AQLI Air Quality Life Index® | Nigeria Fact Sheet

Particulate pollution ($PM_{2.5}$) in Nigeria is 4.6 times higher than the WHO guideline of 5 µg/m³.[1,2] The average Nigerian resident could live 1.8 years longer if particulate levels were permanently reduced to meet the guideline. Those living in the most polluted states of Cross River and Taraba could live more than 3.5 years of life expectancy (Figure 1).[3]

KEY TAKE-AWAYS

- Particulate pollution is the third greatest external threat to life expectancy in Nigeria, behind child and maternal malnutrition and neglected tropical diseases and malaria. While pollution reduces average life expectancy 1.8 years, unsafe water, sanitation and handwashing, and HIV/AIDS and other sexually transmitted infections reduce it by 1.4 years and 1 year, respectively (Figure 4).
- All of Nigeria's 229.9 million people live in areas where the annual average $PM_{2.5}$ concentrations exceed the WHO guideline (Figure 1).
- Over 70 percent of the population lives in regions that do not meet Nigeria's national standard of 20 µg/m³. If these areas met the national standard, the average life expectancy could increase by 6.6 months—adding a total of 89.5 million life years to the population.
- In the Niger River Delta, Nigeria's most polluted region, 46.6 million residents could gain 2.4 years of life expectancy by meeting the WHO guideline (Figure 2).[4] In the most polluted local government area, Bakassi (Cross River state), residents could gain 3.9 years of life expectancy.
- Residents in Lagos, Nigeria's most populous state, would gain 1.6 years if $PM_{2.5}$ levels met the WHO guideline (Figure 3). In Abuja, the capital city, residents would gain 2.6 years.
- $PM_{2.5}$ concentrations increased by 16.7 percent between 1998 and 2023, further reducing life expectancy by more than 3 months (Figure 2).

Figure 1 · Potential gain in life expectancy from permanently reducing $PM_{2.5}$ from the 2023 concentration to the WHO guideline

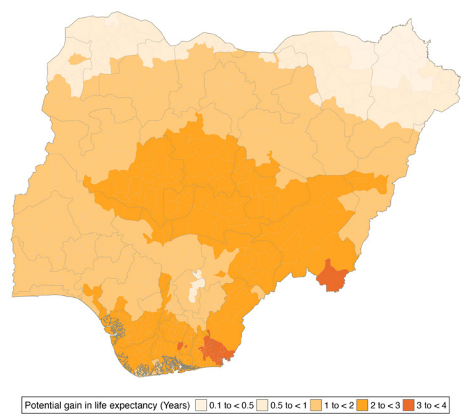
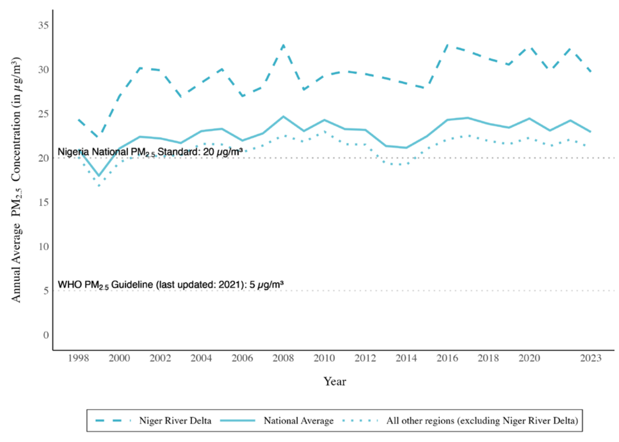


Figure 2 · Annual average $PM_{2.5}$ concentration in Nigeria, 1998-2023



1 This data is based on the AQLI 2023 dataset. All annual average $PM_{2.5}$ values (measured in micrograms per cubic meter: µg/m³) are population weighted.

2 World Health Organization. WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide. Geneva, 2021. https://iris.who.int/bitstream/handle/10665/345329/9789240034228-eng.pdf

3 Four out of the ten most polluted Local Government Areas (LGAs) of Nigeria lie in the Cross river state as follows: Akpabuyo, Bakassi, Calabar and Calabar South.

4 Niger river delta is defined as the following nine states: Rivers, Delta, Akwa Ibom, Imo, Edo, Ondo, Cross River, Abia, Bayelsa.

Figure 3 · Potential life expectancy gain from reducing $PM_{2.5}$ from 2023 levels to the WHO guideline in the 10 most populous states of Nigeria

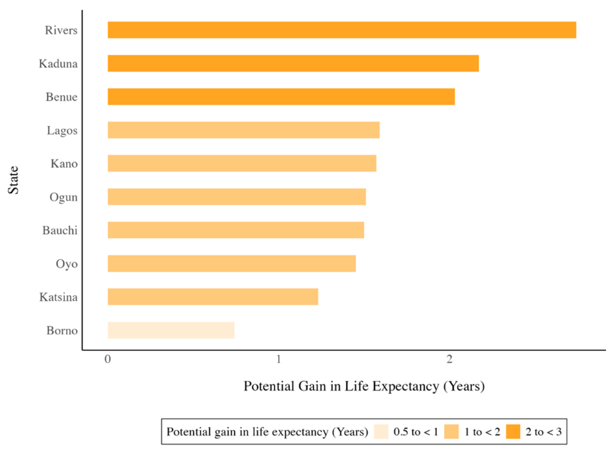
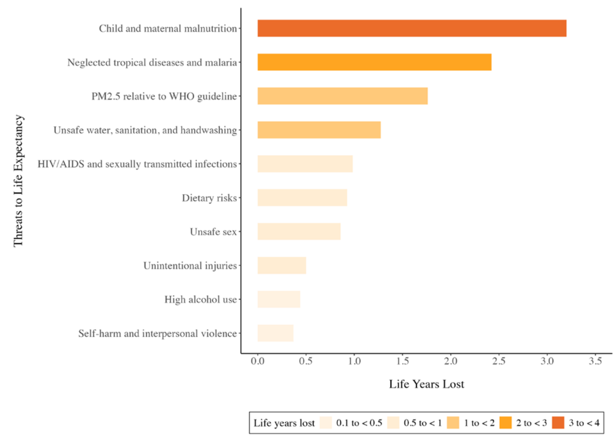


Figure 4 · Top 10 external threats to life expectancy in Nigeria



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 the latest AQLI (2023 $PM_{2.5}$ concentrations) data.

POLICY PROGRESS TOWARDS CLEAN AIR

Nigeria has one of the strongest regulatory and policy frameworks for addressing air pollution in Africa. It is among seven African countries that have adopted an air quality management plan and one of the 14 countries that publicly share their air quality data.

In 2021, the National Environmental Standards Regulations and Enforcement Agency (NESREA) implemented Nigeria's first national air quality regulation.[5] The regulation:

- sets ambient quality standards;
- limits industrial, vehicular, and indoor emissions; and
- promotes investment in cleaner technologies.

In June 2021, NESREA partnered with Clarity Movement Co. to provide real - time air quality data in Nigeria.[6]

5 Federal Republic of Nigeria Official Gazette. 2021. https://www.nesrea.gov.ng/wp-content/uploads/2023/07/Airquality_Regulation.pdf

6 Clarity. 2021. "Nigeria Set to Deploy New Technology to Monitor Air Quality". https://www.clarity.io/blog/nesrea-selects-claritys-air-quality-monitoring-technology-to-deliver-actionable-data-to-inform-policy-decisions

Potential life expectancy impacts of particulate pollution reductions in the 25 most populous local government areas (LGAs) of Nigeria

Local Government Area	Population (Millions)	Annual Average 2023 $PM_{2.5}$ Concentration (µg/m³)	Life Expectancy Gains from reducing $PM_{2.5}$ from 2023 concentration to WHO $PM_{2.5}$ guideline of 5 µg/m³ (Years)	Life Expectancy Gains from reducing $PM_{2.5}$ from 2023 concentration to National $PM_{2.5}$ standard of 20 µg/m³ (Years)
Alimosho	2.7	19.8	1.5	0.0
Abuja	2.4	30.5	2.5	1.0
Ikorodu	1.9	22.8	1.7	0.3
Ado Odo/Ota	1.7	19.5	1.4	0.0
Surulere	1.7	21.2	1.6	0.1
Amuwo Odofin	1.7	21.0	1.6	0.1
Eti-Osa	1.5	21.9	1.7	0.2
Apapa	1.5	21.4	1.6	0.1
Ungogo	1.5	21.4	1.6	0.1
Ikeja	1.5	20.9	1.6	0.1
Ojo	1.4	21.3	1.6	0.1
Obio/Akpor	1.2	34.4	2.9	1.4
Mainland	1.2	21.5	1.6	0.2
Lagos Island	1.1	21.8	1.7	0.2
Akko	1	21.9	1.7	0.2
Kosofe	1	22.6	1.7	0.3
Bwari	1	31.4	2.6	1.1
Gezawa	0.9	21.1	1.6	0.1
Konduga	0.9	11.8	0.7	0.0
Bauchi	0.9	23.2	1.8	0.3
Igabi	0.9	27.2	2.2	0.7
Oshodi/Isolo	0.9	20.4	1.5	0.0
Shomolu	0.9	21.9	1.7	0.2
Port Harcourt	0.8	33.8	2.8	1.4
Ifo	0.8	20.6	1.5	0.1

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 2023 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 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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