.4	1.6
Punjab	Bhakkar	2.9	31	2.1	1.6	1.2
Punjab	Khanewal	2.9	44	3.3	2.8	1.7
Punjab	Kasur	2.8	42	3.1	2.7	1.6
Punjab	Vehari	2.8	45	3.5	3.0	1.8
Punjab	Attock	2.7	37	2.7	2.2	1.5
Federal Capital Territory	Islamabad	2.6	42	3.2	2.7	1.7
Punjab	Okara	2.5	39	2.8	2.3	1.5
Punjab	Chakwal	2.5	32	2.2	1.7	1.3
Punjab	Mianwali	2.5	34	2.3	1.8	1.3
Punjab	Layyah	2.5	36	2.5	2.0	1.4

ABOUT THE AIR QUALITY LIFE INDEX (AQLI)

The AQLI is a pollution index that converts particulate air pollution into perhaps the most important metric that exists: its impact on life expectancy. Developed by the Energy Policy Institute at the University of Chicago (EPIC), the AQLI is rooted in cutting-edge, peer-reviewed research co-authored by EPIC Director Michael Greenstone that for the first time quantified 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