# AQLI Air Quality Life Index®

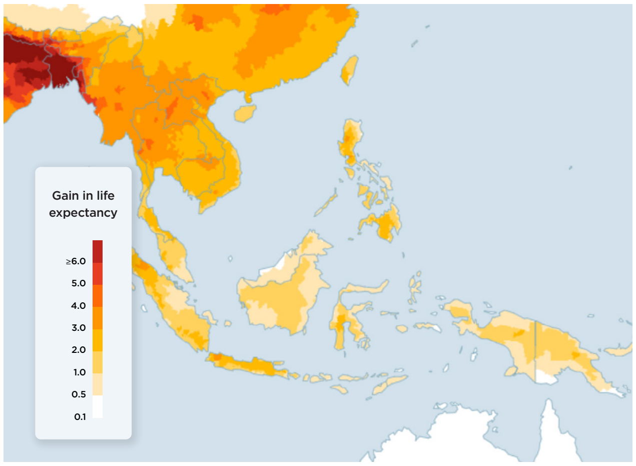
# Southeast Asia Fact Sheet

Virtually all (99.9 percent) of Southeast Asia's 656.1 million people live in areas where particulate pollution exceeds the World Health Organization (WHO) guideline of 5 $\mu g/m^3$.[1] Despite the lockdowns of the pandemic, pollution continued to rise in much of Southeast Asia in 2020. This pollution cuts short the life expectancy of the average Southeast Asian person by 1.5 years, relative to what it would be if the WHO guideline was met. That's a total of 959.8 million person-years lost to pollution in the eleven countries that make up this region. Some countries in the region experience greater impacts from pollution.

## KEY TAKE-AWAYS

- **Myanmar:** Myanmar is the most polluted country in Southeast Asia. The average resident here would gain 2.7 years of life expectancy on average if particulate pollution were reduced to the WHO guideline. In Yangon and Mandalay, average pollution levels were 32.7 and 36 $\mu g/m^3$ in 2020, suggesting that if the WHO guideline were met, residents would gain 2.7 and 3 years of life expectancy on average, respectively.
- **Cambodia:** Cambodia experienced the largest increase in particulate pollution in 2020, with pollution levels rising 26 percent—from 16.5 to 20.8 $\mu g/m^3$. Based on current pollution levels, residents of Cambodia stand to gain 1.5 years of life expectancy on average if the WHO guideline is met.
- **Indonesia:** On Indonesia's island of Java, the country's population and industrial center, the 10.38 million residents of Jakarta Raya would gain an average of 2.4 years in life expectancy if particulate pollution met the WHO guideline. Similarly, in the cities of Depok and Bogor, residents would gain an average of 2.8 and 2.5 years, respectively. The average resident of Indonesia would gain 1.1 years.
- **Vietnam:** Vietnam is the third most polluted country in Southeast Asia. The average resident of Vietnam would gain 1.9 years in life expectancy if air quality were improved to comply with the WHO guideline. In Ho Chi Minh City, the largest city in the country, life expectancy would rise by 2.3 years. In the northern Red River Delta region, which surrounds the capital city of Hanoi, home to 7 million people, life expectancy would increase by 3 years on average.
- **Thailand**: In Thailand, particulate pollution was up 11 percent from 2019. The average resident of Thailand would gain 1.8 years if pollution levels met the WHO guideline. In Thailand's capital Bangkok, residents would gain 1.5 years if pollution levels met the WHO guideline.

**Figure 1** · Potential Gain in Years of Life Expectancy through Permanently Reducing $PM_{2.5}$ from 2020 Concentration to the WHO Guideline, Southeast Asia




- For two decades, pollution levels in Southeast Asia have remained largely unchanged, generally fluctuating between 19 and 22 $\mu g/m^3$ on average. However, during dry seasons, fires in Indonesia cause sudden spikes in pollution for the country and its downwind neighbors like Malaysia.
- During the first year of the pandemic, the population weighted-average pollution level across Southeast Asia declined, most likely because of a smaller number of fires compared to 2019, a year characterized by thousands of fires on the Indonesian islands of Sumatra and Borneo. Some countries, not impacted by the fires, saw increases. The countries where pollution increased from 2019 to 2020 were Myanmar, Thailand and Cambodia.

1 Southeast Asia includes the following countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, The Philippines, Singapore, Thailand, Timor-Leste, and Vietnam.

# Average $PM_{2.5}$ Concentrations and Potential Life Expectancy Gains in 25 Most Polluted Regions of Southeast Asia

| Country | Region | Population (Millions) | $PM_{2.5}$ Concentration, 2020 (µg/m³) | Years of Life Expectancy Gained through Reducing $PM_{2.5}$ Concentrations: From 2020 concentration to WHO guideline of 5 µg/m³ | Years of Life Expectancy Gained through Reducing $PM_{2.5}$ Concentrations: From 2020 concentration by 30 percent |
|---|---|---|---|---|---|
| Myanmar | Sittwe | 0.4 | 54.2 | 4.8 | 1.6 |
| Myanmar | Maungdaw | 0.1 | 50.1 | 4.4 | 1.5 |
| Myanmar | Mrauk-u | 0.5 | 46.4 | 4 | 1.4 |
| Myanmar | Mandalay | 1.9 | 41.4 | 3.6 | 1.2 |
| Myanmar | Kyaukpyu | 0.3 | 41 | 3.5 | 1.2 |
| Myanmar | Minbu | 0.8 | 40.1 | 3.4 | 1.2 |
| Laos | Xayabury | 0.1 | 38.6 | 3.3 | 1.1 |
| Laos | Chomphet | 0 | 38.5 | 3.3 | 1.1 |
| Thailand | Klong Lan | 0.1 | 38.1 | 3.2 | 1.1 |
| Vietnam | Thanh Oai | 0.2 | 38.1 | 3.2 | 1.1 |
| Vietnam | Quốc Oai | 0.2 | 38.1 | 3.2 | 1.1 |
| Laos | Nga | 0 | 38 | 3.2 | 1.1 |
| Vietnam | Hà Đông | 0.4 | 37.9 | 3.2 | 1.1 |
| Thailand | Pang Sila Thong | 0 | 37.9 | 3.2 | 1.1 |
| Thailand | k. mae poen | 0 | 37.9 | 3.2 | 1.1 |
| Vietnam | Yên Lạc | 0.2 | 37.8 | 3.2 | 1.1 |
| Myanmar | Det Khi Na | 0.7 | 37.8 | 3.2 | 1.1 |
| Vietnam | Ứng hòa | 0.2 | 37.7 | 3.2 | 1.1 |
| Myanmar | Kyaukse | 0.8 | 37.6 | 3.2 | 1.1 |
| Vietnam | Hoài Đức | 0.2 | 37.6 | 3.2 | 1.1 |
| Vietnam | Phúc Thọ | 0.2 | 37.6 | 3.2 | 1.1 |
| Thailand | Sangkhla Buri | 0 | 37.6 | 3.2 | 1.1 |
| Vietnam | Thạch Thất | 0.2 | 37.6 | 3.2 | 1.1 |
| Thailand | Mae Wong | 0 | 37.5 | 3.2 | 1.1 |
| Vietnam | Vĩnh Tường | 0.2 | 37.4 | 3.2 | 1.1 |

**Figure 2** · Potential Gain in Years of Life Expectancy Through Permanently Reducing $PM_{2.5}$ from 2020 Concentrations to the WHO Guideline, in 10 Largest Regions in Southeast Asia

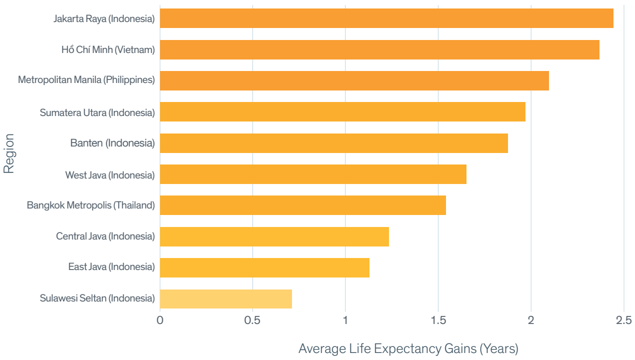
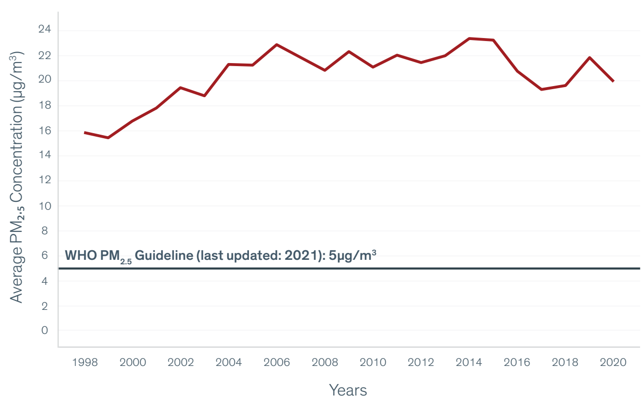



**Figure 3** · Average $PM_{2.5}$ Concentrations in Southeast Asia, 1998 to 2020




## 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 recent 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, global particulate measurements, yielding unprecedented insight into the true cost of particulate 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 particulates air pollution from other factors that affect health. The more recent of the two studies 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. To learn more about the methodology used by the AQLI, visit: aqli.epic.uchicago.edu/about/methodology

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