AQLI Air Quality Life Index® | Indonesia Fact Sheet

Fine particulate air pollution ($PM_{2.5}$) shortens the average Indonesian resident's life expectancy by 1.3 years, relative to what it would be if the World Health Organization (WHO) guideline of 5 µg/m³ was met.[1] In the most polluted parts of the country, such as parts of Sumatera Utara and Jawa Barat, Indonesians are at risk of losing more than 2.5 years of their lives as a result of exposure to air pollution (Figure 1).

KEY TAKE-AWAYS

- Virtually all of Indonesia's 273 million people live in areas where the annual average particulate pollution level exceeds the WHO guideline of 5 µg/m³.
- More than half of the population lives in regions that exceed the country's own national standard of 15 µg/m³. If these regions were to meet the country's national standard, the residents in these regions would live 7.2 months longer—collectively adding 125 million years to Indonesia's total life expectancy.
- While particulate pollution takes 1.3 years off the life of the average Indonesian resident, diabetes & kidney diseases and child & maternal malnutrition reduce average life expectancy by 9 months and 10.5 months, respectively (Figure 2).
- Compared to 1998, Indonesians are exposed to PM2.5 levels which are 47 percent higher. This means that an average Indonesian is likely to lose 7 more months off their life compared to 1998 as a result of air pollution, if this trend is sustained.
- The Special Capital Region of Jakarta is the most polluted province in the country, with an average resident here likely to lose 2.2 years of their life expectancy compared to what it would be if the pollution level in Jakarta met the WHO guideline. Jakarta is closely followed by Jawa Barat, which is also Indonesia's most populous province. An average resident here is at the risk of losing 1.9 years of their life expectancy— amounting to a loss of 94 million life years in the province (Figure 3).
- Deli Serdang, Kota Medan and Kota Binjai in the Sumatra Utara province of Indonesia are the most polluted regions in the country (Table 1). An average resident of these regions could live more than 2.5 years longer if pollution levels in these regions were permanently brought down to meet the WHO guideline.

Figure 1 · Potential gain in life expectancy from permanently reducing PM2.5 from 2022 concentration to the WHO guideline

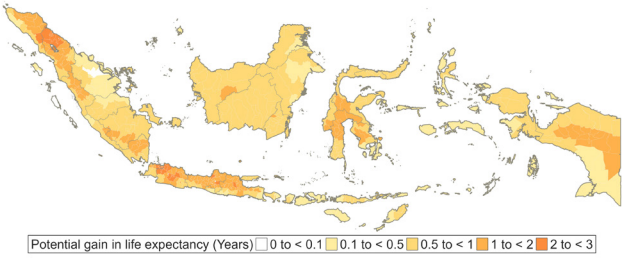
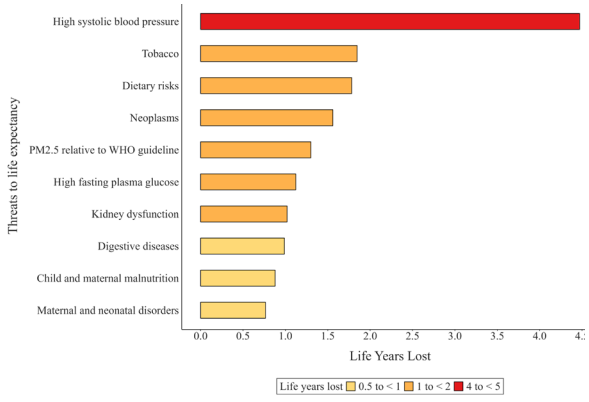


Figure 2 · Top 10 threats to life expectancy in Indonesia



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 (2022) data.

1 This data is based on the AQLI 2022 dataset. All annual average PM2.5 values (measured in micrograms per cubic meter: µg/m³) are population weighted.

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

Regency/City	Population (millions)	Annual Average 2022 PM2.5 µg/m	Life Expectancy Gains from reducing PM2.5 from 2022 concentration to WHO PM2.5 guideline of 5 µg/m³	Life Expectancy Gains from reducing PM2.5 from 2022 concentration to National PM2.5 guideline of 15 µg/m³	Life Expectancy Gains from reducing PM2.5 from 2022 concentration by 30 percent
Bogor	5.6	28.3	2.3	1.3	0.8
Bandung	3.7	29.6	2.4	1.4	0.9
Tangerang	3.3	26.4	2.1	1.1	0.8
Bekasi	3.2	29.3	2.4	1.4	0.9
Jakarta Timur	3.1	29.4	2.4	1.4	0.9
Surabaya	2.9	19.9	1.5	0.5	0.6
Sukabumi	2.8	14.8	1	0	0.4
Malang	2.7	16	1.1	0.1	0.5
Garut	2.7	17.5	1.2	0.2	0.5
Kota Bekasi	2.6	29.8	2.4	1.5	0.9
Jember	2.6	14	0.9	0	0.4
Cianjur	2.5	20.1	1.5	0.5	0.6
Kota Bandung	2.5	29.4	2.4	1.4	0.9
Jakarta Barat	2.5	26.8	2.1	1.2	0.8
Kota Medan	2.5	33	2.7	1.8	1
Karawang	2.4	26.4	2.1	1.1	0.8
Cirebon	2.4	23.2	1.8	0.8	0.7
Jakarta Selatan	2.3	29.6	2.4	1.4	0.9
Depok	2.1	31.8	2.6	1.6	0.9
Sidoarjo	2.1	22.9	1.8	0.8	0.7
Brebes	2	21	1.6	0.6	0.6
Cilacap	2	11.3	0.6	0	0.3
Deli Serdang	2	33.1	2.8	1.8	1
Kota Tangerang	1.9	28.2	2.3	1.3	0.8
Tasikmalaya	1.9	13.5	0.8	0	0.4

Figure 3 · Potential gain in life expectancy from reducing PM2.5 from 2022 levels to the WHO guideline in 10 most populous provinces of Indonesia

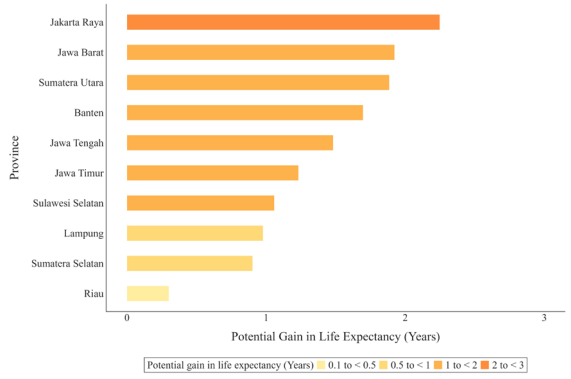
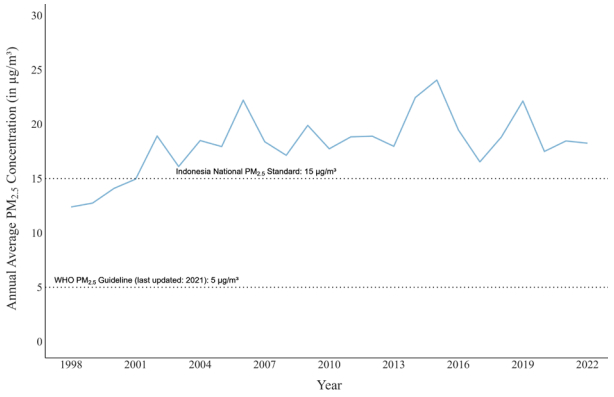


Figure 4 ·Annual average PM2.5 concentrations in Indonesia, 1998-2022



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 (PM2.5), 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 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. This metric is then combined with sea-salt and mineral dust removed satellite-derived PM2.5 data. All 2022 annual average PM2.5 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.