Colombia Fact Sheet

Colombia is the sixth most polluted country in South America. Fine particulate air pollution ($PM_{2.5}$) shortens the average Colombian resident's life expectancy by 10 months, relative to what it would be if the World Health Organization (WHO) guideline of 5 µg/m³ was met.[1] Some areas of Colombia fare much worse than average, with air pollution shortening lives by 2 years in Puerto Leguízamo, the country's most polluted municipality in the Putumayo department.

KEY TAKEAWAYS

- 99.3 percent of Colombia's population live in areas where the annual average particulate pollution level exceeds the WHO guideline. Only 0.8 percent of the population lives in areas that exceed the country's national air quality standard of 20 µg/m³, which is four times the WHO guideline.
- From 1999 to 2021, average annual particulate pollution increased by 44.7 percent and stand at a level that is 2.7 times the WHO guideline.
- In each of the most polluted municipalities of the country—Puerto Leguízamo, Puerto Alegria and Leticia—residents are on track to lose 2 years of life expectancy on average relative to the WHO guideline.
- If the capital city of Bogotá were to reduce particulate pollution to meet the WHO guideline, residents in Bogotá would gain a total of 8.3 million life years.
- Colombia's departments face severe air inequality. For instance, a person living in the least polluted municipality of the highly polluted Guainía department loses more life years to air pollution (1.4 years) than a person living in the most polluted municipality of the less polluted La Guajira department (0.6 years). (See Figure 5)

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

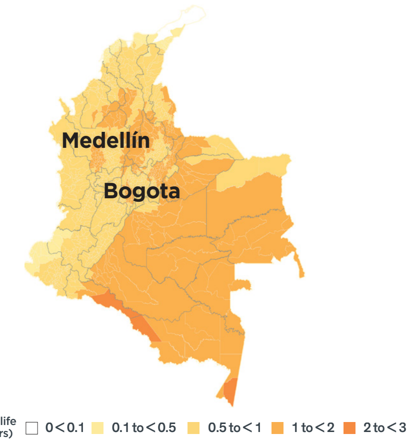
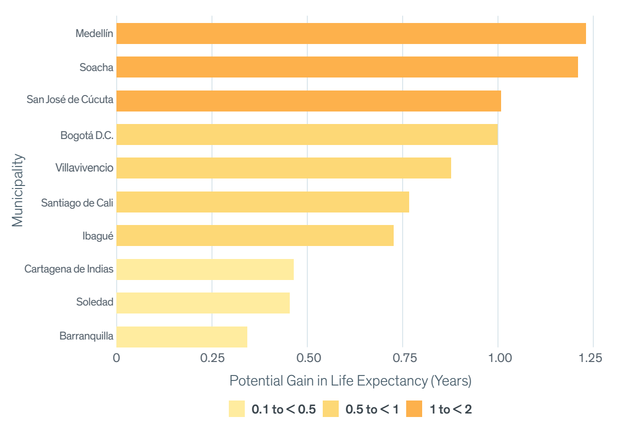


Figure 2 · Potential gain in life expectancy from reducing $PM_{2.5}$ from 2021 levels to the WHO guideline in the 10 most populous municipalities of Colombia



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[2], the country is one of only two countries in South America to have fully open air quality data. Making these datasets more fully accessible on a more timely basis allows Colombia's citizens with a variety of skill sets to participate in addressing air pollution.

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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 "Open Air Quality Data: The Global Landscape," OpenAQ, 2022: https://documents.openaq.org/reports/Open+Air+Quality+Data+Global+Landscape+2022.pdf

Figure 3 · Top 15 threats to life expectancy in Colombia

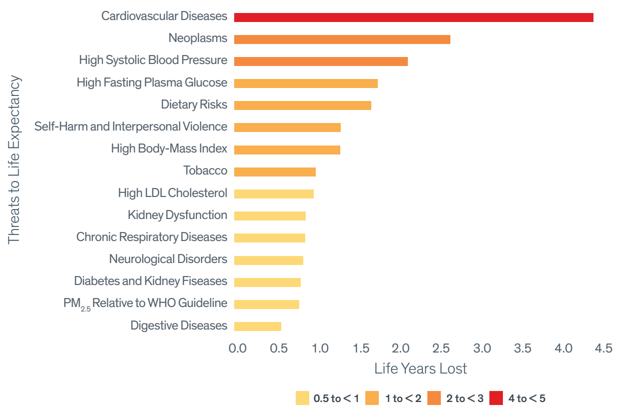


Figure 4 · Annual average $PM_{2.5}$ concentration in Colombia, 1998-2021

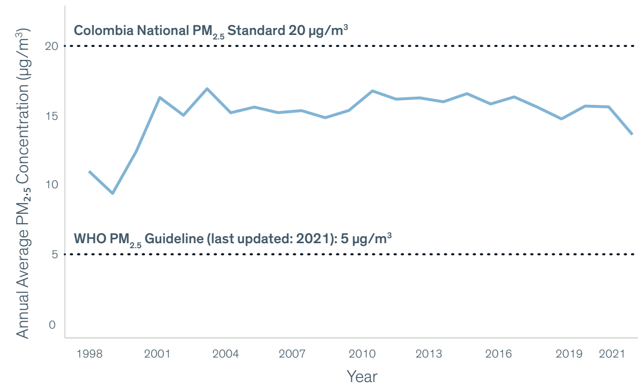
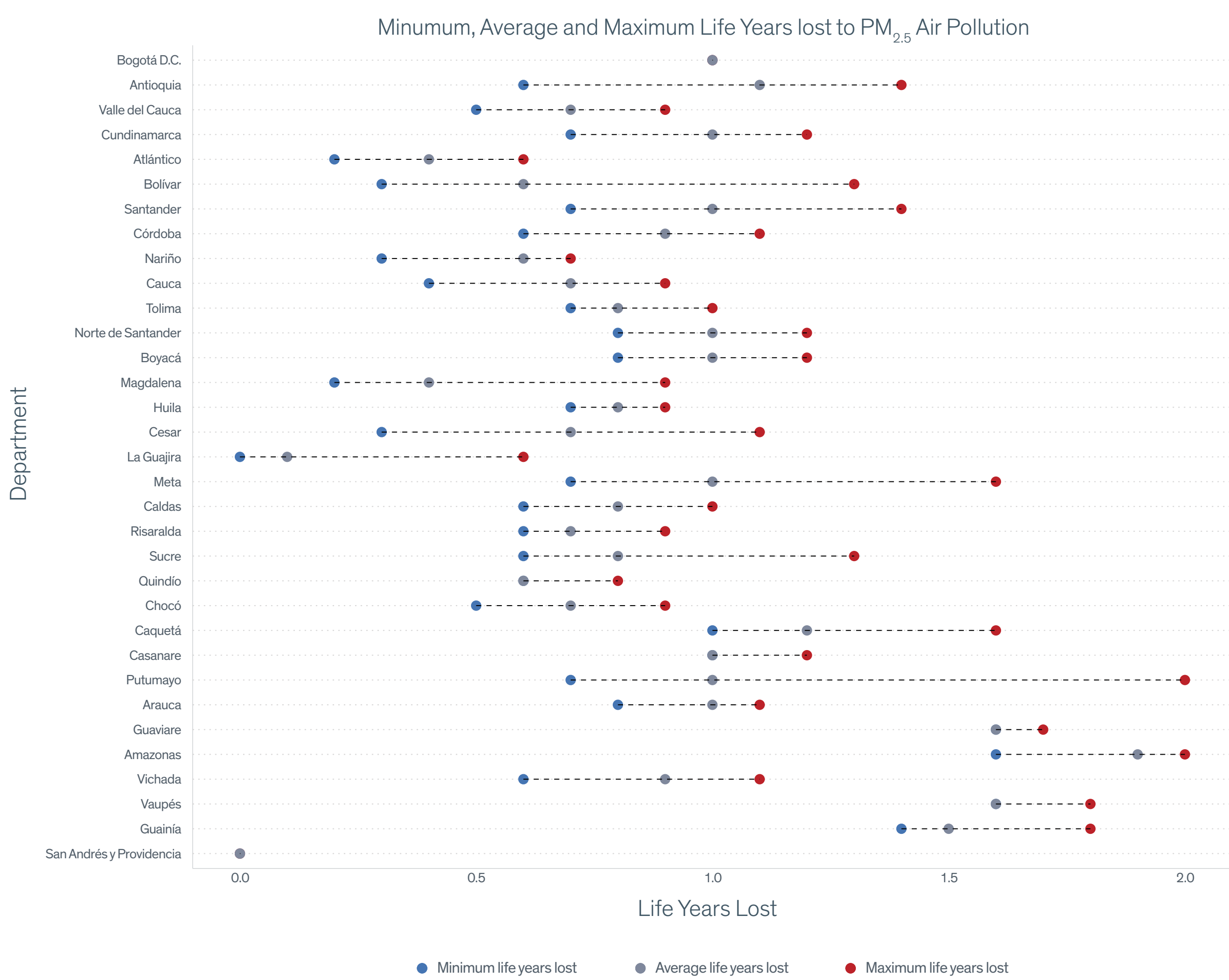


Figure 5 · Range of life years lost to air pollution in all departments of Colombia

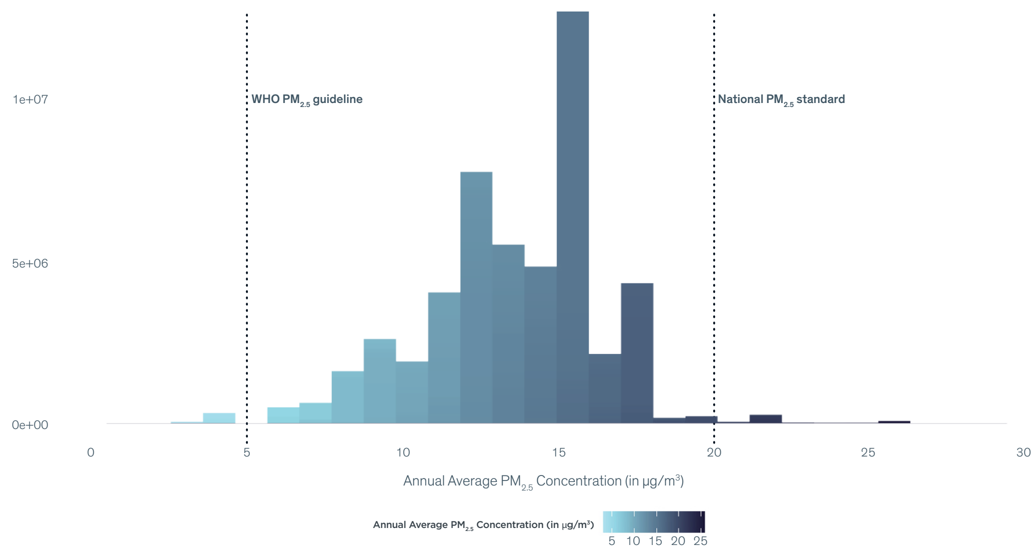


Note: Bogotá D.C. is a department with a single municipality of the same name, hence minimum, maximum and average life years lost are all the same. In the Quindio, Vaupés, Casanare and Guaviare departments, the minimum life years lost and the average life years lost are the same. In the department of San Andrés y Providencia, average particulate pollution is in compliance with the WHO guideline as a result, minimum, average and maximum life years lost are the same, equal to 0.

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

Department	Muncipality	Population (millions)	$PM_{2.5}$ concentration 2021 (in µg/m³)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentrations to the WHO guideline of 5 µg/m³ (years)	Life expectancy gains from reducing $PM_{2.5}$ from 2021 concentrations by 30 percent (years)
Bogotá D.C.	Bogotá D.C.	8.3	15.1	1	0.4
Antioquia	Medellín	2.5	17.4	1.2	0.5
Valle del Cauca	Santiago de Cali	2.5	12.8	0.8	0.4
Atlántico	Barranquilla	1.2	8.5	0.3	0.2
Bolívar	Cartagena de Indias	1	9.7	0.5	0.3
Atlántico	Soledad	0.7	9.6	0.4	0.3
Norte de Santander	San José de Cúcuta	0.7	15.2	1	0.4
Tolima	Ibagué	0.6	12.3	0.7	0.4
Cundinamarca	Soacha	0.6	17.3	1.2	0.5
Meta	Villavicencio	0.5	13.9	0.9	0.4
Santander	Bucaramanga	0.5	15.1	1	0.4
Magdalena	Santa Marta	0.5	6.9	0.2	0.2
Cesar	Valledupar	0.5	10.5	0.5	0.3
Antioquia	Bello	0.5	16.5	1.1	0.5
Risaralda	Pereira	0.5	11.2	0.6	0.3
Córdoba	Montería	0.5	14	0.9	0.4
Nariño	San Juan de Pasto	0.5	11.4	0.6	0.3
Valle del Cauca	Buenaventura	0.4	10.3	0.5	0.3
Caldas	Manizales	0.4	13.6	0.8	0.4
Huila	Neiva	0.3	12.9	0.8	0.4
Valle del Cauca	Palmira	0.3	12.9	0.8	0.4
Quindío	Armenia	0.3	11	0.6	0.3
La Guajira	Riohacha	0.3	5.8	0.1	0.2
Sucre	Sincelejo	0.3	12.9	0.8	0.4
Cauca	Popayán	0.3	12.4	0.7	0.4

Figure 6 · Distribution of annual average $PM_{2.5}$ in Colombia



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.