AQLI Air Quality Life Index® | Thailand Fact Sheet

Fine particulate air pollution ($PM_{2.5}$) shortens the average Thai resident's life expectancy by 1.6 years, relative to what it would be if the World Health Organization (WHO) guideline of 5 µg/m³ were met. In the most polluted parts of the country, such as parts of the Saraburi, Chiang Rai, and Phayao provinces, pollution is shortening people's life expectancy by more than 2.5 years. (Figure 1)

KEY TAKE-AWAYS

- In 2022, the annual-average $PM_{2.5}$ concentration in Thailand was 21.2 µg/m³—5.3 percent lower compared to 2021 but still 4.2 times higher than the WHO guideline of 5 µg/m³. As a result, all of Thailand's 69.3 million people live in areas where the annual average particulate pollution level exceeds the WHO guideline.
- While particulate pollution takes 1.6 years off the life of the average Thai resident, diabetes & kidney diseases, transport injuries and infectious diseases take off 1.4 years, 1 year and 1.2 months, respectively (Figure 2).
- More than 90 percent of Thailand's population lives in regions that don't meet the country's national standard of 15 µg/m³. If pollution levels in these regions were brought down to meet the country's standard, average life expectancy of individuals living in these regions would go up by 8.4 months— adding 42.4 million years of life to Thailand's population.
- In the most populous provinces of the country—Bangkok Metropolis, Nakhon Ratchasima and Samut Prakan—13.9 million residents or 20.1 percent of Thailand's population are on track to lose 22.8 million total life years if the current pollution levels persist (Figure 3). If Thailand were to reduce particulate pollution to meet the WHO guideline, an average resident of these regions could potentially live longer by 1.6 years.
- Despite the drop in pollution this year, particulate pollution has increased over time in Thailand. Relative to 1998, average annual particulate pollution in 2022 went up by 21.8 percent, further reducing life expectancy by 5 months. During that time, particulate pollution increased the most in Northeastern Thailand, with a 30 percent increase (Figure 4).
- The 25 most polluted districts in Thailand are located in the provinces of Saraburi, Chiang Rai Phayao and Phra Nakhon Si Ayutthaya. In each of these regions, an average resident could lose more than 2.5 years of their life expectancy if the current levels of pollution persist. (Appendix table)
- In the Chiang Mai province—plagued by forest fire episodes and often considered among the most polluted regions in the world, an average resident could lose 2.2 years of their life expectancy if the current pollution levels persist.

Figure 1 · Potential gain in life expectancy from permanently reducing $PM_{2.5}$ from 2022 concentration to the WHO guideline

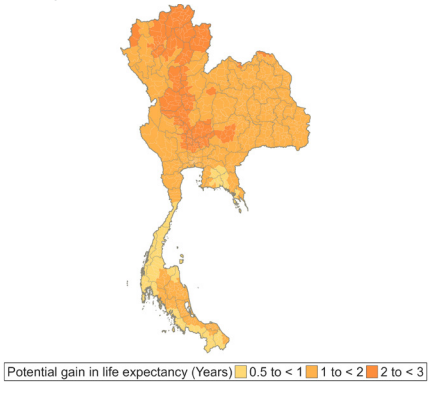
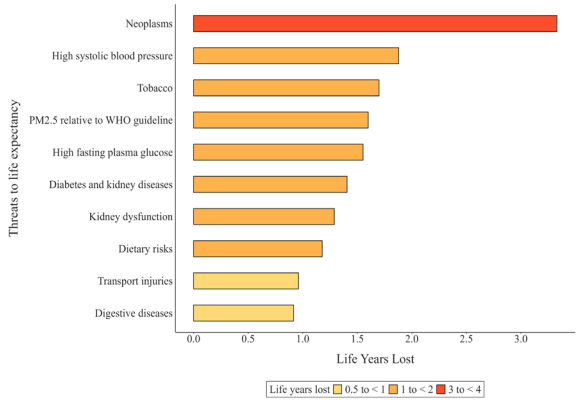


Figure 2 ·Top 10 threats to life expectancy in Thailand



1 Northern, Northeastern, Central and Southern Thailand are defined as provinces listed in the following file: https://docs.google.com/spreadsheets/d/1U9-juiKmd4a0dr9YZAO7_Ij6RPFn04Fu7wIleyaNj0I/edit?gid=1737077606#gid=1737077606

Potential Gain in Years of Life Expectancy through Reducing $PM_{2.5}$ Concentrations in the 25 Most Populous Provinces

District	Population (Hundred thousands)	Annual Average 2022 $PM_{2.5}$ Concentration ($\mu g/m^3$)	Life Expectancy Gains from reducing $PM_{2.5}$ from 2022 concentration to WHO $PM_{2.5}$ guideline of 5 $\mu g/m^3$	Life Expectancy Gains from reducing $PM_{2.5}$ from 2022 concentration to National $PM_{2.5}$ standard of 15 $\mu g/m^3$	Life Expectancy Gains from reducing $PM_{2.5}$ from 2022 concentration by 30 percent
Muang Samut Prakan	9.6	18.3	1.3	0.3	0.5
Muang Nonthaburi	6.1	18.5	1.3	0.3	0.5
Muang Samut Sakhon	4.8	17.8	1.3	0.3	0.5
Phra Pra Daeng	4.4	19.2	1.4	0.4	0.6
Muang Nakhon Ratchasima	4.3	29.7	2.4	1.4	0.9
Hat Yai	4.1	16.4	1.1	0.1	0.5
Muang Chon Buri	4	15.3	1	0	0.4
Bang Plee	3.9	19.4	1.4	0.4	0.6
Muang Nakhon Pathom	3.8	20.5	1.5	0.5	0.6
Muang Khon Kaen	3.7	23.9	1.9	0.9	0.7
Pak Kret	3.6	19.7	1.4	0.5	0.6
Khlong Luang	3.6	20.9	1.6	0.6	0.6
Bang Khen	3.5	18.4	1.3	0.3	0.5
Lam Luk Ka	3.5	19.4	1.4	0.4	0.6
Chatuchak	3.3	18.6	1.3	0.4	0.5
Muang Udon Thani	3.3	21.7	1.6	0.7	0.6
Muang Rayong	3.3	15.2	1	0	0.4
Muang Phuket	3.3	11.3	0.6	0	0.3
Muang Pathum Thani	3.1	19.9	1.5	0.5	0.6
Krathum Baen	2.9	17.3	1.2	0.2	0.5
Muang Phitsanulok	2.8	28	2.3	1.3	0.8
Si Racha	2.8	16.1	1.1	0.1	0.5
Bang Lamung	2.8	15.3	1	0	0.4
Bang Kapi	2.8	19.2	1.4	0.4	0.6
Bang Khae	2.8	17.5	1.2	0.2	0.5

Figure 3 · Potential gain in life expectancy from reducing $PM_{2.5}$ from 2022 levels to the WHO guideline in 10 most populous provinces of Thailand

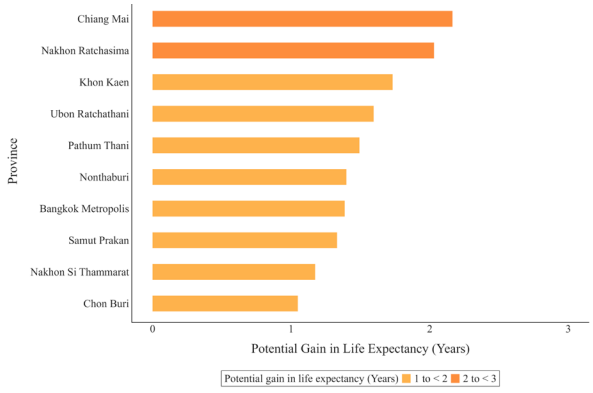
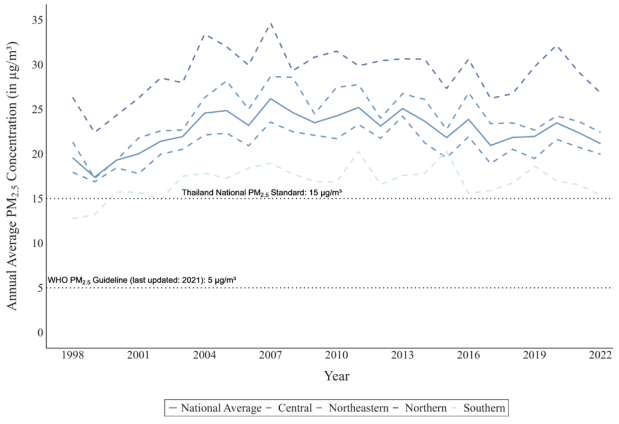


Figure 4 · Annual average $PM_{2.5}$ concentrations in Thailand, 1998-2022



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 ($PM_{2.5}$), 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 PM10 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 2022 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.