Thailand Fact Sheet

Fine particulate air pollution ($PM_{2.5}$) shortens the average Thai resident's life expectancy by 1.8 years, relative to what it would be if the World Health Organization (WHO) guideline of 5 µg/m³ was met.[1] Some areas of Thailand fare much worse than average, with air pollution shortening lives by 3 years in Phan, the country's most polluted district in the Chiang Rai province.

KEY TAKEAWAYS

- All of Thailand's 69.3 million people live in areas where the annual average particulate pollution level exceeds the WHO guideline.
- Measured in terms of life expectancy, particulate pollution takes 1.8 years off the life of the average Thai resident. In contrast, diabetes and kidney diseases reduce the average life expectancy by 1.2 years.
- Particulate pollution has increased over time. From 1999 to 2021, average annual particulate pollution increased by 28.4 percent, further reducing life expectancy by 6 months. During that time, particulate pollution increased the most in Northeastern Thailand, with a 45.3 percent increase.[2]
- 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.
- If Thailand were to reduce particulate pollution to meet the WHO guideline, the 9.1 million residents in Bangkok Metropolis, the capital of Thailand, would gain 1.5 years of life expectancy on average.

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

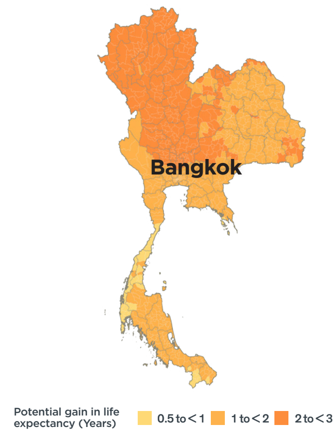
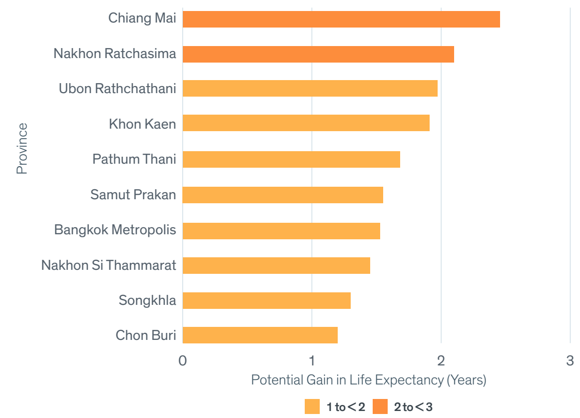


Figure 2 · Potential gain in life expectancy from reducing $PM_{2.5}$ from 2021 levels to the WHO guideline in 10 most populous provinces of Thailand



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 Northern, Northeastern, Central and Southern Thailand are defined as provinces listed in the following file: https://docs.google.com/spreadsheets/d/16_nRAwCqO4K_4TyJQ0xiSN-jpEshEkJnWmx2Bq8BJWA/edit#gid=0

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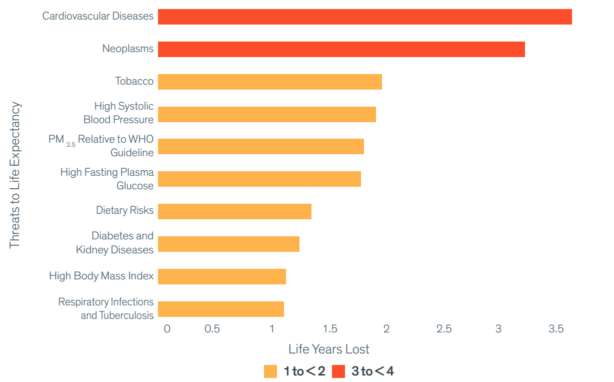
Potential life expectancy impacts of particulate pollution reduction in the 25 most populous districts of Thailand

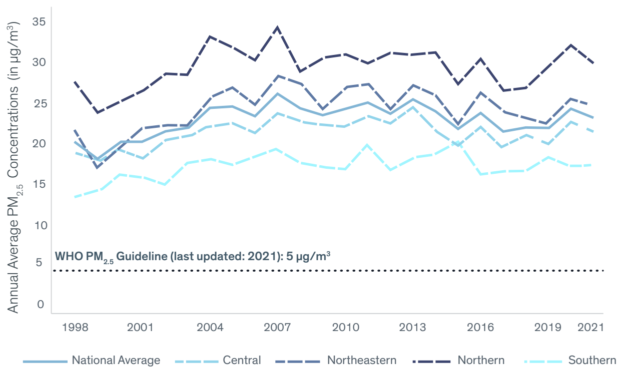
District	Population (hundred thousands)	Annual average 2021 $PM_{2.5}$ concentration (µg/m³)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentration to WHO $PM_{2.5}$ guideline of 5 µg/m³ (years)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentration to national $PM_{2.5}$ standard of 15 µg/m³ (years)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentration by 30 percent (years)
Muang Samut Prakan	9.8	20.6	1.5	0.5	0.6
Muang Nonthaburi	6	20.3	1.5	0.5	0.6
Muang Samut Sakhon	4.8	19.9	1.5	0.5	0.6
Bang Khen	4.6	19.9	1.5	0.5	0.6
Phra Pra Daeng	4.5	21.3	1.6	0.6	0.6
Muang Nakhon Ratchasima	4.3	29.7	2.4	1.4	0.9
Hat Yai	4.3	19.3	1.4	0.4	0.6
Muang Chon Buri	4.1	17.2	1.2	0.2	0.5
Bang Plee	4	21.4	1.6	0.6	0.6
Muang Nakhon Pathom	3.8	21.1	1.6	0.6	0.6
Chatuchak	3.7	20.3	1.5	0.5	0.6
Muang Khon Kaen	3.7	25.7	2	1	0.8
Pak Kret	3.6	21.1	1.6	0.6	0.6
Khlong Luang	3.5	22.9	1.8	0.8	0.7
Lam Luk Ka	3.5	21.2	1.6	0.6	0.6
Muang Phuket	3.3	13.2	0.8	0	0.4
Muang Udon Thani	3.3	25.2	2	1	0.7
Muang Rayong	3.3	15.4	1	0	0.5
Muang Pathum Thani	3.1	22	1.7	0.7	0.6
Chom Thong	3	19.7	1.4	0.5	0.6
Krathum Baen	2.9	19.1	1.4	0.4	0.6
Muang Phitsanulok	2.8	31.3	2.6	1.6	0.9
Muang Nakhon Si Thammarat	2.8	21	1.6	0.6	0.6
Thanyaburi	2.8	21.6	1.6	0.6	0.6
Suan Luang	2.8	20.3	1.5	0.5	0.6

Figure 3 · Top 10 threats to life expectancy in Thailand



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. '$PM_{2.5}$ 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 $PM_{2.5}$ concentrations in Thailand, 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 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 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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