AQLI Air Quality Life Index® Indonesia Fact Sheet

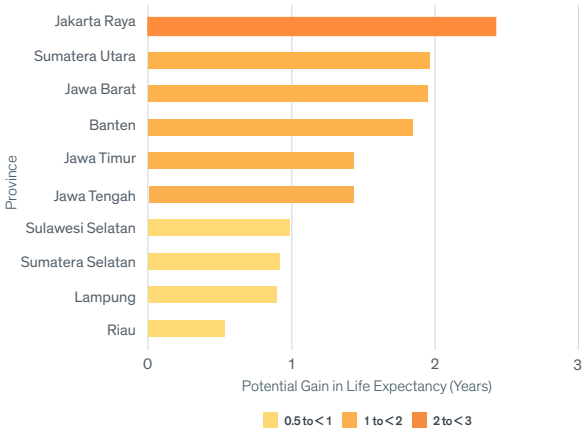
Fine particulate air pollution ($PM_{2.5}$) shortens the average Indonesian resident's life expectancy by 1.4 years, relative to what it would be if the World Health Organization (WHO) guideline (5 µg/m³) was met.[1] Some areas of Indonesia fare much worse than average, with air pollution shortening lives by 2.9 years in Deli Serdang, the most polluted regency/city in Indonesia.

KEY TAKEAWAYS

- Virtually all of Indonesia's 272 million people live in areas where the annual average particulate pollution level exceeds the WHO guideline. More than half of the population lives in areas that exceed the country's own national standard of 15 µg/m³.
- Measured in terms of life expectancy, particulate pollution is among the greatest threats to human health in Indonesia, taking 1.4 years off the life of the average Indonesian resident. In contrast, diabetes and kidney infections reduce average life expectancy by 1.2 years, while respiratory infections reduce life expectancy by 1 year.
- In the Special Capital Region of Jakarta—the most polluted province of Indonesia—10.7 million residents are on track to lose 2.4 years of life expectancy on average relative to the WHO guideline.[2]
- If Indonesia were to reduce particulate pollution to meet the WHO guideline, residents in Jawa Barat—the most populous province of Indonesia with 49.1 million people—would gain 2 years of life expectancy.

Figure 1 · Potential gain in life expectancy from permanently reducing $PM_{2.5}$ from 2021 concentration to the WHO guideline

Figure 2 · Potential gain in life expectancy from reducing $PM_{2.5}$ from 2021 levels to the WHO guideline in 10 most populous provinces of Indonesia



1 This data is based on the AQLI 2021 dataset. All annual average $PM_{2.5}$ values (measured in micrograms per cubic meter: µg/m³) are population weighted.
2 Special Capital Region of Jakarta is called Jakarta Raya in the AQLI data.

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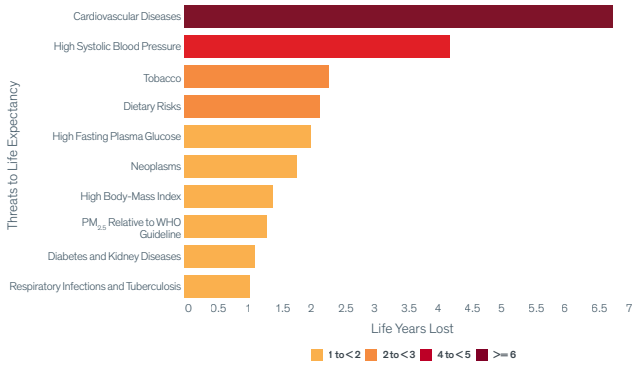
Potential life expectancy impacts of particulate pollution reduction in the 25 most populous regencies and cities of Indonesia

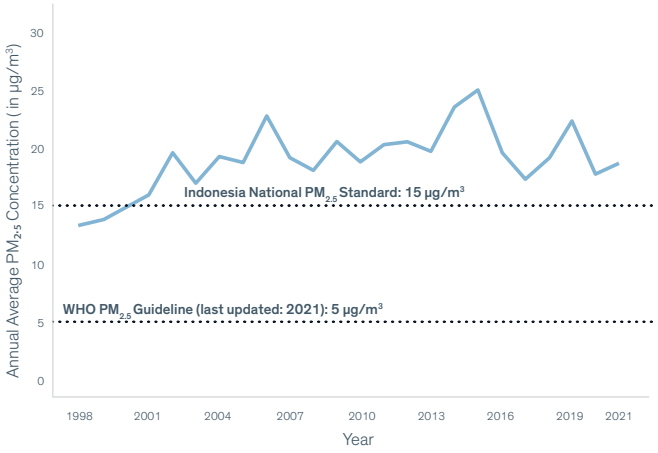
Regency/City	Population (millions)	Annual average 2021 $PM_{2.5}$ concentration ($\mu g/m^3$)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentrations to the WHO guideline of 5 $\mu g/m^3$ (years)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentrations to the national guideline of 15 $\mu g/m^3$ (years)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentrations by 30 percent (years)
Bogor	5.5	30.4	2.5	1.5	0.9
Bandung	3.7	28.9	2.3	1.4	0.8
Tangerang	3.3	27.4	2.2	1.2	0.8
Bekasi	3.2	29.4	2.4	1.4	0.9
Jakarta Timur	3.1	31.4	2.6	1.6	0.9
Surabaya	2.9	21.4	1.6	0.6	0.6
Sukabumi	2.8	14.8	1	0	0.4
Malang	2.7	18.6	1.3	0.4	0.5
Garut	2.6	17.8	1.3	0.3	0.5
Kota Bekasi	2.6	30.7	2.5	1.5	0.9
Jember	2.6	15.7	1	0.1	0.5
Cianjur	2.5	19.9	1.5	0.5	0.6
Kota Bandung	2.5	28.6	2.3	1.3	0.8
Jakarta Barat	2.5	28.3	2.3	1.3	0.8
Kota Medan	2.5	33.9	2.8	1.9	1
Karawang	2.4	26.1	2.1	1.1	0.8
Cirebon	2.4	21.3	1.6	0.6	0.6
Jakarta Selatan	2.3	32.4	2.7	1.7	1
Depok	2.1	33.8	2.8	1.8	1
Sidoarjo	2.1	25.4	2	1	0.7
Brebes	2	19.3	1.4	0.4	0.6
Cilacap	2	13.3	0.8	0	0.4
Deli Serdang	2	34.4	2.9	1.9	1
Kota Tangerang	1.9	29.8	2.4	1.5	0.9
Tasikmalaya	1.9	15	1	0	0.4

Figure 3 · 10 Threats to life expectancy in Indonesia



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. "PM2.5 relative to WHO Guideline" bar displays the reduction in life expectancy relative to the WHO guideline as calculated by latest AQLI (2021) data.

Figure 4 · Annual average $PM_{2.5}$ concentration in Indonesia, 1998-2021



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 $\mu g/m^3$ 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 $\mu g/m^3$ 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 2021 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 the 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.

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