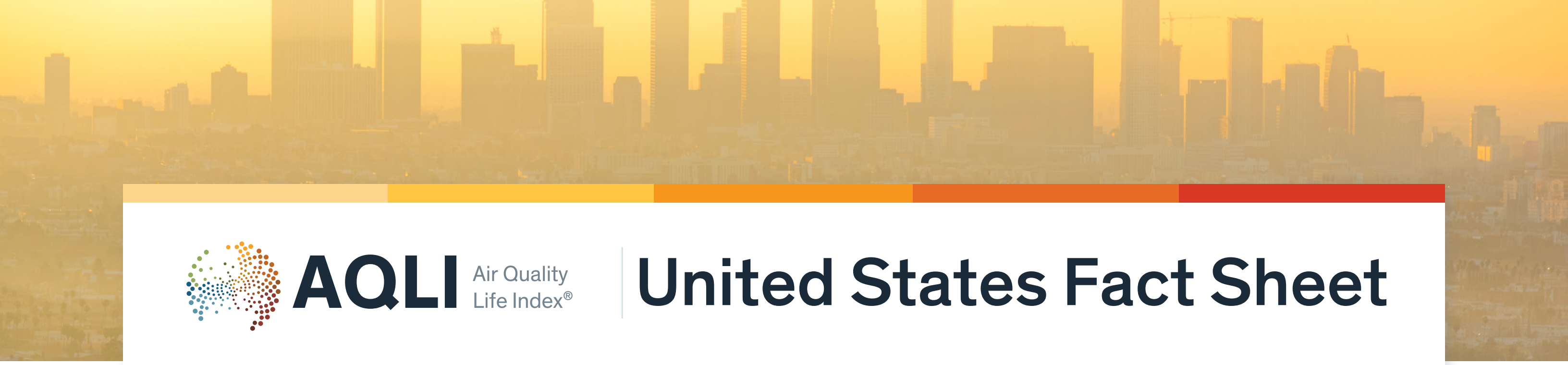


United States Fact Sheet

AQLI Air Quality Life Index®

Since the Clean Air Act was enacted in 1970, particulate pollution has declined by 64.2 percent—extending the life expectancy of an average American by 1.3 years.[1] Despite this success, the latest scientific evidence on the impact of air pollution at even the low levels that exist in much of the United States reveals that 92.8 percent of the population are now considered to be living in areas with unsafe levels of pollution, according to the new World Health Organization (WHO) guideline of 5 µg/m³. That's up from 7.6 percent under the previous WHO guideline of 10µg/m³. While there is potential for further progress, the health benefits of clean air in the United States are smaller than in many other parts of the world.

KEY TAKE-AWAYS

- In the United States, average pollution was 7.1 µg/m³ in 2020, slightly above the WHO guideline. At this level, residents could expect to gain roughly 2.5 months from clean air, equivalent to 68 million total life years.
- The largest benefits from improved pollution in the United States are concentrated along the West Coast where rising wildfires have increased pollution in recent years. Residents of California's Central Valley are now consistently exposed to average particulate pollution levels above both the WHO guideline and the nation's own air quality standard.
- In 2020, 19 out of the top 20 most polluted counties in the United States were in California. Average pollution concentrations ranged from 13 µg/m³ in Sierra County to 22.6 µg/m³ in Mariposa County. In Mariposa, residents stand to gain 1.7 years of life expectancy if air quality were kept below the WHO guideline.

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

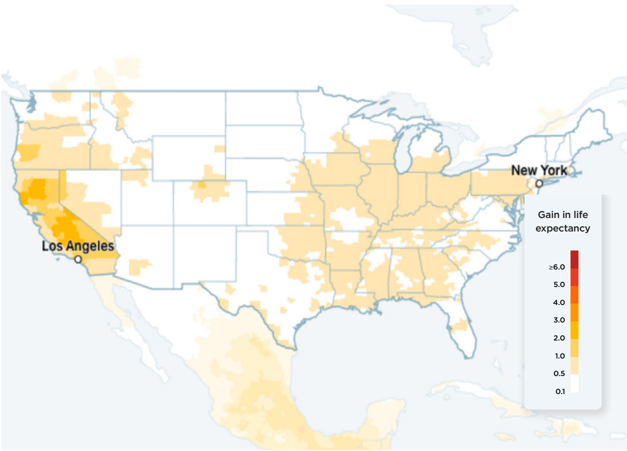
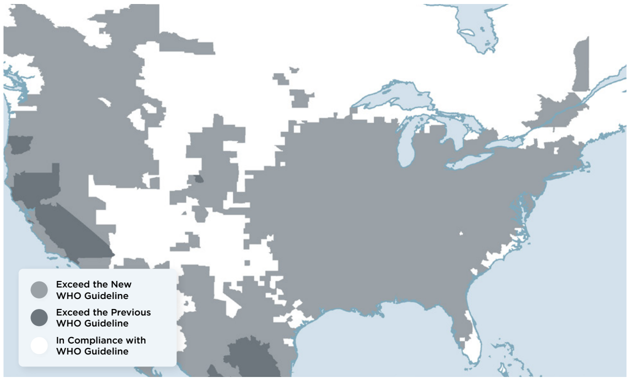


Figure 2 · Impact of the Revised WHO Guideline on the USA



Note: **White** regions correspond to those places that are in compliance with the WHO guideline. **Dark Grey** regions correspond to those places that were categorized as polluted under the previous WHO guideline. **Light Grey** regions correspond to regions that are newly out of compliance with the updated WHO guideline.

1 Details on how 1970 particulate pollution concentrations and life expectancy changes since 1970 were estimated are available at aqli.epic.uchicago.edu/policy-impacts.

Figure 3 · Change in Life Expectancy Due to Change in $PM_{2.5}$ Concentration in the US, 1970-2020

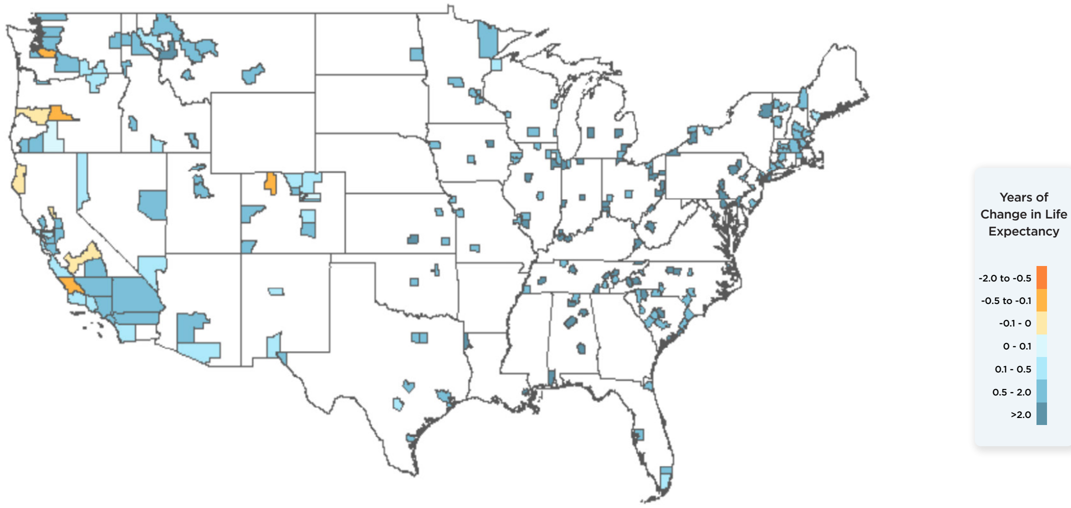


Figure 4 · Estimated Gain in Life Expectancy due to Decrease in $PM_{2.5}$ in 10 Most Populous States, 1970-2020

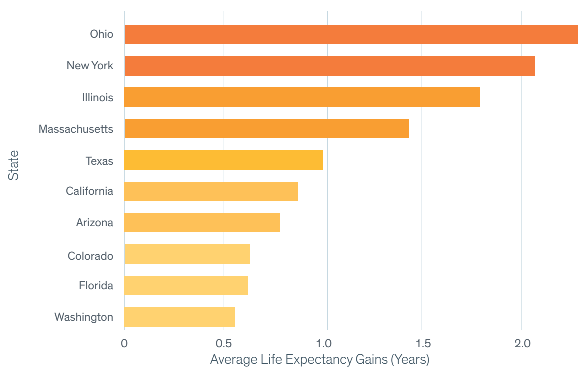
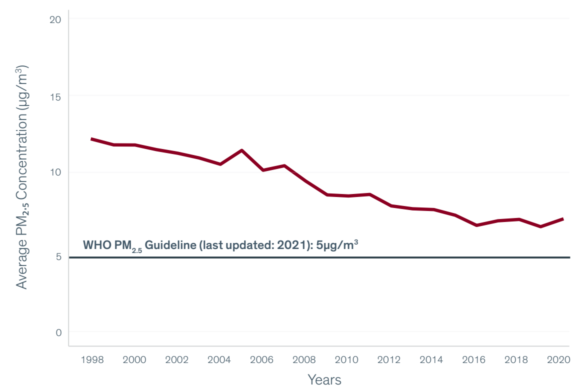


Figure 5 ·Average $PM_{2.5}$ Concentrations in the United States from 1998 to 2020



POLICY IMPACTS

While much of the United States now falls above the WHO's guideline for what is considered a safe level of pollution, pollution levels have vastly improved since 1970. For those living in the former smog capital of Los Angeles, particulate pollution has declined by almost 52.9 percent, extending life expectancy for the average Angeleno by 1.3 years. Hundreds of counties, primarily along the East Coast as well as in the Midwest and parts of Texas have witnessed a decline in particulate pollution since the year 1970. For example, in Saint Louis, Missouri, there has been a reduction in pollution of about 67 percent—extending life expectancy there by almost 1.6 years. In Philadelphia, a reduction in pollution has extended average life expectancy by 2.3 years.

Average $PM_{2.5}$ Concentrations in the United States from 1998 to 2020

State	Population (Millions)	$PM_{2.5}$ Concentration, 1970 ($\mu g/m^3$)	$PM_{2.5}$ Concentration, 2020 ($\mu g/m^3$)	Years of Life Expectancy Gained due to Decrease in $PM_{2.5}$, 1970-2020	Years of Life Expectancy Gain through Reducing $PM_{2.5}$ from 2020 Concentration to WHO Guideline
Alabama	2	37.6	7	3	0.2
Alaska	0.3	7.7	2.4	0.5	0
Arizona	5.5	15.3	7.3	0.8	0.23
California	35.2	19.7	10.8	0.9	0.57
Colorado	4	13.6	7.2	0.6	0.21
Connecticut	2.7	18.9	6.4	1.2	0.14
Delaware	0.6	35.7	7	2.8	0.19
District of Columbia	0.9	38.4	6.4	3.1	0.13
Florida	7.1	11.4	5.1	0.6	0.01
Hawaii	1	3.8	1.5	0.2	0
Idaho	0.9	16.4	7.6	0.9	0.26
Illinois	7.6	26.7	8.4	1.8	0.33
Indiana	2.3	34.6	8.4	2.6	0.34
Iowa	1	20.6	7	1.3	0.2
Kansas	0.9	28.2	7	2.1	0.2
Kentucky	1.2	45.2	8.1	3.6	0.3
Louisiana	0.7	31.2	6.9	2.4	0.19
Maine	0.3	7.1	4.7	0.2	0
Maryland	1.5	31.2	6.7	2.4	0.16
Massachusetts	4.1	20.6	5.9	1.4	0.09
Michigan	3	29	7.3	2.1	0.23
Minnesota	2.8	13.6	6.6	0.7	0.15
Missouri	2.6	23.6	7.7	1.6	0.27
Montana	0.6	17.4	5.7	1.1	0.07
Nevada	2.8	9.4	6.9	0.2	0.19
New Hampshire	0.9	18	5.2	1.2	0.02
New Jersey	3.8	24.6	6.6	1.8	0.15
New Mexico	0.9	8.9	5.6	0.3	0.06
New York	9.7	27.8	6.7	2.1	0.17
North Carolina	3.6	28.2	6.5	2.1	0.15
North Dakota	0.2	13	5.2	0.8	0.02
Ohio	6.3	31	7.6	2.3	0.25
Oklahoma	1.6	18.7	7.5	1.1	0.25
Oregon	1.9	14.5	10	0.4	0.49
Pennsylvania	3.5	33.7	7	2.6	0.2
Rhode Island	0.7	22	6.7	1.5	0.17
South Carolina	3.3	23.1	6	1.7	0.1
Tennessee	3.4	34.5	7	2.7	0.19
Texas	14.8	17.1	6.9	1	0.18
Utah	2.1	14.6	6.5	0.8	0.15
Vermont	0.3	21.8	4.9	1.6	0
Virginia	1.6	27.7	5.9	2.1	0.09
Washington	5.6	11.1	5.5	0.6	0.05
West Virginia	0.3	32.7	6.2	2.6	0.12
Wisconsin	2	23.4	7.2	1.6	0.21

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 $\mu g/m^3$ 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 $\mu g/m^3$ 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