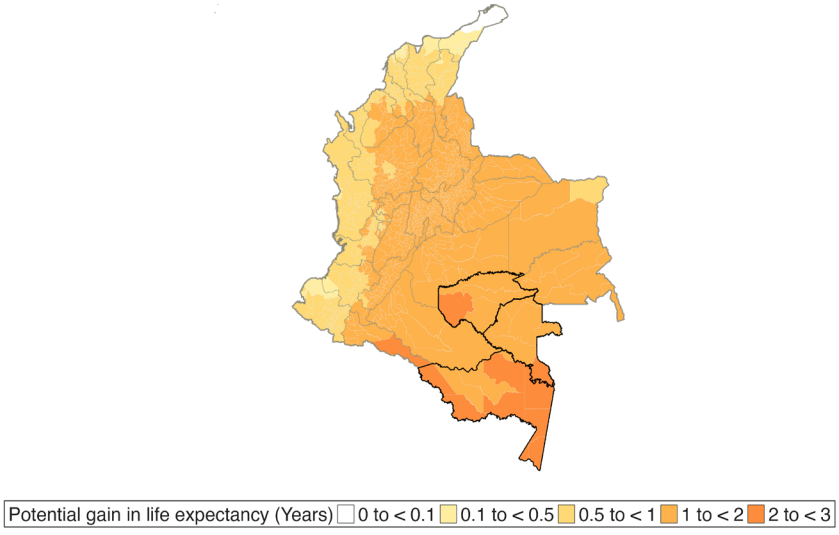
AQLI Air Quality Life Index® | Colombia Fact Sheet

Fine particulate air pollution ($PM_{2.5}$) in 2022 shortens the average Colombian resident's life expectancy by 1.1 years, relative to what it would be if the World Health Organisation (WHO) guideline of 5 µg/m³ was met. Colombia is the eighth most polluted country in Latin America[1] —with air pollution shortening lives by as many as 2.8 years in the country's most polluted regions[2]. (Figure 1).

KEY TAKE-AWAYS

- 99.3 percent of Colombia's population live in areas where the annual average particulate pollution level exceeds the WHO guideline of 5 µg/m³ for annual $PM_{2.5}$ concentration.
- Five percent of the population lives in areas that exceed the country's national annual $PM_{2.5}$ standard of 20 µg/m³.
- While particulate pollution takes 1.1 years off the life of the average Colombian resident, tobacco and childhood & malnutrition take off just 7.6 and 4.6 months, respectively. The impact of pollution on life expectancy is comparable to suicide and violence in Colombia (Figure 3).
- While the particulate concentration in Colombia is just below its national annual $PM_{2.5}$ standard, residents in the capital city of Bogotá would gain 1.4 years of life expectancy on average if particulate pollution were reduced to meet the WHO guideline. (Figure 2)
- In Colombia's most polluted municipalities—Leticia, Puerto Nariño, and Tarapacá—residents are on track to lose more than 2.5 years of life expectancy on average relative to the WHO guideline (Figure 1).
- From 1999 to 2022, average annual particulate pollution increased by 52.8 percent and stands at a level that is 3.2 times the WHO guideline. This means that an average Colombian is likely to lose 3.6 more months off their life compared to 1998 as a result of air pollution, if this trend is sustained. (Figure 4).

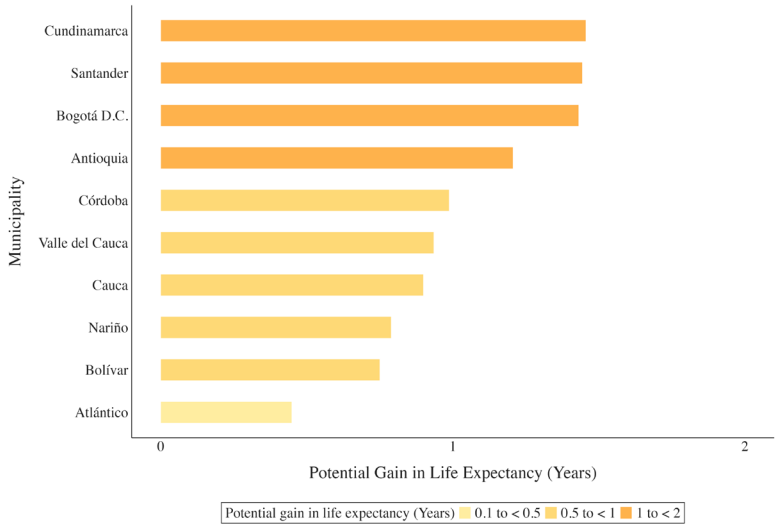
Figure 1.
Potential gain in life expectancy from permanently reducing $PM_{2.5}$ from 2022 concentration to the WHO guideline



1 Latin America region is defined as the following 20 countries and territory: México, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Paraguay, Chile, Argentina, Uruguay, Cuba, Haiti, Dominican Republic, Puerto Rico.

2 The Municipality of Leticia in the Amazonas department is the most polluted region in Colombia.

Figure 2.
Potential gain in life expectancy from reducing $PM_{2.5}$ from 2022 levels to the WHO guideline in ten most populous Departments of Colombia



POLICY IMPACTS

Access to reliable, timely and ready-to-use data on air pollution is one area where Colombia sets a great example for South America. According to OpenAQ's Open Air Quality Data: The Global Landscape 2022 report, the country is one of only two countries in South America to have fully open government public air quality data. Making these datasets more fully accessible on a more timely basis allows Colombians with a variety of skill sets to participate in addressing air pollution.

Although Colombia does not have a specific clean air programme, it has sector specific policies such as Bogota's bus rapid transit (BRT) system (largest in the world) with dedicated bus lanes and BRT routes. In July 2019, the country further tightened the screws on diesel emissions by passing a law that requires all diesel vehicles to use EURO VI or advanced technologies and renewing the public transport fleet with low emission technologies.[3,4]

Figure 3 · Selected major threats to life expectancy in Colombia

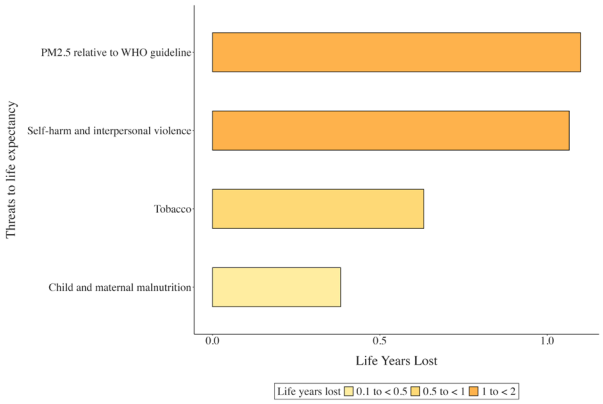
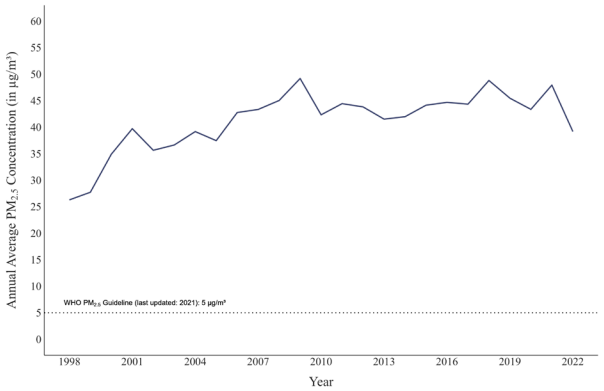


Figure 4 ·: Annual average $PM_{2.5}$ concentrations in Colombia, 1998-2022



3 Library of Congress. July 2019. Colombia: Congress Passes Laws Aimed at Improving Air Quality. https://www.loc.gov/item/global-legal-monitor/2019-07-31/colombia-congress-passes-laws-aimed-at-improving-air-quality/#:~:text=(July%2031%2C%202019)%20On,national%20transport%2C%20especially%20diesel%20vehicles.

4 Stockholm Environment Institue. January 2024. From pollution to progress: Bogotá's strategy for harmonizing climate, air quality and health https://www.sei.org/features/bogotas-climate-change-strategy-to-align-with-air-pollution-and-health-agendas-sei/.

Potential life expectancy impacts of particulate pollution reductions in the 25 most populous municipalities of Colombia

Municipality	Population (Millions)	Annual Average 2022 $PM_{2.5}$ Concentration (μg/m³)	Life Expectancy Gains from reducing $PM_{2.5}$ from 2022 concentration to WHO $PM_{2.5}$ guideline of 5 μg/m³	Life Expectancy Gains from reducing $PM_{2.5}$ from 2022 concentration to National $PM_{2.5}$ standard of 20 μg/m³	Life Expectancy Gains from reducing $PM_{2.5}$ from 2022 concentration by 30 percent
Bogotá D.C.	8.074	19.6	1.4	0	0.6
Medellín	2.484	18.6	1.3	0	0.5
Santiago de Cali	2.406	14.8	1	0	0.4
Barranquilla	1.21	9.1	0.4	0	0.3
Cartagena de Indias	1.008	11.1	0.6	0	0.3
Soledad	0.67	10.2	0.5	0	0.3
San José de Cúcuta	0.651	20	1.5	0	0.6
Ibagué	0.559	15.6	1	0	0.5
Soacha	0.552	22.7	1.7	0.3	0.7
Villavicencio	0.519	16.8	1.2	0	0.5
Bucaramanga	0.505	19.6	1.4	0	0.6
Santa Marta	0.504	7.5	0.2	0	0.2
Valledupar	0.485	11.4	0.6	0	0.3
Bello	0.483	17.5	1.2	0	0.5
Pereira	0.467	13.9	0.9	0	0.4
Montería	0.455	15.5	1	0	0.5
San Juan de Pasto	0.448	13.9	0.9	0	0.4
Buenaventura	0.417	11.4	0.6	0	0.3
Manizales	0.388	17.4	1.2	0	0.5
Neiva	0.337	17.7	1.2	0	0.5
Palmira	0.302	15.4	1	0	0.5
Armenia	0.297	14.3	0.9	0	0.4
Riohacha	0.286	6.6	0.2	0	0.2
Sincelejo	0.282	12.8	0.8	0	0.4
Popayán	0.278	14	0.9	0	0.4

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 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.