AQLI Air Quality Life Index® | Indonesia Fact Sheet

An average Indonesian could live 1.3 years longer if particulate pollution ($PM_{2.5}$) were permanently reduced to meet the World Health Organization (WHO) guideline of 5 µg/m³.[1,2] In the most polluted parts of the country, such as parts of Sumatera Utara, Jakarta Raya, and Jawa Barat, Indonesians could gain more than 2.7 years to life expectancy (Figure 1).

KEY TAKE-AWAYS

- Particulate pollution is the third biggest external threat to life expectancy in Indonesia, following smoking and dietary risks. While it takes 1.3 years off the life of the average Indonesian resident, child and maternal malnutrition and transport injuries reduce life expectancy by 10.5 months and 4.8 months, respectively (Figure 2).
- Virtually all of Indonesia's 276 million people live in areas where the annual average particulate pollution level exceeds the WHO guideline.
- 72.9 percent of Indonesia's population lives in regions where the particulate concentrations exceed the country's national standard of 15 µg/m³. If these regions were to meet the country's national standard, residents would live 6.9 months longer—collectively adding 116.4 million years to Indonesia's population.
- Compared to 1998, Indonesians are exposed to particulate levels that are 61.7 percent higher. This means that an average Indonesian is likely to lose 8.4 more months of their life compared to 1998 as a result of air pollution, if this trend is sustained (Figure 3).
- The Special Capital Region of Jakarta (Jakarta Raya) is the most polluted province in the country. An average individual here could live 2.6 years longer if particulate concentrations met the WHO guideline (Figure 4).
- In Indonesia's capital of Nusantara, residents could potentially gain one year of life expectancy if particulate concentrations were reduced to meet the WHO guideline.[3] This means that compared to residents of Jakarta, Indonesia's former capital, residents of Nusantara, are likely to live 1.6 years longer because of cleaner air.
- In Jawa Barat, Indonesia's most populous province, an average resident could live 1.6 years longer by breathing air that meets the WHO guideline (Figure 4).

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

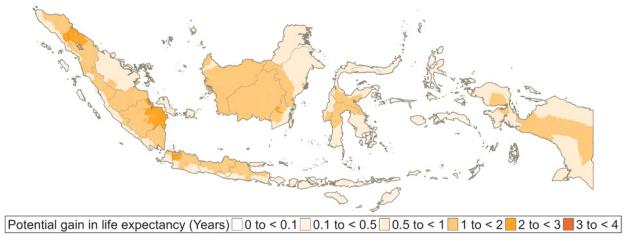
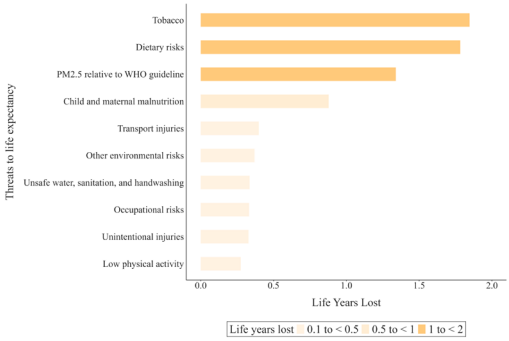


Figure 2 · Top 10 external threats to life expectancy



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. "PM2.5 relative to WHO Guideline" bar displays the reduction in life expectancy relative to the WHO guideline as calculated by the latest AQLI (2023 PM2.5 concentrations) data.

1 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.

2 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.

3 $PM_{2.5}$ concentrations for Nusantara were not available in our database. To estimate particulate concentrations for Nusantara, we consider the population weighted average $PM_{2.5}$ value of Kutai Kartanegara and Penajam Paser Utara (the two regencies whose parts are being converted to Nusantara).

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

Province	City/Regency	Population (in 100,000)	Annual average $PM_{2.5}$ concentration in 2023 (in µg/m³)	Potential gain in life expectancy from reducing $PM_{2.5}$ concentrations from 2023 levels to WHO $PM_{2.5}$ guideline of 5 µg/m³ (in years)	Potential gain in life expectancy from reducing $PM_{2.5}$ concentrations from 2023 levels to Indonesia's national standard of 15 µg/m³ (in years)
Sumatera Utara	Kota Medan	25.2	36	3.0	2.1
Sumatera Utara	Deli Serdang	20.0	34.7	2.9	1.9
Sumatera Selatan	Ogan Ilir	4.3	33.3	2.8	1.8
Sumatera Selatan	Palembang	17.3	32.8	2.7	1.7
Sumatera Utara	Kota Binjai	3.0	32.7	2.7	1.7
Jakarta Raya	Jakarta Selatan	23.0	32.6	2.7	1.7
Jakarta Raya	Jakarta Timur	31.4	32.6	2.7	1.7
Jawa Barat	Kota Bekasi	26.3	32.6	2.7	1.7
Jawa Barat	Depok	21.3	32.5	2.7	1.7
Jakarta Raya	Jakarta Pusat	10.9	32.5	2.7	1.7
Jakarta Raya	Jakarta Barat	25.2	32.1	2.7	1.7
Banten	Kota Tangerang	19.6	32	2.6	1.7
Banten	Tangerang Selatan	14.0	31.3	2.6	1.6
Kalimantan Selatan	Hulu Sungai Utara	2.3	29.4	2.4	1.4
Jakarta Raya	Jakarta Utara	17.9	29.2	2.4	1.4
Sumatera Utara	Serdang Bedagai	6.8	28.9	2.3	1.4
Jawa Barat	Kota Bogor	10.8	28.6	2.3	1.3
Jawa Barat	Bekasi	32.2	28.4	2.3	1.3
Sumatera Selatan	Ogan Komering Ilir	7.3	28.4	2.3	1.3
Sumatera Utara	Tebingtinggi	1.8	28.4	2.3	1.3
Sumatera Utara	Langkat	10.6	28.1	2.3	1.3
Sumatera Utara	Pematangsiantar	2.8	28	2.3	1.3
Banten	Tangerang	33.5	28	2.3	1.3
Sumatera Utara	Karo	4.2	27	2.2	1.2
Jawa Barat	Bogor	56.1	26.8	2.1	1.2

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

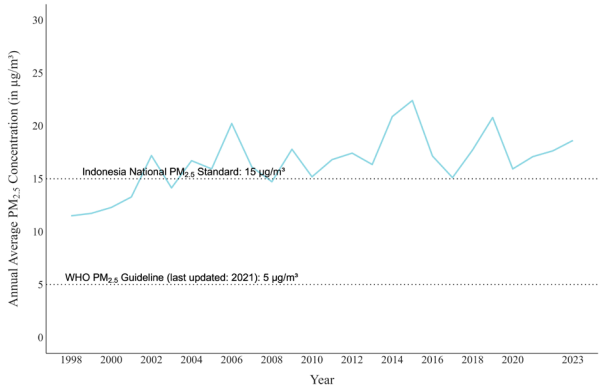
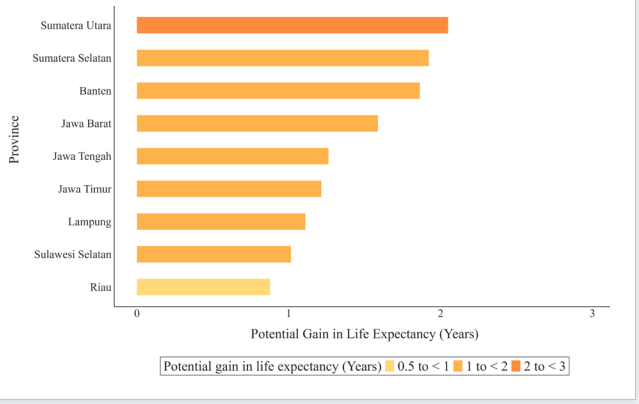


Figure 4 · Potential gain in life expectancy from reducing $PM_{2.5}$ from 2023 levels to the WHO guideline in the 10 most populous provinces of Indonesia



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.