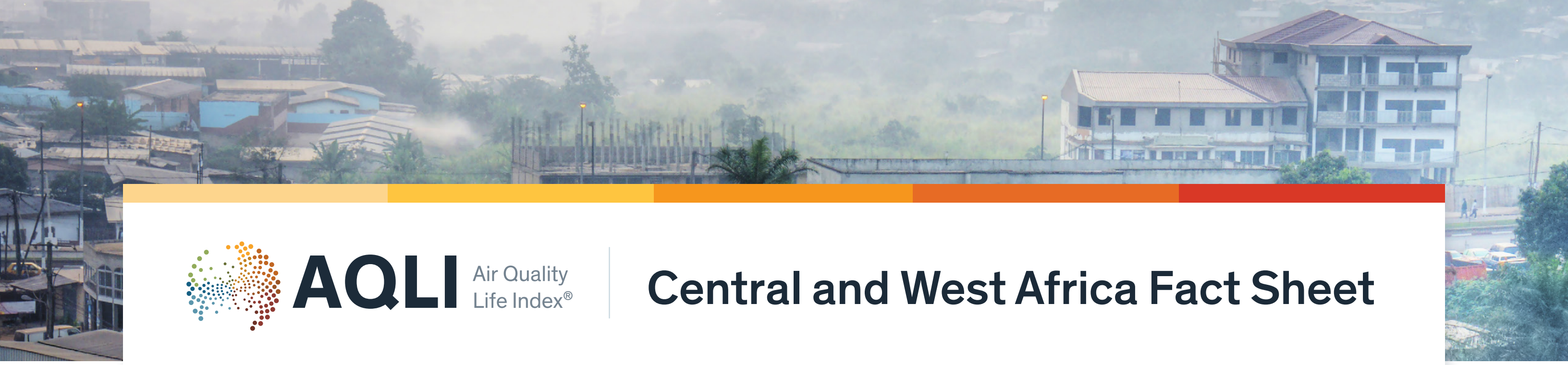


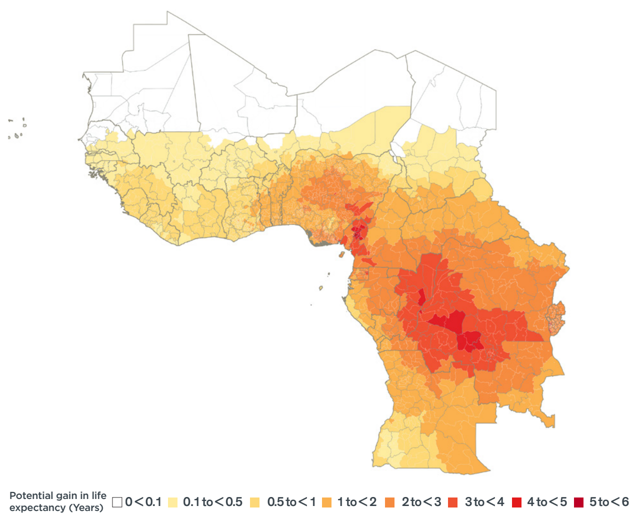
Central and West Africa Fact Sheet

Of the world's 30 most polluted countries, eight are in Central and West Africa, a region that comprises 27 countries and 638.7 million people.[1] Fine particulate air pollution ($PM_{2.5}$) shortens the average Central and West African's life expectancy by 1.6 years, relative to what it would be if the World Health Organization (WHO) guideline of 5 µg/m³ was met. In this region, average particulate pollution levels are 4.2 times the WHO guideline, which amounts to a total of 1 billion life years lost to pollution for this region as a whole.[2] Central Africa is more polluted than Western Africa, with the Central African countries of the Democratic Republic of the Congo, Republic of the Congo and Rwanda being the most polluted countries. Air pollution is shortening lives by 2.4 years for the average resident of Central Africa. In comparison, an average resident of West Africa loses 1.2 years of life expectancy.

KEY TAKEAWAYS

- **Democratic Republic of the Congo**: Measured in terms of life expectancy, particulate pollution is the third greatest threat to human health in the country, taking 2.9 years off the life of the average resident. In contrast, respiratory infections and tuberculosis reduce average life expectancy by 3 years and cardiovascular diseases reduce average life expectancy by 3.9 years. In Kinshasa, the capital and largest city of the Democratic Republic of the Congo, about 11.9 million people are on track to lose 3.3 years of life expectancy on average relative to the WHO guideline.
- **Cameroon**: Cameroon, home to 28.6 million people, is the fifth most polluted country on the African continent and eleventh most polluted country in the world. If Cameroon were to reduce particulate pollution to meet the WHO guideline, residents would gain 2.5 years of life expectancy.
- **Nigeria**: Nigeria is the ninth most polluted country in the region. Particulate pollution reduces average life expectancy by 1.8 years, relative to if the WHO guideline was met. Measured in terms of risk to life expectancy, particulate pollution closely follows the greatest risk—child and maternal malnutrition, which reduces life expectancy by 3.8 years. In the most populous state of Lagos, one of the fastest growing cities in the world, 21.1 million people are on track to lose 1.4 years of life expectancy relative to the WHO guideline. In the Sardauna local government area, the most polluted part of Nigeria, residents are on track to lose 4 years of life expectancy.
- **Republic of the Congo**: Particulate pollution shortens the life expectancy of the average resident of the Republic of the Congo by 2.7 years, relative to what it would be if the WHO guideline was met. Brazzaville, the capital and most populous city, contains particulate pollution levels that are almost 8 times the WHO guideline. If the Republic of the Congo were to reduce particulate pollution to meet the WHO guideline, the 1.4 million residents in Brazzaville would gain 3.3 years in life expectancy on average.

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



1 Central Africa is defined as the following 11 countries: Angola, Burundi, Cameroon, Central African Republic, Chad, Republic of the Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, São Tomé and Príncipe, Rwanda. West Africa is defined as the following 16 countries: Benin, Burkina Faso, Cabo Verde, Gambia, Ghana, Guinea, Guinea-Bissau, Côte d'Ivoire, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo.

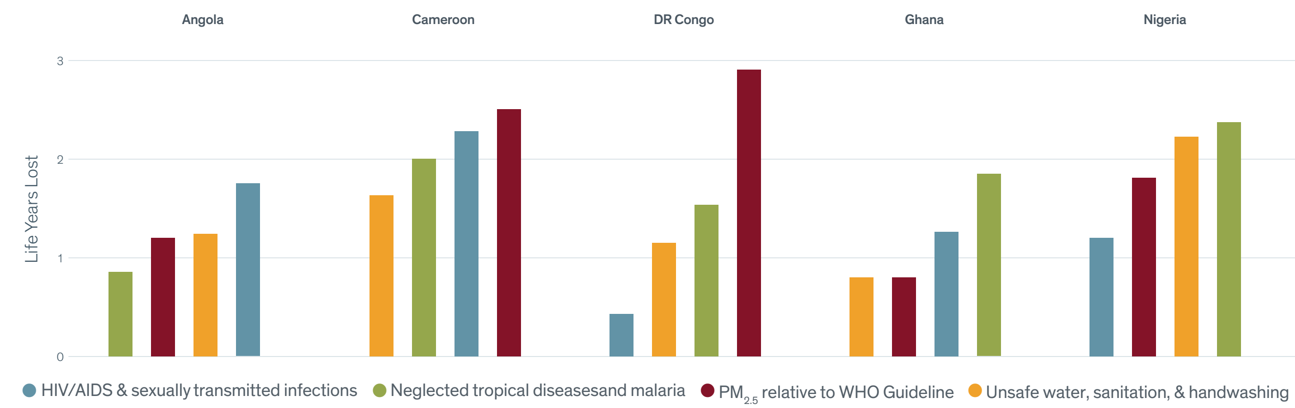
2 This data is based on the AQLI 2021 dataset. All annual average $PM_{2.5}$ values (measured in micrograms per cubic meter: µg/m³) are population weighted.

POLICY IMPACTS

Air quality standards have proved to be an essential component of national policy actions to reduce air pollution and improve health. Yet, none of the 27 countries in Central and West Africa have a national annual average $PM_{2.5}$ standard. In fact, only 17 of Africa's 58 countries have adopted legislative instruments containing some air quality standards.[3] Furthermore, 96.3 percent of the African countries do not have fully open public government air quality data.[4]

The entire continent of Africa stands to gain a lot if it works on implementing targeted emission reduction strategies for the largest contributors to air pollution across the continent (household fuel combustion, transportation and open burning).[5] This coupled with enhanced air quality monitoring and sharing of air quality data openly in a maximally-useful format has the potential to greatly improve air quality and provide health, economic and societal benefits.

Figure 2 · Comparison of selected major global threats to life expectancy in the 5 most populous countries in Central and West Africa



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 3 · Potential gain life expectancy from reducing $PM_{2.5}$ from 2021 levels to the WHO guideline in the 10 most populous regions of Central and West Africa

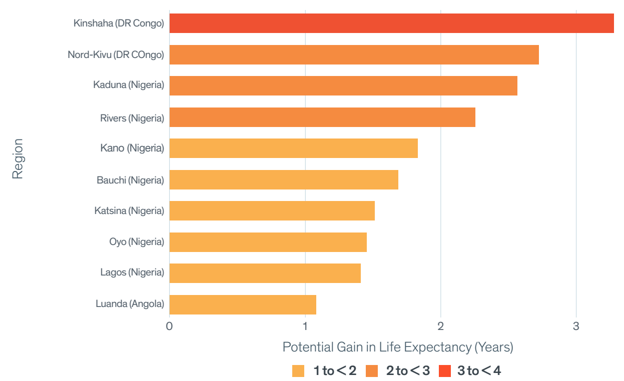
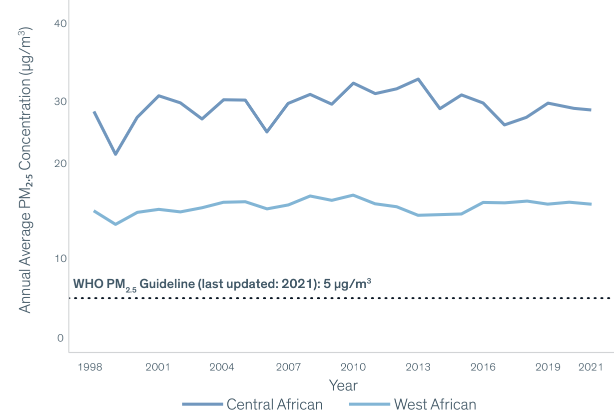


Figure 4 · Annual average $PM_{2.5}$ concentrations in Central and West Africa, 1998-2021



3 Regulating Air Quality: the First Global Assessment of Air Pollution Legislation report, UNEP: https://www.unep.org/resources/report/regulating-air-quality-first-global-assessment-air-pollution-legislation. Also, please note that only a subset of these countries are a part of Central and West Africa. These 17 countries are as follows: Algeria, Benin, Burkina Faso, Côte d'Ivoire, Egypt, Eswatini, Gambia, Ghana, Kenya, Mauritius, Morocco, Mozambique, Nigeria, Rwanda, Senegal, South Africa, and the United Republic of Tanzania.

4 Open Air quality data, The global landscape 2022 community summary table: https://docs.google.com/spreadsheets/d/1m3KfNOGQNlBBGn-jSqPoRmKH-lU0ic1AY9UN-ClXQb3I/edit#gid=1038230352. Please note that in reporting numbers using this table, we have assumed this table's definition of the African continent (54 countries). The AQLI definition that is used elsewhere in the factsheet defines the African continent as containing a total of 61 countries. Some of the regions in this definition may or may not be included elsewhere in the African continent's definition.

5 The State of air quality and health impacts in Africa report. HEI, IHME: https://www.stateofglobalair.org/sites/default/files/documents/2022-10/soga-africa-report.pdf

Potential life expectancy impacts of particulate pollution reductions in 50 most polluted regions of Central and West Africa

Country	Region	Population (in 100,000s)	$PM_{2.5}$ 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)
Cameroon	Hauts Plateaux	1.2	60.1	5.4	1.8
Cameroon	Koung Khi	1	58.6	5.2	1.7
Cameroon	Menoua	4.1	58.3	5.2	1.7
Cameroon	Bamboutos	4.2	55.1	4.9	1.6
Cameroon	Mifi	4.3	55.1	4.9	1.6
Cameroon	Mezam	7.7	52.2	4.6	1.5
Cameroon	Ndé	1.4	51.1	4.5	1.5
Cameroon	Momo	2	50.8	4.5	1.5
Cameroon	Haut Nkam	2.1	50.7	4.5	1.5
Democratic Republic of the Congo	Mangai	0.1	49.7	4.4	1.5
Cameroon	Bui	4.7	49.5	4.4	1.5
Democratic Republic of the Congo	Luebo (ville)	0.3	48	4.2	1.4
Democratic Republic of the Congo	Ilebo	5	47.5	4.2	1.4
Democratic Republic of the Congo	Oshwe	3.2	47.4	4.2	1.4
Cameroon	Ngo Ketunjia	2.7	47.1	4.1	1.4
Democratic Republic of the Congo	Nioki	0.7	47.1	4.1	1.4
Democratic Republic of the Congo	Ilebo (ville)	1	47	4.1	1.4
Democratic Republic of the Congo	Kutu	7.4	47	4.1	1.4
Democratic Republic of the Congo	Luebo	3	46.9	4.1	1.4
Democratic Republic of the Congo	Yumbi	1.4	46.5	4.1	1.4
Democratic Republic of the Congo	Mweka	8.1	46	4	1.4
Republic of the Congo	Mossaka	0.5	45.9	4	1.3
Democratic Republic of the Congo	Demba	6.7	45.9	4	1.3
Democratic Republic of the Congo	Kikwit	11.2	45.8	4	1.3
Democratic Republic of the Congo	Inongo	4.8	45.6	4	1.3
Cameroon	Boyo	1.8	45.2	3.9	1.3
Democratic Republic of the Congo	Mushie	2.1	45.2	3.9	1.3
Democratic Republic of the Congo	Masi-Manimba (ville)	0.4	45.2	3.9	1.3
Democratic Republic of the Congo	Dekese	2	45	3.9	1.3
Democratic Republic of the Congo	Bolobo (ville)	0.8	44.9	3.9	1.3
Democratic Republic of the Congo	Bulungu	12.2	44.9	3.9	1.3
Republic of the Congo	Owando	0.9	44.7	3.9	1.3
Democratic Republic of the Congo	Lusambo	1.5	44.6	3.9	1.3
Nigeria	Sardauna	3.2	44.6	3.9	1.3
Democratic Republic of the Congo	Idiofa	16	44.4	3.9	1.3
Democratic Republic of the Congo	Dibaya-Lubwe	0.3	44.2	3.8	1.3
Democratic Republic of the Congo	Lodja (ville)	0	44.2	3.8	1.3
Democratic Republic of the Congo	Bagata	6.9	44.1	3.8	1.3
Cameroon	Lebialem	1.7	44	3.8	1.3
Democratic Republic of the Congo	Masi-Manimba	14.2	43.9	3.8	1.3
Democratic Republic of the Congo	Bena-Dibele	0	43.9	3.8	1.3
Democratic Republic of the Congo	Lukolela	1.8	43.6	3.8	1.3
Democratic Republic of the Congo	Bandundu	2.1	43.6	3.8	1.3
Democratic Republic of the Congo	Bulungu (ville)	0.7	43.5	3.8	1.3
Republic of the Congo	Impfondo	0.8	43.5	3.8	1.3
Democratic Republic of the Congo	Dimbelenge	4.8	43.3	3.8	1.3
Democratic Republic of the Congo	Kole	3.1	43.1	3.7	1.3
Democratic Republic of the Congo	Kiri	3.3	43.1	3.7	1.3
Democratic Republic of the Congo	Bomongo	1.7	43.1	3.7	1.3
Democratic Republic of the Congo	Inongo (ville)	0.4	42.7	3.7	1.3

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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