

Open Air Quality Data: The Global Landscape

2026

WRITTEN BY THE OPENAQ TEAM
WITH CONTRIBUTIONS FROM THE
OPENAQ COMMUNITY

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2026 /

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THE GLOBAL LANDSCAPE



MANILA, PHILIPPINES
14.5995° N/ 120.9842° E

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OPEN AIR QUALITY DATA / 2026

Executive Summary

Open Air Quality Data: The Global Landscape is the only comprehensive, global assessment of whether and how national governments are producing and sharing air quality data with the public.

Air pollution is the greatest external threat for death across the world, cutting lives short by an average of 1.9 years (Greenstone, et al. 2025) and harming health in a myriad of ways, starting in the womb.

Governments have a responsibility to address this public health crisis, and reliable monitoring is essential to doing so. Data generated by air quality monitors underpin all necessary actions, from quantifying levels, sources, and health impacts of air pollution to informing how to reduce emissions through regulatory and other solutions.

Air pollution measurements are relevant not only for governments, but for everyone who breathes air and for those who can lend their skills to solving the problem, such as researchers preparing emissions inventories, building models, or conducting epidemiological studies, community leaders and communicators expanding awareness, and entrepreneurs building forecasting models.

Rather than attempting to solve the problem of air pollution in isolation, governments that choose to share their data openly can leverage the expertise of others to build more innovative and durable approaches to solving the air pollution crisis.

Despite the imperative, not all governments monitor air quality, and those that do vary widely in their data sharing practices.

OpenAQ—an NGO that hosts the world's largest open-source, open-access database of real-time and historical outdoor air quality measurements—conducts a biennial analysis of countries across the world to determine which have government-level air quality monitoring programs and whether and how those governments are opening their monitoring data to the public.

Trends and gaps in air quality monitoring

Just 67% of the countries we examined conduct or sponsor continuous air quality monitoring at a national or subnational level in 2026, an increase of only 3% since our last report in 2024. In other words, 33% of countries' governments are not currently monitoring air pollution, one of the greatest global health risks. Major gaps in monitoring persist, with many of the most populated, polluted countries still lacking government-coordinated air quality monitoring programs or conducting very limited monitoring, especially in the Global South (Hasenkopf, et al. 2023).

In fact, nearly one billion people live across 65 countries where there is no evidence of governmental air quality monitoring, 7 out of 10 of whom live in low-income or lower-middle income countries, as classified by the World Bank. Furthermore, for the most populated countries whose national government is not monitoring air quality, air pollution is one of the top eight risk factors for death and disability in their country.

THE MONITORING GAP

33%

of countries lack continuous government air quality monitoring

1 billion

people live in countries with no evidence of government monitoring

7 in 10

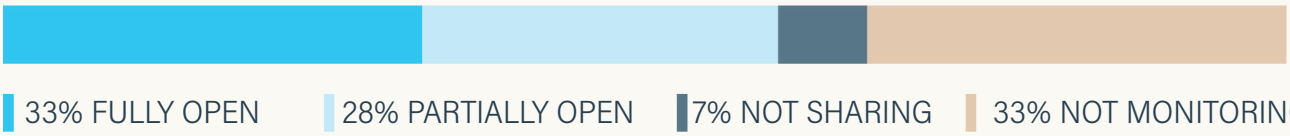
of those 1 billion people live in low - or lower-middle-income countries

top 8

Air pollution is one of the top 8 risk factors for death and disability in countries lacking government monitoring

Trends and gaps in air quality data sharing

61% of 198 countries examined share air quality data publicly. 33% of 198 do so in a fully open way, while 28% share data only in a partially open way.



33% FULLY OPEN 28% PARTIALLY OPEN 7% NOT SHARING 33% NOT MONITORING

As one example of how data are being shared, many countries share their data through an Air Quality Index (AQI), a good first step toward transparency. AQIs translate complex pollutant concentration data into a simple, understandable format that can alert the public about the immediate threat of polluted air, and AQI providers often share actions that people can take to reduce exposures. However, a subset of countries only publish AQIs and not the underlying pollutant concentrations. This approach lacks the detail necessary for most scientific inquiry, and, depending on the methodology used, may even be misleading.

In short, a third of countries provide full and easy public access to maximally useful air quality data-data with the requisite detail to inform scientific inquiry, policies to reduce air pollution, air pollution forecasts, and other important "use cases."

Compared to previous years, there is a continued increase in the number of countries that share their air quality data publicly in some way (up by 8% from 2022, and by 6% from 2024), and an increase in countries making the data fully open and accessible (up by 10% from 2022, and 6% from 2024).

> One-third of the countries (33%) provide full and easy public access to air quality data, which maximizes support for clean air solutions.

Recommendations

Measuring and tracking air pollution levels is critical to understanding and developing solutions to poor air quality. Making air quality data fully open, easily accessible and freely available allows everyone across public, private and civil society to innovate, collaborate and apply effective solutions towards clean air. We recommend:

01 All governments should measure and track air quality.

Recognizing that resources are limited, a government just beginning to monitor could start by installing a reference-grade $PM_{2.5}$ monitor as described in Our Common Air's 2024 report, *"Accelerating Country-led Air Quality Reporting to Achieve Clean Air"* and *AQMx's Air Quality Management Guidance for Air Monitoring*. In some circumstances, air sensors may suffice.

02 All governments should share the air quality data they generate in a fully open and accessible manner.

Fully open means in physical units, at the station-level with station-specific coordinates, in daily or sub-daily (hourly, minutely) frequency reported in near real-time or a reasonably timely manner, and in a format that is programmatically accessible and machine-readable.

Recommendations

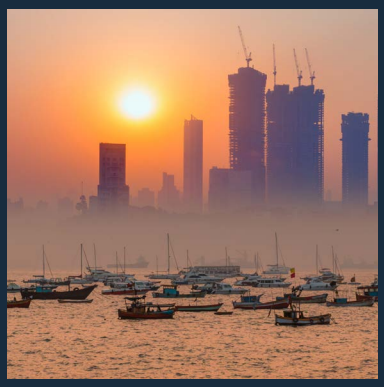
CONTINUED

03 Funders, such as development agencies, banks and philanthropies, should support less-resourced governments.

Countries where a relatively small investment would close a serious data gap and effect positive national-level change are identified in the EPIC report, *"EPIC's 2025 Clean Air Investment Update: A Tougher Landscape—and an Even Greater Opportunity."*

04 Funders should include conditions for data transparency in funding agreements—and provide the resources to do that.

One example of funding with an open data sharing requirement is the EPIC Air Quality Fund.



MUMBAI, INDIA
9.0760° N / 72.8777° E

Glossary

Air quality (AQ) data

Ambient, ground-level and station-specific pollutant, e.g., particulate matter ($PM_{2.5}$, PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3) and black carbon (BC) concentration data

Air sensors

Commonly referred to as "low-cost sensors" and used for indicative monitoring, i.e., used for informational purposes and not held to a rigorous., reference-grade standard

Countries

Shorthand for the 193 United Nations member states and 5 dependencies or disputed territories with populations greater than one million considered in this report (Hong Kong, Kosovo, Puerto Rico, Taiwan, Palestinian territories)

Data governance

Decisions about data, including acquiring, processing, analyzing, and using data. This can include determining who can access it for what purpose

Fully open

Data that fulfill the Key Criteria for Fully Open Data: physical units, station-specific coordinates, fine-scale frequency, timely reporting, and programmatic access

Government data

Air quality data from devices or monitoring systems run, commissioned, or sponsored by national or subnational governments

Real-time data

Data produced on daily or sub-daily (e.g., hourly, 10-minute, 15-minute intervals) levels and released on an approximate daily or sub-daily basis

Reference monitor

Ground-based monitors that are held to a "reference method" standard. Also: "reference-grade monitor" and "research-grade monitor"

Transparent/transparency

Used as a synonym for "open"/"openness"

Introduction

OPEN AIR QUALITY DATA / 2026

Air pollution is the greatest external threat for death across the world, cutting lives short by an average of 1.9 years (Greenstone, et al. 2025). Air pollution is a major health risk factor in every World Bank-defined region (#1 in Middle East & North Africa and South Asia; #2 in East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, #3 in Sub-Saharan Africa, and #8 in North America) (United Nations Environment Programme, 2026). Exposure to air pollution starts in the womb and is associated with numerous poor health outcomes over a lifetime, as well as impacts on productivity and quality of life. The burden of air pollution is unequal, harming babies and young children in particular (Children's Environmental Health Collaborative, 2026), as well as residents of lower-income communities and countries where pollution tends to be higher (Health Effects Institute, 2025). Higher concentrations of pollutants such as $PM_{2.5}$, NO_2, and SO_2 are associated with increased rates of emergency department visits and hospital admissions among people with respiratory and cardiovascular diseases (DeVries, et al. 2017; Sun, et al. 2024). The global health cost of mortality and morbidity by exposure to just $PM_{2.5}$ alone is $8.1 trillion, which is 6.1 % of the global gross domestic product (GDP) (World Bank, 2022).

Governments have a core responsibility to address this public health threat, and reliable monitoring is essential to doing so. The World Health Organization describes continuous, consistent air quality monitoring as necessary for quantifying health impacts and tracking progress toward cleaner air (WHO, 2026). Air quality data underpin all actions on air pollution. They tell us how much pollution is in the air we breathe. They help us predict how air pollution will change in space and time. They shape our understanding of how air pollution impacts human health, climate change, ecological health, and economic and social well being. Air quality data serve as an important foundation for the design, implementation, enforcement, and assessment of the effectiveness of pollution control policies. In short, air quality data are essential to achieving clean air.

Government monitoring is particularly valuable because it tends to be sustained over time, cover multiple pollutants, follow consistent quality-assurance procedures, and provide data that can be used for regulatory purposes.

INTRODUCTION / CONTINUED

Public access to these measurements extends their value. Timely information can help people reduce their exposure, while detailed open data allow non-governmental actors to contribute through epidemiological and source-apportionment studies, forecasting, public communication, and pollution-control strategies. Evidence from China illustrates the potential health benefits of disclosure: nationwide real-time monitoring and public reporting increased awareness and pollution-avoidance behavior, reducing pollution-related mortality effects, with estimated benefits far exceeding the costs of the monitoring and disclosure program (Barwick et al., 2024).

Publicly available air quality data from U.S. embassy monitoring programs worldwide contributed to substantial reductions in fine particulate matter concentrations in the corresponding cities (Jha & La Nauze, 2022). After these monitoring efforts were halted in 2025, local pollution levels increased, with the largest and most persistent effects observed in cities where few comparable sources of air quality data existed (Zhou et al., 2026). Open data therefore expand the value of government monitoring by enabling wider participation in solving the air pollution problem.

An evolving but uneven monitoring landscape

The ways air quality is measured and communicated are changing rapidly. Reference-grade monitoring remains the foundation of regulatory systems, but smaller and less expensive air sensors, satellite observations, atmospheric models, and new data-management technologies increasingly complement conventional networks. These tools help fill geographic gaps where the cost and technical requirements of traditional monitoring pose barriers.

Government air quality monitoring is consequently carried out through a growing mix of government, academic, nonprofit, community, and private-sector efforts. Governments may operate systems directly or partner with universities, civil society organizations, funders, and technology providers to install instruments, manage data, or communicate results.

More monitoring, however, does not automatically mean the data are publicly accessible and maximally useful. This report explores how transparent governments are with the data they collect.

“These tools help fill geographic gaps where the cost and technical requirements of traditional monitoring pose barriers.”

Existing knowledge and the remaining global information gap

A growing body of work has sought to document air quality monitoring gaps. Academic studies have examined monitoring within particular regions and countries (Alvarez et al., 2020; Rojas et al., 2026; Taghizadeh et al., 2023; United Nations Economic and Social Commission for Asia and the Pacific, 2025; Verma et al. 2023).

However, to our knowledge, no studies have examined monitoring gaps from a global perspective and paired that research with information on data transparency. OpenAQ's Open *Air Quality Data: The Global Landscape* series was developed to address this gap.

Goals of the Assessment

OPEN AIR QUALITY DATA / 2026

This assessment, the fourth in a biennial series, reviews the global landscape of air quality data produced by governments, answering two critical questions:

01

Which countries are—and are not—actively monitoring air quality on a continuous basis?

02

Where government-level monitoring occurs, are the resulting data being shared publicly and, if so, to what extent?

Goals of the Assessment

By answering these questions, the assessment seeks to describe the state of government air quality monitoring and public data access worldwide; identify trends, gaps, and opportunities; and provide useful information to stakeholders positioned to act on those findings:

Governments and regulators

can identify opportunities to expand monitoring and improve the accessibility and usefulness of the data they produce.

Researchers, civil society organizations, data providers, and technical partners

can identify where additional measurements, infrastructure, expertise, and partnerships are most needed.

Funders

including development institutions and philanthropies, can identity where financial and technical support, open-data education, or investment in data infrastructure could have the greatest impact.

Communities and advocates

can better understand what governments do and do not measure and disclose, supporting public awareness and accountability.

In this assessment, we describe the current global landscape of government air quality monitoring and data accessibility to the best of our knowledge, as gathered via public resources and the OpenAQ community. We welcome feedback. If you would like to contribute new information or submit corrections, please email info@openaq.org.

This assessment has been conducted biennially since 2020. Repeating the assessment over time makes it possible to identify not only the current state of monitoring and data access, but also where systems are expanding, disappearing, or becoming inaccessible and where persistent gaps remain. This edition rechecks evidence from 2022 and 2024 while incorporating new sources and methodological refinements to reflect changes in monitoring and data-sharing practices.

OPEN AIR QUALITY DATA / 2026

Understanding government air quality monitoring

How Air Quality Is Monitored and Data Are Managed

There are many ways to monitor ambient air quality, including ground-based, airborne, mobile and satellite measurements. This assessment focuses on stationary ground-based monitoring networks that provide real-time data, including reference monitors and air sensors. Cases where we found governments using offline methods (e.g., filter-based sampling) were also taken as evidence of air monitoring.

Reference monitors

Governments typically evaluate the state of air quality using data from ground-based monitors that are held to a "reference method" standard (US CFR App L, US CFR App O). Codified reference methods vary across the world, but as long as the monitors are well maintained, data from reference monitors (also referred to as reference-grade or research-grade monitors) tend to be highly accurate. Therefore, measurements gathered from reference monitors are the gold standard for measuring pollutant concentrations, and as such, remain the tool for regulatory compliance (Berman & Ebisu, 2020).

Air sensors

In the last 20 years, new instrumentation to measure air quality has been developed—air sensors that are more compact, portable and affordable than reference monitors (Okorn, 2024). The quality of data from air sensors varies due to such factors as the technology used, differences in validation and calibration efforts, and weather conditions. Their cost varies from a few hundred to a few thousand US dollars, depending on the technology used, the number of pollutants they measure, and the resources required for calibration and maintenance. Because of this variability, we refer to these instruments as "air sensors," not the other commonly used term, "low-cost sensors." The use of air sensors is also often referred to as "indicative monitoring."

AIR SENSORS / CONTINUED

The small size, portability and relative affordability of air sensors has contributed to their easy deployment and has resulted in a surge in their use in the last several years, including by some government entities that have incorporated air sensors into their air quality monitoring networks, allowing for greater geographic coverage.

While reference monitors remain the gold standard, air sensors play an important role in helping governments and other air quality stakeholders understand what is in the air.

DATA MANAGEMENT

Generating data is the first step. A data management system is also required to process and store the data, conduct quality control, visualize and interpret the data, and share the data. These data management systems can be costly to build, and currently entities starting or expanding air quality monitoring must choose to either rely on proprietary systems or build their system from scratch. To meet the need for an alternative, a customizable open-source data management system (DMS) is currently being designed through a collaborative effort, Clean Air COMPASS, and will be available in early 2027.

Why This Assessment Focuses on Government Data

Air quality monitoring is not the sole purview of governments. Academic institutions, civil society organizations, private companies and individuals also monitor air quality and, in a number of cases, share the data they collect. But data from air quality monitoring conducted or sponsored by governments provides unique value to air quality stakeholders.

GOVERNMENT DATA / CONTINUED

Compared to non-government efforts, government efforts tend to offer:

Data on more pollutants.

Governments typically monitor a number of air pollutants.

More sustained data collection.

Government-generated measurements are typically sustained longer—over the course of multiple years at any given location.

Greater uniformity of measurements and methodology.

Although monitoring practices and data quality assurance methods vary, most countries have similar frameworks and objectives and focus on the same pollutants of key interest. Non-governmental efforts rarely share goals or coordinate across projects.

Data that can be used for regulatory purposes.

While governments can perform indicative monitoring and have less strict data quality when data are used for informational purposes, government-generated data that have undergone rigorous quality assurance and validation are used for regulatory compliance and in litigation.

Greater legitimacy and accountability.

The public tends to place greater trust in government monitoring and typically has a say in demanding data accountability.

Despite these benefits, a number of gaps still exist in government monitoring and data sharing. This is particularly true where data on air quality are most needed—highly populated and highly polluted countries typically classified as low- and middle-income. This report highlights these gaps.

Assessment approach

OPEN AIR QUALITY DATA / 2026

Key Criteria for Fully Open Air Quality Data

Open air quality data facilitate many "use cases" that support governments in reducing air pollution, such as epidemiological studies, source apportionment studies that identify the sources of pollution and their relative contribution, forecasting models, and communications that raise awareness. When governments open the air quality data they generate to the public, they no longer have to solve the issue of air pollution in isolation.

While there are certainly valid cases where access to data should be restricted,[2] air quality data do not fall into that category. Air is a common resource shared by all; air quality measurements at any given time or place are factual; and keeping air pollution data confidential impedes the development and implementation of solutions.

Despite the benefits of open air quality data, there is considerable variability in whether and how governments share the data they generate. Governments can maximize the usefulness of open air quality data by providing the data in formats that (1) are easily 'harmonizable' with other data sources into a single format and (2) allow the most use cases to be built on top of the underlying data.

More specifically, this assessment deems a source of air quality data as fully accessible, open and transparent, and maximally useful if the source meets the following Key Criteria for Fully Open Data:[3]

[2] Examples of valid reasons to restrict data access: data that contains personal information or where consent has not been given for release, data with confidential commercial information, or situations where release of the data could harm a public good, e.g., endangered species, archaeological sites, national security.

[3] Beyond meeting these Key Criteria for Fully Open Data, the value of air quality data are increased when data are accompanied by "metadata"—which are contextual information such as ownership, licensing, station classification, measurement method, equipment information, ownership, and stable identifiers—and when any historical records are shared..

Fully open air quality data

A Physical Units

Data are shared in physical units, as opposed to an Air Quality Index (AQI), Air Pollution Index, Pollution Standard Index, or other indicator that summarizes measurements.

Example: $PM_{2.5}$ data are shared in units of micrograms per cubic meter ($\mu g/m^3$), as opposed to a unitless Air Quality Index value.

B Station-Specific Coordinates

Data are provided at the most transparent geographic scale at which they are collected—station-scale—and with location metadata in the form of readily available geographic coordinates, ideally to five places past the decimal.

Example: Data that are provided originate from a single station, as opposed to an aggregation or average of several stations over a city. Additionally, the geographic coordinates from which the data originate are also shared (e.g., the station is located at: 101.89322° N, 30.29571° E).

C Timely Fine-Scale Temporal Information [near Real-Time]

Data are (1) provided at daily or sub-daily levels with time-of-collection stamps and averaging periods, and (2) in near real-time or in a timely manner (i.e., within 24 hours of the timestamp at which data are reported).

Example: Data are shared as hourly averages within a few hours after they are produced (or, at the very least, within a month), as opposed to yearly averages of pollution levels shared a couple of years later.

D Programmatic Access

Data and metadata as defined in the preceding criteria are publicly and currently accessible in a programmatic and machine-readable form, or a downloadable delimited file.

Example: Data are shared via an Application Programming Interface (API), FTP server, or other method that supports automated retrieval and in an open, standardized format that software can parse directly. This contrasts with data shared that can only be read by a person or by specific software, such as values embedded in a PDF, file in a proprietary format, or images of tables charts.

KEY CRITERIA / CONTINUED

By meeting the above criteria, governments can accelerate air pollution solutions by allowing everyone—civil society, government, private sector, academia—to lend their expertise. Diversity of knowledge, skill, and experience leads to more innovative and durable approaches.

Air Quality Indices and the AQI Hub.

Many people do not know how AQIs are calculated and do not realize that they vary significantly across government jurisdictions or providers. This can lead to misunderstandings about the risks posed by air pollution and difficulty in comparing AQIs across regions.

OpenAQ's AQI Hub (https://aqihub.info) is an online resource dedicated to deepening public understanding of air quality indices worldwide. The platform provides detailed descriptions of various national, regional and municipal systems, enabling users to learn how an AQI is built and to compare how different jurisdictions assess and communicate air pollution.

ASSESSMENT APPROACH / METHODOLOGY

Methodology

We conducted a thorough assessment of air quality monitoring carried out by governments in all 193 United Nations member states and 5 dependencies or disputed states with populations exceeding one million [N=198]. The results are current as of October 2026.

The data from the previous edition of this report (2024) was carried over and double-checked for validity and currentness. If the source is found to be invalid or stale, then we updated the gaps using the following procedure:

01

We sought online evidence of an active, continuous ground-level air quality monitoring program that is conducted regularly and that is either led, sponsored or commissioned by a national or subnational government. Pieces of evidence that we looked for were categorized into primary or secondary—primary evidence include those found on the website of the government entity (e.g., government data portal, news article or informational page found on the government entity's website), while secondary evidence were those found in non-government websites such as third-party websites or reports, e.g., WHO or World Bank reports, scientific or news articles that reference government monitoring.

02

We searched a wide range of sources, including government agency websites and reports, the World Health Organization's Ambient Air Quality Database, publicly available air quality data platforms (such as AQICN and OpenAQ), reports by multinational nonprofit organizations specializing in air quality, and peer-reviewed scholarly articles.

03

Additionally, when applicable, we also sought evidence from governmental decrees on air pollution, social media posts from governmental organizations, and various governmental departments (like departments of environment, meteorology, climate change, statistics, communications and scientific research institutions) providing air quality information.

METHODOLOGY / CONTINUED

04

If no electronic media evidence (either primary or secondary) was found through the web search, we consulted our global network.

05

The compiled data was validated by consultations with experts in the field and in-country contacts, making sure that the source we found was legitimate, or that if a country was marked without monitoring, there truly was no monitoring.

We designed our review process as per the 'scoping review' methodology originally developed by Arksey and O'Malley (2005), along with notable improvements that have followed, such as the inclusion of expert consultations to complement the original methodology and refining the search strategy iteratively. Figure 1 (p. 22) illustrates the steps we took to categorize the countries we researched.

While the focus of this report is on national-level government air quality monitoring, many subnational governments conduct and lead air monitoring efforts; for some countries, this is fiscally sponsored by the national government and run by the subnational government. Others monitor independently of the national government. For example, the state-level environmental protection agency in Nigeria conducts air quality monitoring for Lagos State, whereas Quezon City in the Philippines conducts their own air quality monitoring assisted by external, non-governmental funding. Thus, while this search includes countries with limited monitoring (e.g., in one city), we did not do an exhaustive search on a country's subnational monitoring.

We allowed for diverse types of monitoring technologies and different types of programs, accounting for the evolving landscape of air quality monitoring and data sharing with new technologies being featured in government programs. For this reason, we also included government monitoring programs using air sensors, or those using social media as a platform to share air quality data.

Changes from previous years

- Network-based analysis: one country could have one or more systems of air quality monitoring that are government-affiliated. In producing a final collage of countries and their state of air monitoring for country-based analysis, we conduct the selection from a list of networks, such that the representative network chosen for each country covers the largest geographical scale and scores the highest in transparency criteria among that country's networks.
- The presence of subnational monitoring was taken as the presence of government-level monitoring when national-level monitoring was absent. *(See following section: Subnational-Level Monitoring)*.
- Criterion B (Station-Specific Coordinates) is now strictly fulfilled only if coordinates are explicitly provided; previously, mere presence in a map interface was taken as fulfillment of this criterion.
- New categories, such as accessibility of historical data and metadata, are added.
- Definitions, such as "national" or "subnational"-level monitoring are better defined.
- Criterion C's "timely" and "fine-scale" definitions are now disaggregated.

Detailed information about each step taken, changes from previous years and additional new definitions can be found in *Appendix A: Detailed Methodology and Appendix B: Data Dictionary*.

Subnational-Level Monitoring

This year, we have disambiguated national and subnational-level monitoring. This classification reflects the geographic scope of the monitoring network at the time of assessment, rather than the administrative level of the agency operating it. We prioritize geographic coverage because our aim is to add nuance to the question of whether monitoring exists within a country. Monitoring that is confined to a single region or city, for example, does not provide the same level of national representation as a network operating across the country and may point to the need for broader, more representative coverage. Accordingly, we classify monitoring as subnational in two instances:

01 A national air quality monitoring network has been established by a national agency, but the instruments are presently installed only in a subnational administrative unit, such as the capital city or national capital region.

Examples: In Cameroon, a reference air quality monitor is installed by the Douala General Hospital under the Ministry of Health and is classified as a subnational "network" because it is the only government-led monitoring in Cameroon. In Togo, their national environmental management agency is running Projet qualité de l'air au Togo (PQAT) and has set up a reference mobile monitor in the capital, Lomé. The agency intends to expand its monitoring network to a total of 25 monitoring stations, but has not done so yet.[4]

In Pakistan, the Pakistan Environmental Protection Agency (Pak-EPA), a national agency, monitors and reports air quality only in Islamabad City. The province of Punjab's Environment Protection Department (Punjab EPD) conducts their own monitoring and individually reports its own air quality index through its website, but not through a national portal. While Pak-EPA and Punjab EPD are of different administrative levels, the geographical distribution of their AQ monitoring activities has them both classified as "subnational" in this assessment.

[4] There are instances where a newly built national network prioritizes implementation in one city first before expanding to others, hence only currently have active sensors in the capital city or region. While they are classified as subnational this year per our definition, this status will be updated in the next iteration of the report if expansion is observed.

SUBNATIONAL-LEVEL MONITORING / CONTINUED

02 There is no national-level monitoring or aggregator, but subnational administrative units, e.g., cities, states, or provinces, are doing their own air quality monitoring independent of the national-level government.

This instance could be characterized by decentralized air quality management, lack of deep federal government involvement, and structural design of monitoring system and data terms.

Examples: In Argentina, there is no national monitoring system; instead, Buenos Aires and Bahia Blanca have their own air monitoring networks. In Australia, all six states (New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania) independently report air quality data in accordance with National Environment Protection Council (NEPC) standards, but not under a national umbrella. In fact, because data ownership, licensing, and terms of use vary from state to state, there are barriers to establishing a national inventory/collection of nationwide air quality data. Recognizing this problem, an academic project led by the not-for-profit organization Australia Research Data Commons (ARDC) has consolidated air pollution data in Australia into a National Air Pollution Monitor Database (NAPMD) to inform economic and environmental policy changes. However, NAPMD is not government-run, is restricted to researchers, and is available only upon request due to formal data-sharing agreements with state agencies.



LAHORE, PAKISTAN
31.5204° N / 74.3587° E

Scoping procedure

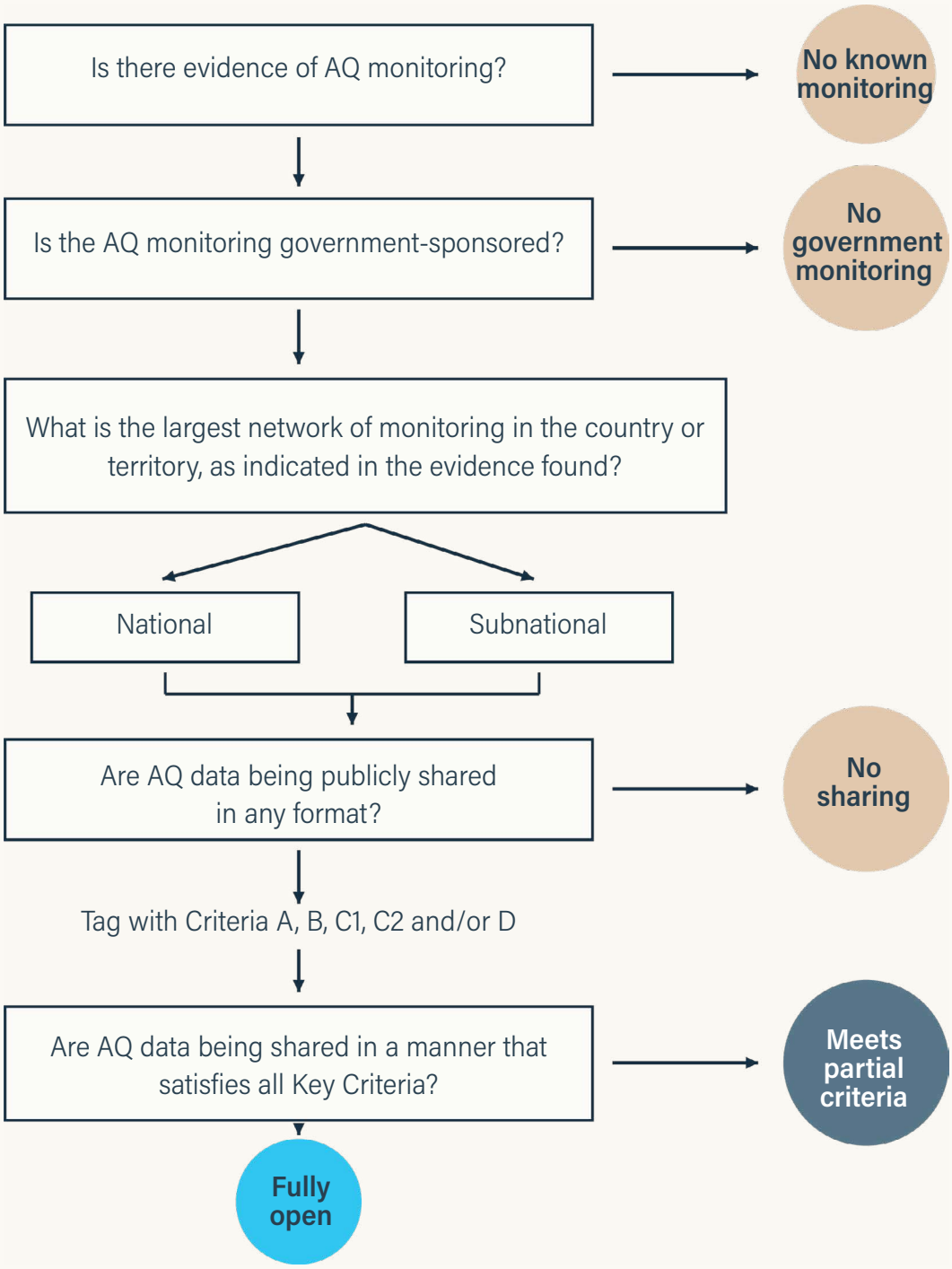


Figure 1. Flowchart of the scoping procedure utilized in this review. (AQ = air quality)

OPEN AIR QUALITY DATA / 2026

Key Insights

Key Insight #1: 33% of countries are not monitoring air pollution.

We found evidence that 67% [N=133] of the world's countries[5] [N=198] are generating air quality data, either on a national or subnational level, on a regular basis. This means that 33% [N=65] are not regularly monitoring air quality, despite the fact that air pollution is the second leading risk factor and leading environmental risk factor for death worldwide. (Health Effects Institute, 2025)

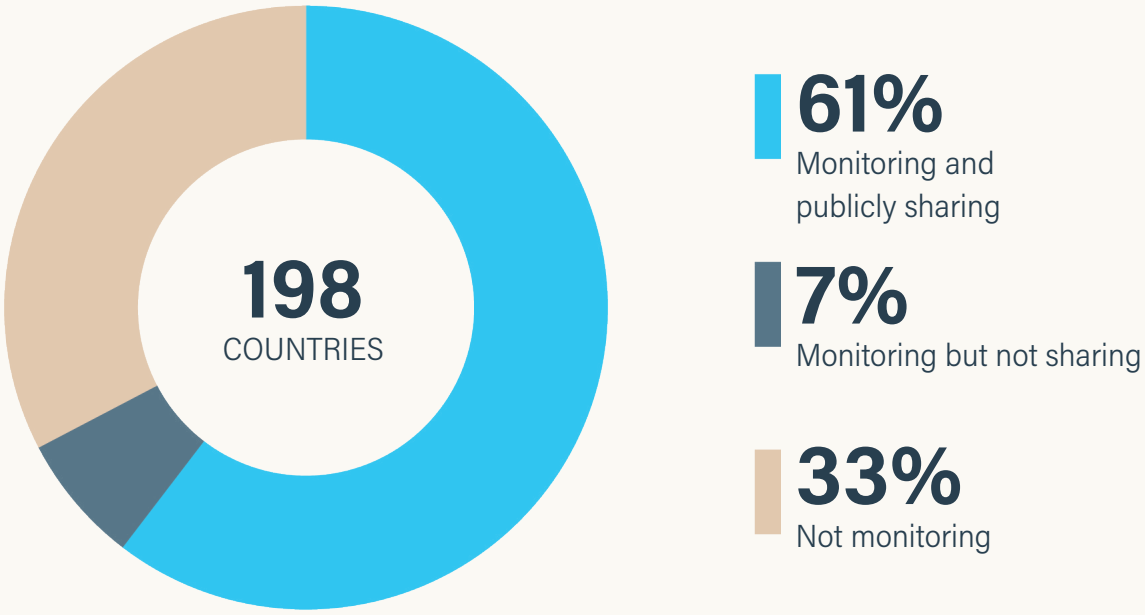


Figure 2. Percentage of countries and dependencies or disputed territories with more than one million people and the fraction that generate air quality data and share their data publicly. (N=198) Percentages are rounded to the nearest whole number and may not sum to 100% due to rounding.

[5] 193 United Nations member states and 5 dependencies or disputed territories with populations greater than one million.

Over the Years

Since 2022[6], we see a net increase in countries that monitor air quality. This year, 67% [N=133] of countries have a continuous monitoring program, a net increase of 3% from 2024, and 5% from 2022. This 5-percentage-point increase in the number of countries monitoring is statistically significant ($p = 0.0226$, $\alpha = 0.05$). Comparing 2024 to 2026 shows that among the 198 selected records with a yes/no 2024 classification, 13 moved from no to yes and 7 moved from yes to no, a net balance of 6. In addition, substantial churn occurs beneath the net balance. While some countries truly started monitoring, some additions to the tally may include subnational monitoring as an indication of monitoring or having missed evidence in the prior round of research. On the other hand, some removals reflect stricter verification, portal failure (as in the case of Kosovo), stale evidence, or uncertain continuity.

Countries that have begun monitoring since 2024 are Benin, Bhutan, Cameroon, Côte d'Ivoire, Dominican Republic, Gambia, Iraq, Libya, Sierra Leone, Eswatini, and Togo. Ukraine's system was offline in 2024 and is back online. Albania has been monitoring since as early as 2010, but we missed this because they did not start reporting data in real-time to the European Environment Agency (EEA) until 2026.[7]

Countries that were monitoring in 2024 but for which we could find no evidence of monitoring in 2026 are Algeria, Belize, Guinea-Bissau, Kosovo, Mozambique, and Venezuela.[8]

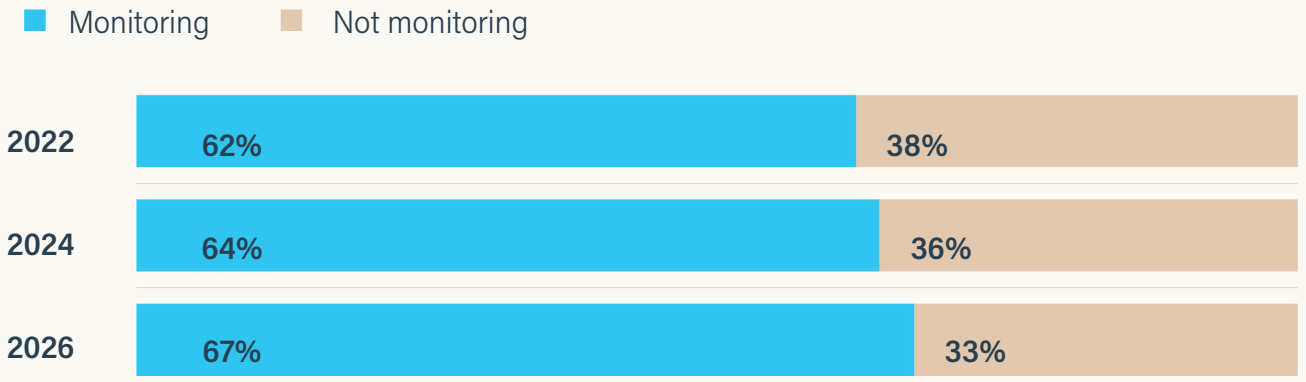


Figure 3. A net increase in the number of countries monitoring air quality is seen from 2022 to 2026. The increase in monitoring countries over time is statistically significant ($p = 0.0226$, $\alpha = 0.05$). Percentages are based on all countries in the dataset (N = 198).

[6] Although OpenAQ has conducted this survey since 2020, changes to the methodology and the number of countries included since the 2024 report limit comparability across years. Therefore, trend analyses in this report include only historical data from the 2022 and 2024 reports.

[7] *See Limitations and Errata* for further details on Albania's air quality monitoring and reporting.

[8] St. Vincent and the Grenadines was incorrectly categorized as monitoring in 2024. See Limitations and Errata for further details on the misclassification.

Regional Insights

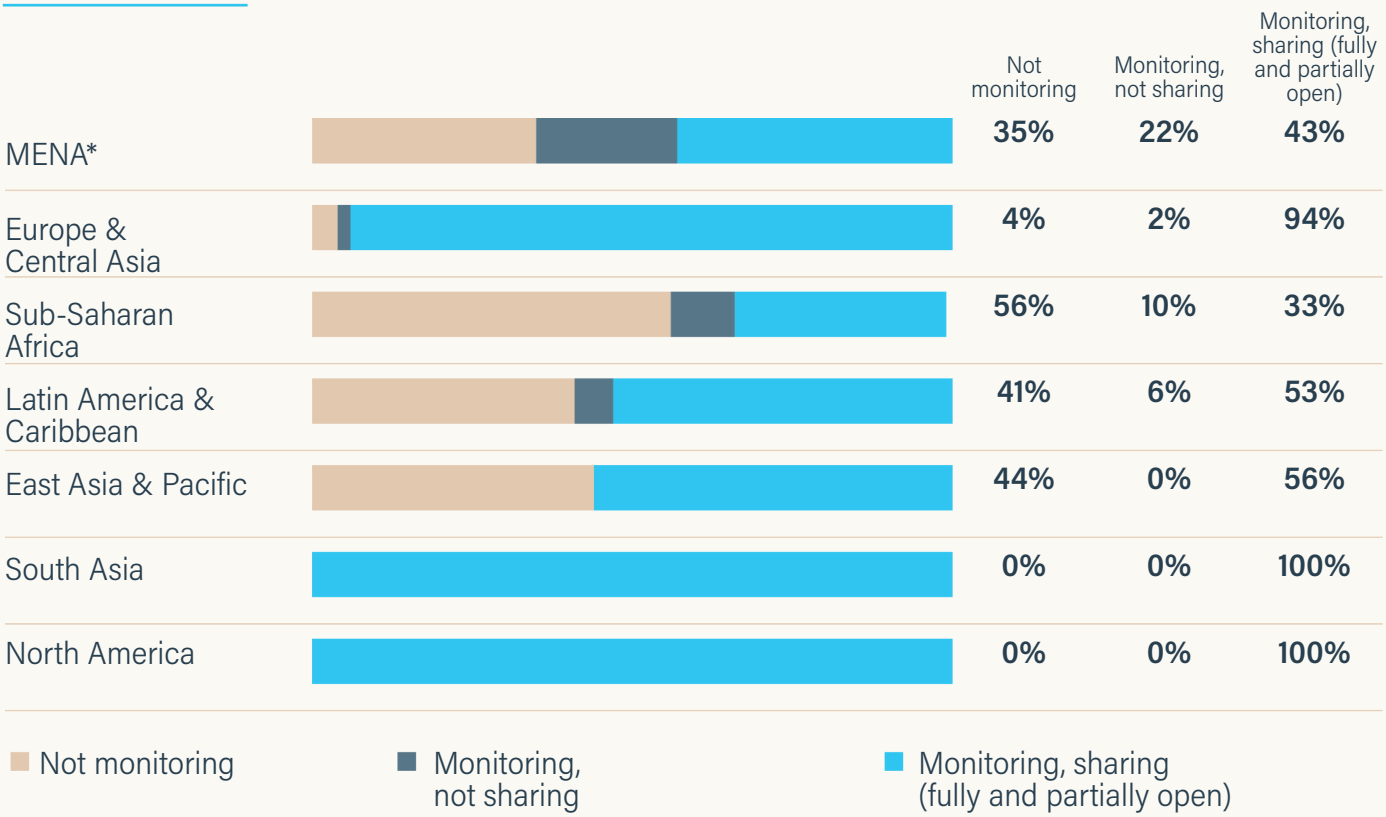


Figure 4. Fraction of countries and dependencies or disputed territories with more than one million people that generate and share air quality data for each World Bank region. (MENA = Middle East and North Africa, Afghanistan and Pakistan.)

Air quality monitoring trends can vary from one region to another. For example, through the European Environment Agency (EEA), Europe leverages a common reporting framework that extends beyond EU member states to include officially cooperating countries and voluntary participants such as Andorra. Sub-Saharan Africa experiences the largest deficit and yet the fastest experimentation—through improvements in air sensor and Internet-of-Things (IoT) technologies, exploration of cross-sector partnerships, and growing international financial support. Among larger East Asia & Pacific monitoring networks, the problem is more often data openness rather than the existence of monitoring itself.

Key Insight #2: Over half of the world's countries publicly share air quality data. A few more generate data, but do not share.

We found evidence that 61% [N=120] of countries [N=198] share air quality data publicly; of these, 53% [N=105] are national governments. On the other hand, only 7% [N=13] of countries generate data but do not share; of these, two of those are subnational-level monitoring (Benin and Cameroon). There is a net gain in the number of countries that started or restarted sharing their data, and is a significant global upward trend ($p = 0.00578$, $\alpha = 0.05$), since 13 new countries (Albania, Barbados, Bhutan, Côte d'Ivoire, Dominican Republic, Ecuador, Ethiopia, Gambia, Myanmar, Paraguay, Qatar, Saudi Arabia, Eswatini and Ukraine) started sharing, while only two countries (Azerbaijan, Kosovo) stopped.[9]

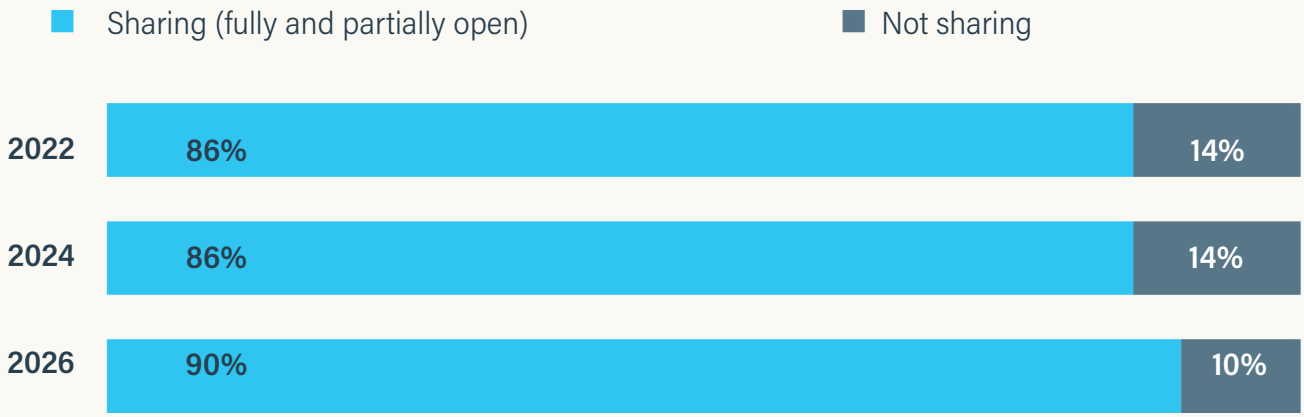


Figure 5. A net gain in the number of countries sharing their data is observed and represents a statistically significant global upward trend ($p = 0.00578$, $\alpha = 0.05$). Percentages are out of the total number of countries sharing air quality data per year.

[9] In 2024, Egypt was incorrectly categorized as sharing air quality data. See Limitations and Errata for further details on the misclassification.

Brazil is transitioning from fragmented state-level air quality data toward a unified national system, although integration remains incomplete.

Brazil's recent development of a National AQ Management System, MonitorAr, is a significant milestone. Previously, air quality networks were operated and shared only at the state level. Now, in addition to the existing federal annual report, two new data products are available: (1) MonitorAr, which integrates all state-operated stations' reported data and shares them in real-time as AQIs in a national dashboard, and (2) the first public repository of physical measurements from 2025 and earlier, together with extensive station metadata compiled by the technical lead of the state annual report. These products remain largely standalone and would benefit from greater integration, allowing data from different sources to be seamlessly connected and interact with one another. Nevertheless, they represent significant progress in making Brazil's air quality data available at the national level.

Key Insight #3: Only 65 countries share maximally open air quality data.

Data may be open to the public, but trapped in images, scanned PDFs, short rolling windows, interactive dashboards without downloads, or products that lack physical concentrations and station context and thus not be maximally open, transparent and useful. Honing in on countries that share air quality data [N=120] (Table 1), we found that 54% [N=65] of them are sharing data in a manner that meets all Key Criteria for Fully Open Data. Out of the total number of countries surveyed [N=198], this is only 33% (Figure 6), which means that about a third of the world's countries provide open access to maximally useful air quality data. Still, this is an upward trend from that observed in 2022 and 2024 (Figure 8).



Figure 6. Percentage of countries and dependencies or disputed territories with more than one million people and the fraction that generate air quality data and share their data publicly, with the "sharing" piece broken down into "fully open" (33%) and "partially open" (28%). (N=198) Percentages are rounded to the nearest whole number and may not sum to 100% due to rounding.

Table 1. Of countries that share air quality data, the number and percentage that meet the Key Criteria for Fully Open Data. The full list of countries and tags indicating whether the criteria are met can be found at https://link.openaq.org/2026-ReportWorksheet. All percentages are expressed out of "Countries that share data" column, and these categories are not mutually exclusive, so country counts for A, B, C and D total over 100%. In 2022 and 2024, C1 and C2 were not disambiguated, so these numbers are taken as the same. The number of countries in 2026 includes both national-level and subnational-level, where subnational-level are only counted when national-level monitoring was not found.

Year	Countries that share data	A: Physical Units	B: Station-Specific Coordinates	C1: Fine Scale	C2: Timely Reporting	D: Programmatic Acces	All criteria met
2022 (absolute)	105	88	70	92	92	47	45
2022 (%)	-	84%	67%	88%	88%	45%	43%
2024 (absolute)	109	92	91	104	104	55	54
2024 (%)	-	84%	83%	95%	95%	50%	50%
2026 (absolute)	120	108	76	115	107	75	65
2026 (%)	-	90%	63%	96%	89%	63%	54%

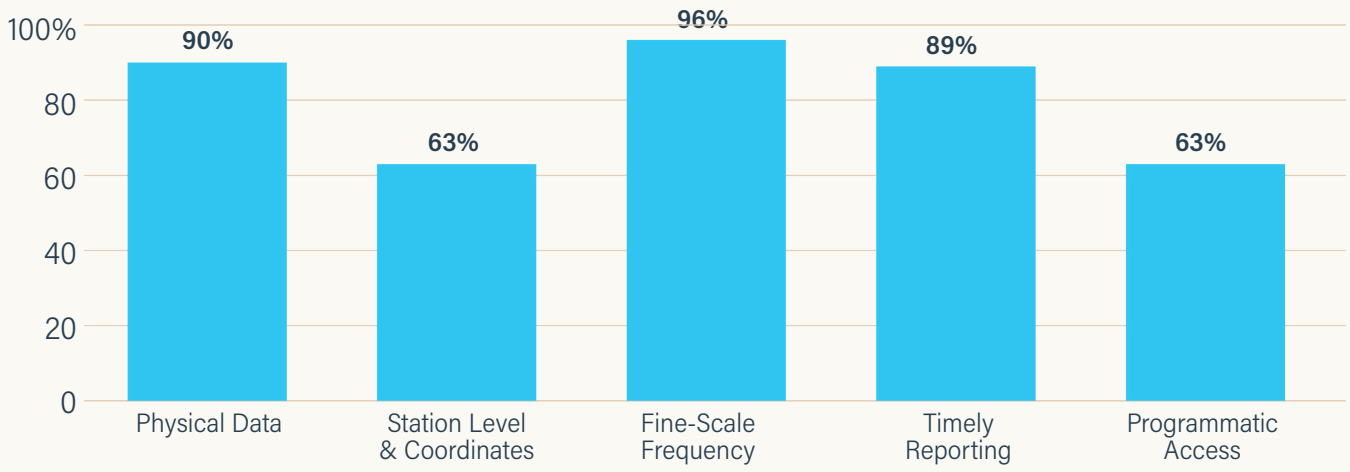


Figure 7 Percentage of countries (out of N=120 countries that share data) that fulfill the respective Key Criteria for Fully Open Data.

DATA OPENNESS / CONTINUED

As Table 1 and Figure 7 depict, almost all countries that monitor and share data fulfill at least one Key Criterion for Fully Open Data, with "fine scale" being the most fulfilled, and "programmatic access" and "station level and coordinates" being the least fulfilled. In fact, most countries fulfill more than one criterion. For example, some countries provide a dashboard reporting live data, but only with air quality indices, or they report data for a large region as an aggregate without specifying the exact location/s of the monitoring station/s. The Philippines and Indonesia both use dashboards, but their interfaces communicate information differently, with varying degrees of practicality and user-friendliness of use. Maldives demonstrates that a government does not need to build an in-house application to achieve accessibility: a cleanly integrated external platform can be easier to understand than a fragmented domestic system.

Of those that share data, Bolivia (El Alto) and Moldova do so without fulfilling any of the Criteria—Moldova shows qualitative, color-coded check marks on top of a visual map for two locations (Bălți and Chișinău) on their website, with no timestamps; and El Alto uploads graphs of monthly AQIs as an image file on their website. (In 2024, Moldova had links on the government website to download the data via a shared public Google Drive.) Myanmar (Yangon) meets only the "timely reporting" criterion. Air quality information is published on Facebook as images of tables containing qualitative assessments at multiple monitoring sites, typically at the beginning of the month following data collection, with none of the other criteria being met. For these locations, while the data are shared for public awareness, the data are not fully open and cannot be maximally used.

Notably, during our research, it appears that search engines may place IQAir, AQICN, Weather Underground, and other third-party pages above the official portal, so formal publication does not guarantee discoverability.

Social media as a public communication platform.

While social media does not allow for the fulfillment of the "Programmatic Access" criterion, many countries use it as a way to disseminate air quality information on a regular or ad-hoc basis; either solely or as another channel in addition to their official government website. For example, Brunei Darussalam, Cambodia, Laos, Myanmar (Yangon), and Pakistan all use Facebook (Cambodia, Laos, Yangon, Pakistan) or Instagram (Brunei) to post alerts. Some of them share concentration data, while others share AQIs, and frequently use tables in static images. Some share daily, while others share monthly.

Air sensors create a spectrum of public communication.

Madagascar embeds a PurpleAir map and supplements it with television announcements and sporadic reporting. Maldives integrates external IQAir maps and current pollutant readings into the Ministry of Climate Change, Environment, and Energy's official public-facing website. Kampala City (Uganda) and Nairobi City County (Kenya) both rely on AirQo to facilitate programmatic access, data downloads, and visual dashboards. The hardware category for all are similar, but government stewardship and communication are very different across these countries.

Over the Years

Since 2022, we see an increase in countries that fulfill all Key Criteria for Fully Open Data from 23% [N=45] in 2022 to 33% [N=65] (Figure 8). Out of the total number of countries surveyed [N=198], this is an overall increase of 10% (+ 20 countries) since 2022, which is statistically significant *($p < 0.0001$, $\alpha = 0.05$)*; i.e., the proportion of fully open countries grew systematically over time regardless of the churn underneath the global net total. This year, Albania, Argentina (Buenos Aires), Brazil, Georgia, Gambia, Guatemala, Israel, Kazakhstan (Almaty), Liechtenstein, Montenegro, Nigeria (Lagos State), and Paraguay all fulfilled the Key Criteria for Fully Open Data, whereas they did not in 2024. Nepal and India also fulfilled all criteria, albeit through various data products instead of one aggregated, coherent data product (see callout box on "Scattered Open Data Products").

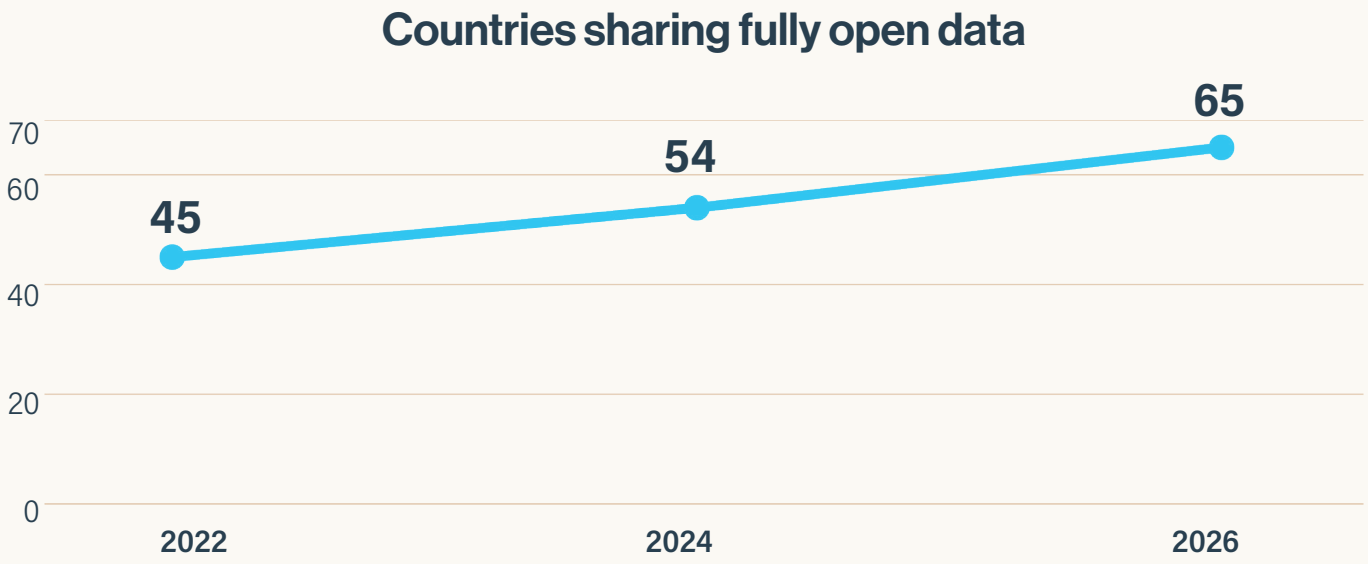


Figure 8. The number of countries providing maximally useful (fully open) data is trending up from 2022 to 2026 ($p < 0.0001$, $\alpha = 0.05$).

Limitations of Sharing Data in Non-Fully Open Ways

Despite some forward movement, the fact remains that only a third of the world's countries share air quality data in a fully open manner. Each instance of not meeting a key criterion reduces the practical value of the data as described below.

Limitations of Sharing Data Only as an Air Quality Index (AQI)

Countries that share data but do not report in physical units (raw concentrations) typically share the data in the form of an air quality index. AQIs are excellent communication tools—they summarize air quality in a simple way for easy public consumption. But they should supplement, not replace, the sharing of data in physical units. Actual physical measurements for each pollutant are required to analyze the complexity and nuances of air pollution and to develop corrective actions. Furthermore, AQIs are not calculated in a standardized way and vary significantly across the world. For more information, visit OpenAQ's Air Quality Index Hub, which decodes the methodologies different countries use to develop their AQI.

Limitations of Not Sharing Exact Locations of Monitoring Stations

Countries that share but do not report station-specific coordinates often share the data in the form of regional aggregates or averages. Some share data per station, but provide no information on the station location (e.g., exact geolocation, accurate representation on a map). Location-specific information on physical air quality parameters is crucial to understand the spatial variability as well as pollution sources and to use this information to design and enforce appropriate regulations.

Limitations of Not Reporting Data at a Fine-Scale Frequency

Countries that share but do not report data at a daily or sub-daily (e.g., hourly, 10-minute, or 15-minute interval) and are reporting at a greater time interval could either be reporting averages over a longer period of time, or reporting cumulative concentration over a period of time. Some information could be lost when data are averaged. While averages could be useful for some types of assessments, the user should be able to access more fine-grained data and calculate averages themselves.

Limitations of Delaying Release of the Data

Countries that share but do not report in a timely way may not gather data in real-time,[10] may undertake certain processes that slow the release of the data, or may simply choose to report less often. Although historical data are useful, real-time data is needed for such applications as air quality forecasting.

[10] Some countries may use offline methods, such as 24-hour filter-based gravimetric methods for particulate matter or cartridge-based sampling for gases, which require laboratory analysis post-collection and thus are not reported in "real-time."

LIMITATIONS / CONTINUED

Limitations of Not Sharing Data Programmatically

Countries that share data but do not share them programmatically either share the data in a static, non-machine-readable format or otherwise make it difficult for anyone intending to use computer software to access and use the data. Although sharing data as a PDF or graphic is better than not sharing, many more use cases—and ultimately, impact—can be derived from the data that are provided in a programmatically accessible, analysis-ready and standardized format.

Key Insight #4: Investing in air quality monitoring programs in 65 countries could support the health of nearly one billion people. Furthermore, greater data transparency would benefit billions of people.

The burden of air pollution is high and growing in many regions around the world; populations from low- and middle-income countries face the largest burden, where 90% of air pollution deaths due to higher levels of ambient $PM_{2.5}$ are found (Health Effects Institute, 2025). Furthermore, in low- and middle-income countries, mortality and morbidity caused by exposure to $PM_{2.5}$ air pollution costs 5.9 to 9% of the country's GDP (World Bank, 2022).

The populations of the 65 countries add up to nearly one billion people, 7 out of 10 of whom live in low-income or lower-middle-income countries, as classified by the World Bank.

Table 2 shows the most populous (20 million and above) of 65 countries where there appears to be no evidence of a public national or subnational-level government program for long-term ground-level ambient air quality monitoring. These are also countries where particulate matter (PM) pollution ranks as one of the top eight risk factors for death and disability.

Countries of high air pollution risk

Table 2. Populous high-risk countries without evidence of a public national or subnational-level government air quality monitoring program, sorted by the ranking of air pollution as an in-country risk factor for death and disability (Column 3).

Country	Population (a)	Ranking of 'air pollution' as an in-country risk factor for death and disability (2023) (b)	Number of deaths attributable to ambient particulate matter pollution (2023) (c)	Life-years lost due to air pollution (2023) (d)
North Korea	26,571,036	1	6,870	1.5
Afghanistan	43,844,111	2	3,200	1.6
Burkina Faso	24,074,580	2	2,920	0.3
Congo, Dem. Rep.	112,832,473	2	11,400	2.7
Mali	25,198,821	2	4,110	0.1
Tanzania	70,545,865	2	4,750	1.2
Yemen	41,773,878	2	6,920	1.1
Angola	39,040,039	3	6,730	1.8
Chad	21,003,705	3	3,990	0.7
Malawi	22,216,120	3	964	1.3
Mozambique	35,631,653	3	1,240	0.8
Niger	27,917,831	3	5,720	0.4
Sudan	51,662,147	3	18,600	0.4
Zambia	21,913,874	3	2,000	2
Iran	92,417,681	4	51,900	1.5
Syria	25,620,427	6	14,200	1.3
Algeria	47,435,31	8	19,800	0
Venezuela	28,516,896	8	17,600	0.9

While many populous countries have partially shared their air quality data, an increase in transparency could benefit over 3.3 billion people by fully supporting scientific inquiry, public awareness, solutions development, forecasting, and more—resulting in even greater progress toward a clean air future.

Countries with populations over 50 million in which real-time air quality data are produced in some format, but not in a fully open manner on a national level by the national government, are shown in Table 3.

a. World Bank figures as of 2026

b. Includes ambient ($PM_{2.5}$, O_3 & NO_2) & household air pollution. Ranking according to Global Burden of Disease 2023.

c. Health Effects Institute, *State of Global Air*. 2025.

d. According to the 2025 Air Quality Life Index. Calculated with respect to ambient $PM_{2.5}$ exposure.

Table 3. Most populous countries (above 50 million) and the Key Criteria for Fully Open Data they have yet to meet. World Bank population figures are as of 2025.

Country Name	Population	Highest Level of Monitoring	Subnational Unit	Physical Units	Station-Level Coordinates	Fine-Scale	Timely	Programmatic Access
China	1,406,585,000	national			No			No
Indonesia	285,721,236	national		No	No			No
Indonesia	285,721,236	national			No			No
Pakistan	255,219,554	subnational	Islamabad City		No			No
Pakistan	255,219,554	subnational	Punjab Province		No			No
Bangladesh	175,686,899	national						No
Bangladesh	175,686,899	subnational	Dhaka City North	No	No			No
Russian Federation	143,513,328	subnational	Samara Region		No			No
Russian Federation	143,513,328	subnational	Upper Volga		No			No
Russian Federation	143,513,328	subnational	Northwest Region		No			No
Russian Federation	143,513,328	subnational	Krasnoyarsk Territory, Khakassia, Tyva	No	No			No
Ethiopia	135,472,051	subnational	Addis Ababa City		No			No
Philippines	116,786,962	national			No			No
Vietnam	101,598,527	national						No
Türkiye	85,878,556	national						No
Myanmar	54,850,648	subnational	Yangon Region	No	No	No	No	No
Colombia	53,425,635	national					No	
Ukraine	38,980,376	national					No	No

Air Quality Data Sharing Practices in Various Countries

Nepal, India, and Bangladesh

Nepal, India, and Bangladesh share data using a variety of open data products, which require collation to fulfill the Key Criteria for Fully Open Data. For India, Nepal and Bangladesh, transparency criteria were evaluated across multiple data products: a "pollution portal" displaying real-time, hourly physical measurements with station information, and a separate dashboard offering a .CSV file download for the most recent week of data, but without station coordinates; or a portal that displays station-level AQI in one product and city-level physical concentrations in monthly reports. A country can thus satisfy the Key Criteria in aggregate, while no single product offers a coherent route to the underlying data.

While the sources could potentially be linked by station code and reconciled to a degree, there could be a mismatch in one station appearing in the portal but not the download dashboard; different aggregation levels are created, which can obstruct use for scientific or policymaking purposes. In this case, openness does not automatically ensure accessibility or data traceability. To maintain traceability and accuracy, data should be consolidated onto a single platform—aligning with FAIR (Findable, Accessible, Interoperable, Reusable) data principles (Wilkinson, 2016).

Paraguay

Paraguay modernized its air quality data management system (DMS), making data available real-time. From a closed-off system pre-2024, the Ministry of the Environment and Sustainable Development (MADES) has expanded their network with Kunak air sensors in 2025 and updated their DMS to transmit the data they generate to a real-time portal accessible via an API. The portal allows visualization, public health communication, physical data reporting, and data downloads coupled with API access and clearly communicated data terms

Tajikistan

Tajikistan moved from ambiguous high-level reporting to a live national portal meeting most transparency criteria, though programmatic access remains the main missing element. In 2026, the Hydrometeorology Agency Committee for Environmental Protection of the Republic of Tajikistan released a first-ever live web app/ dashboard for air quality monitoring for the entire country. This presents a significant improvement from posting daily ambiguous data aggregated at the pollutant-level to openly sharing the data in an information-rich platform. The only missing piece to full transparency is making the data programmatically accessible (data downloads are currently available only by request).

OPEN AIR QUALITY DATA / 2026

Further Insights & Conclusions

Beyond the key insights, a more nuanced story can be told. In this section, we further describe the gap between durable, representative monitoring networks with publicly accessible data and monitoring networks that are geographically narrow, institutionally fragile, closed, and/or provide limited public access.

Monitoring Infrastructure Gaps

Zero monitoring

The absence of air quality monitoring is concentrated among low-income countries, small states, and conflict-affected countries. The most significant barrier that low-income countries (including many small states) face is resource constraints, such as a lack of financial resources for purchase, deployment and maintenance of monitors, difficulty of overseas procurement and/or technical expertise.

In addition, some countries may perceive air pollution as a non-issue. Where satellite predictions indicate typically low levels of air pollution, it is reasonable for a country to prioritize other health and environmental needs. However, even where air pollution is not perceived to be a concern, a country could and should install a few air sensors at low cost that would, at the very least, indicate whether a regulatory monitoring system is needed.

Underrepresentative air quality monitoring

In a number of cases where we found evidence of government monitoring, the monitoring was limited in geographic scope—not representative of all areas within a country that suffer from air pollution. For example, Pakistan monitors air quality only in Islamabad City and Punjab Province. Kyrgyzstan is expanding monitoring, but Bishkek remains the most extensively monitored city. Much of Kenya's monitoring is concentrated in Nairobi County. Somalia has a very small identifiable footprint; Eswatini has one publicly identifiable sensor; Madagascar is concentrated in Antananarivo; and Paraguay's national system is currently limited to two cities. In Colombia, while there is a national-level aggregation by the Ministry of Environment and Sustainable Development of Colombia (IDEAM), data are most prolific in Bogotá and Medellín, which monitor independently.

MONITORING INFRASTRUCTURE GAPS / CONTINUED

Even relatively advanced monitoring systems can leave important gaps in public data availability. In Puerto Rico, a US territory, government monitors transmit data through AirNow rather than through a dedicated local portal. Although Puerto Rico's 2026 air monitoring network plan identifies at least nine active stations, only four have appeared on AirNow at the time assessment was conducted, and most of those have not reported data for an extended period. In fact, in 2026, only one station in all of Puerto Rico appeared to transmit data, and even then only sporadically. This is despite detailed network documentation and reported ongoing efforts to expand, replace, and upgrade monitoring equipment. Thus, with only one station currently reporting data on AirNow, Puerto Rico appears as a striking "desert" on the US's monitoring station map and also illustrates an unusual but important challenge: a monitoring network can be well documented and actively maintained while still facing substantial gaps in connectivity and public data reporting.

With limited resources, monitoring in the most populated cities makes sense, but as governments are able, they should expand their monitoring network so that it is equitably distributed and captures major emissions sources.

> "Evidence gaps hinder effective regional planning, leaving pastoral needs out of the national air quality agenda. Moreover, when major emission sources located outside of populated areas (such as refineries, unregulated mining, quarries) are not monitored, a lack of evidence can impede regulation."
>
> - Semeyan Hillary Lenantoiye with Inclusive Culture Action Network (ICAN) in Kenya

The Need for Stable, Long-Term Investment

Many countries have benefited from external support. For example, in 2026, Cameroon installed its first air quality monitoring stations with philanthropic support, and Benin received support from a development agency to maintain and install new instruments. In 2025, international funding supported the development of Gambia's new nationwide network. But history has shown that when funding ends, regression can occur.

- Some years ago, Algeria's national network (SAMASAFIA) fell into disuse and was not revived when an international cooperation to support the network failed to materialize.
- Bolivia's Red MoniCA resulted from approximately 15 years of Swiss-supported work and developed a broad multi-municipality system. National and municipal reporting continued for years, with annual reporting visible through 2022 and some local publication later. However, evidence we gathered in 2026 suggests gradual attrition: portals stop updating, municipalities disappear from current reporting, Potosi data end in late 2025, and only El Alto still shows weak, sporadic evidence in 2026. The gradual decline in reporting and portal availability fell away municipality by municipality rather than the entire system disappearing overnight. Bolivia demonstrates how a substantial system can erode after a long period of operation when financing, maintenance, logistics, data hosting, and local responsibilities falter. Monitoring regression can be incremental and easy to miss if assessments record only whether at least one station still reports.

Because philanthropic support or developmental aid cannot be expected to exist forever, governments need to build the costs of monitoring into their budgets, and the international community can invest in shared or replicable open-source infrastructure that lowers the monetary and technical cost of running such in-country monitoring programs.

Pilots

Pilot projects can pave the way for future continuous air quality monitoring. For example, Guinea is not currently monitoring but is conducting a pilot project through its research center, Cité des Sciences et de l'Innovation de Guinée (CSIG). In 2025, they installed the first air quality monitoring sensors in the country. This will hopefully turn into a full-fledged government network that is sustained over time.

Data Disclosure Gaps

No data sharing

Thirteen countries monitor, but either keep the data entirely private, publish only summaries, or provide the information only if asked. These include Azerbaijan, Bahrain, Benin, Cameroon, Costa Rica, Egypt, Iraq, Jamaica, Libya, Morocco, Sierra Leone, Somalia, and Togo. It is important to respect data sovereignty, but outreach by trusted parties such as peer countries could convince these governments to, at the very least, publish AQI values.

Just as countries face resource constraints in monitoring, data sharing requires financial resources for costs associated with hosting,

DATA DISCLOSURE GAPS / CONTINUED

building and maintaining the platform and ensuring data quality, on top of capacity building for civil servants.

In good news, two countries—Cameroon and Togo—plan to publish their data shortly, but missed the cutoff for this report (L. Djeri-Wake, personal communication, July 2026; H. Ashangwa, personal communication, June 2026).

Limited data sharing

Air quality data may be available, but may be limited and only partially transparent (i.e., not fulfill the Key Criteria for Fully Open Data). For example, some countries may be sharing data in physical units, including exact geographic coordinates, and in a fine-scale, timely fashion—fulfilling all but one criterion, which is sharing their data in a format that allows for programmatic access and machine readability (e.g., State of Tasmania, Australia; State of São Paulo, Brazil; Kuwait, Mexico). On the other hand, most countries share data near-real time (in a timely manner and at a fine-scale frequency), and, in some cases, this is the only open data criterion that is fulfilled (e.g., El Salvador, Senegal, Barbados, Indonesia). Many countries prefer to share air quality indices, qualitative descriptors (e.g., "good", "average", "hazardous") or symbologies (e.g., green check or red X mark) instead of air quality concentrations for public communications (e.g., Myanmar, Mauritius, Malaysia, Moldova).

Sharing data generated by air sensors

While public data-sharing is possible within a number of air sensor platforms, the decision remains within the government's hands—they decide whether to use that capability. For example, Dhaka City North (Bangladesh) and Chicago (USA) both use Clarity technology, which allows fully open data sharing, but only Chicago shares the data publicly.

Funders can demand data transparency through grant and procurement requirements, as seen in EPIC-supported government grantees and UNICEF-supported work in Laos.

Moreover, air sensor vendor choice matters because it establishes default data rights, hosting options, API access, embedding, paywalls, and portability. For example:

- Madagascar uses PurpleAir, which is a highly visible data platform, but does not give customers ownership and rights over the data.
- Uganda's National Environment Management Authority (NEMA) uses AQI.IN, whose air quality reading widgets can be embedded into external websites, but the service itself limits programmatic access and machine readability and uses a paywall.
- Maldives embeds IQAir widgets on their official environment website cleanly, so an external user can view the current AQI and pollutant measurements with a map overlay, but have no direct way to access the data programmatically.
- Kazakhstan's Eco Almaty Clarity system is open via Clarity, which allows for fully open data sharing via an opt-in model.
- Kampala Capital City Authority uses AirQo, which allows for fully open data sharing via an opt-in model.

SHARING DATA GENERATED BY AIR SENSORS / CONTINUED

See Before You Buy: A Guide to Choosing Air Sensors that Allow Fully Open Data, an OpenAQ publication, for more information about important considerations when choosing an air sensor partner.

Income Patterns

Table 4. Distribution and characteristics of air quality monitoring and data availability across countries categorized by World Bank-defined income groups. Expressed percentages are out of the total number of countries in that income group.

World Bank-defined income group	Number of countries	National	Subnational	Fully transparent	Comprehensive metadata	Programmatic among active
Low income	25	6 (24%)	1 (4%)	1 (4%)	1 (4%	2 (8%)
Lower middle income	47	14 (30%)	12 (26%)	2 (4%)	0 (0%)	5 (11%)
Upper middle income	59	36 (61%)	3 (5%)	13 (22%)	9 (15%)	19 (32%)
High income	67	59 (88%)	2 (3%)	43 (64%)	37 (55%)	48 (72%)

Table 4 depicts a steep income gradient where countries grouped as higher income have the highest number of active monitoring networks and the highest transparency level. Additionally, provisions of comprehensive metadata (i.e., ownership and licensing information; technical descriptions for the monitoring system/s) are found in higher-level economies. However, despite being resource-constrained, the low-income group shows a selective leapfrogging effect where two out of seven active low-income economies have programmatic access, compared with six of 24 active lower-middle-income economies. These low-income cases are few at this time and often use modern external platforms and/or international partnerships, including The Gambia, Sierra Leone, Ethiopia, Somalia, and Uganda.

The Importance of Partnerships

Internal partnerships

Partnerships internal to a country, such as NGOs and academic institutions partnering with governments to install monitoring networks, can help overcome resource constraints.

INTERNAL PARTNERSHIPS / CONTINUED

In The Gambia, the local non-profit Permian Health Lung Institute is a technical partner for the National Environmental Agency's Clean Air Initiative, which enabled them to have a nationwide network of air quality sensors. Similarly, Pakistan's Urban Unit, a private, government-owned company, created a 160-node air quality sensor network across 14 large cities in Pakistan. Argentina's Breathe2Change initiative maintains a close collaboration with the Secretariat of Environment of Tucumán and is arming local decision-makers, media, and civic society with their collected air quality data. In Denmark, the Danish Centre for Environment and Energy at Aarhus University manages the air quality data for the Danish Ministry of the Environment. In Australia, the Australia Research Data Commons (ARDC) consolidates air pollution data from all states into a National Air Pollution Monitor Database (NAPMD); however, data from this portal is only available only upon request due to their formal data-sharing agreements with state agencies. Liberia, although not classified as having a verified active government network, benefits from the work of Clean Air Liberia, an initiative by the Kigali Collaborative Research Center (Rwanda) and United Methodist University (Liberia) that operates an active $PM_{2.5}$ air quality monitoring network in Greater Monrovia.

Regional partnerships and shared infrastructure

Several regional systems exist to support air quality monitoring. For example, ICIMOD's Atmospheric Watch Initiative (AWI) runs monitoring stations across Nepal, Bhutan, Bangladesh, Pakistan, and Afghanistan (with a real-time dashboard, "Air Quality Watch"), and supported the SERVIR-HKH programme (with NASA/USAID) that combines satellite data and geospatial technology to co-develop solutions for air quality alongside other resilience challenges. Although the latter has concluded, the services, tools, and resources developed under the initiative remain active.

The European Environment Agency (EEA) air pollution division serves all European nations; it supplies long-term data hosting, publishes fully open air quality data with helpful metadata, and provides bulk access that national portals sometimes do not provide. That said, not all European countries report in a systematic way to the EEA Air Quality Portal. Greece, Hungary, and Italy share a subset of their networks. Croatia transmits national but not all local networks, although its domestic one-stop portal is broader. In the UK, data are reported to the Department for Environment, Food and Rural Affairs (DEFRA), which in turn reports to EEA, but Scotland and Northern Ireland have stations absent from DEFRA. Kosovo has historical data on the EEA portal, but no current live transmission because its national data portal is under construction. These inconsistencies can pose problems if someone using DEFRA or EEA Air Quality is unaware of them.

REGIONAL PARTNERSHIPS AND SHARED INFRASTRUCTURE / CONTINUED

There are many benefits to being part of a regional system, as illustrated by the EEA and Canada-United States Air Quality Agreement (AQA)[11], namely increased resilience. These systems can serve as a backup repository of air quality data when a government's portal is not functioning, serve as the site for data downloads, and provide access to historical data when a government does not have the capacity to host them (or would rather not).

A regional system would especially benefit Caribbean and Pacific island small states. Only three of the 12 Caribbean small states monitor air quality, and none of the 11 Pacific island small states do. Even for small states with no significant local sources of air pollution, health could be compromised by transboundary air pollution, volcanic ash, fires, or other sources (e.g., local solid fuel use, waste burning, transportation). Support from a regional body, such as the United Nations Environment Programme (UNEP) Intergovernmental Air Pollution Network for Latin America and the Caribbean or the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) could ensure minimal air quality monitoring coverage, especially if the country chooses air sensors managed by companies that facilitate open data sharing.

Global data aggregators

Beyond regional systems, global data aggregators, *i.e.,* OpenAQ, can serve the same or similar functions as regional platforms—such as hosting data, backing up data, providing access to historical data, and supporting data downloads.

[11] Read more about regional air quality agreements on our blog article, "Air Knows No Borders: The State of Transnational Air Quality Agreements". https://openaq.medium.com/air-knows-no-borders-the-state-of-transnational-air-quality-standards-b0ba7f0d8665

Institutional, Platform, and Data Governance Patterns

Government ownership shapes the impact of external support

Externally supported monitoring efforts have the greatest impact when the government receiving support takes strong leadership–integrating monitoring, use of the data, and public communications into centralized government systems.

Laos

Laos illustrates the challenges that can arise when monitoring responsibilities are dispersed across institutions and externally supported initiatives are not clearly integrated into a centralized system. The national network was historically managed by the Ministry of Natural Resources and Environment (MoNRE), now part of the Ministry of Agriculture and Environment (MAE) following government restructuring, but its former real-time air quality portal is no longer operational. We could not find whether or where it is being maintained. Public communication appears to have shifted partly to the Ministry of Health, which periodically shares air quality updates on Facebook using station-level information produced by the MAE. At the same time, several parallel initiatives are underway, including a satellite-based forecasting project with the Asian Disaster Preparedness Center and a large UNICEF-supported low-cost sensor network whose data are publicly available, including through OpenAQ. These efforts demonstrate continued activity and experimentation, but the respective roles of government agencies and external partners are not always clear, and the various monitoring and communication products do not appear to form a single coordinated system where information can be acquired with ease.

Malawi

Malawi's government does not currently monitor, but there are signs of increasing government engagement. Malawi's meteorological department uses data from an externally funded local monitoring network for forecasting, while locally led advocacy and monitoring efforts have contributed to clean-air regulation and received government recognition, including publication of monitoring data through a government website.

The Gambia

Gambia's National Environment Agency participates in the deployment of monitoring supported by international funders and a local nonprofit partner. It has also used this momentum to strengthen broader environmental governance.

GOVERNMENT OWNERSHIP / CONTINUED



HO CHI MINH CITY, VIETNAM
0.8231° N / 106.6297° E

Viet Nam

Viet Nam provides a strong example of government-led integration. Alongside a broader push for digitalization, environmental transparency, and greater attention to air pollution, international support from partners including USAID, Winrock International, and IDH has helped strengthen environmental data systems and government capacity. Viet Nam now operates a public-facing air quality monitoring aggregator platform that brings together air quality measurements from national and provincial monitoring stations, making monitoring data more accessible and centralized.

What matters is the degree to which externally supported monitoring becomes embedded in government practice, i.e., whether government agencies coordinate monitoring activities, use and communicate the data, participate in operating the network, allocate appropriate budgets, and sustain those functions over time.

Decentralization can be harmonized, fragmented or legally blocked

Successful decentralized systems combine local operation with common standards, stable identifiers, required upstream reporting, and a national or regional archive. The United States and Taiwan are strong examples of decentralization, where subnational units conduct the monitoring and report centrally. Canada, Germany, New Zealand, Finland, France, Spain, and the United Kingdom also show different forms of coordinated decentralization. Italy is moving toward fuller reconciliation.

The value of reliable, real-time data

A study in 2026 found that after the shutdown of air quality monitoring at United States embassies worldwide, local air pollution levels increased 24–33%, with the largest effects in areas where there are poor substitutes for embassy data (Zhou, 2026). This study demonstrates that information-based governance relying on high-quality government sources can erode and lead to a reversal of air quality gains when there is no reliable, real-time air pollution data.

DECENTRALIZATION / CONTINUED

Some systems are fragmented across ministries, agencies, or regional branches. Indonesia, Ukraine, and Greece have independently operated networks with separate reporting mechanisms. Russia relies heavily on regional centers and city reporting, often using percentages or ranges relative to national maximum permissible concentrations rather than consistently exposing physical values in a harmonized national service.

Australia is a distinct case: state systems are capable and extensive, but different data-licensing policies prevent complete national reconciliation.

Brazil, Mexico, Colombia, and Viet Nam show different stages of building national aggregation above subnational operators.

Outsourcing and hybrid institutional models are common

As noted under the partnerships section above, governments frequently commission universities, nonprofits, public institutions, and private consultancies to obtain technical capacity. Denmark entrusts major monitoring functions to a university. France relies on approved regional associations. Estonia uses a state-owned research center. England uses a private consultancy for inventory and aggregation functions. Gambia's National Environment Agency partnered with Permian Health Lung Institute, an NGO, as a deployment partner. Cameroon's first reference monitor is associated with a public hospital. Benin's system is linked to a state-owned port. Kenya and Kazakhstan also work with external technical providers.

The key distinction is accountability: outsourced technical execution can be durable when public ownership, data rights, validation rules, and continuity obligations remain clear. It is more fragile when the project operator or vendor controls the only working platform and no government institution can sustain it independently.

Validation and metadata should be part of system design

Sharing data in real-time is a key component of transparency and allows for forecasting and other important uses. Governments might be reluctant to share data before validation, but solutions exist. The United States and Netherlands explicitly distinguish real-time provisional data from validated data used for regulatory and research purposes. Canada similarly separates real-time AirNow access from validated historical government records. This is preferable to withholding all immediate data while waiting years for validation, provided the status of each dataset is documented.

VALIDATION AND METADATA / CONTINUED

Metadata provide context about station types, locations and other factors that reflect data accuracy and comparability. Peru, Latvia, the United Kingdom, and the United States stand out for equipment, ownership, station, or licensing detail. Cyprus, Hong Kong, and Taiwan publish station photographs; Taiwan goes a step further by supplementing pollutant measurements with hourly webcam images, providing additional visual context for the conditions surrounding the monitoring data. Andorra highlights a special metadata problem for mobile stations: historical measurements lose meaning if the station's location at each time is not preserved

Recap & Recommendations

Governments have a responsibility to monitor air quality: Air pollution is a leading health concern across the world that disproportionately impacts low- and middle-income countries. Reliable data on air pollution are fundamental for informing actions to improve air quality and tracking progress. Government monitoring systems should cover geographies of concern and be sustained over time.

Our findings: Unfortunately, we found no recent evidence of government-operated/sponsored air quality monitoring in 65 of the 198 countries we reviewed. In other words, 33% of countries are not monitoring air pollution, one of the greatest global health risks.

MONITORING: One-third (33%) of countries are not monitoring air pollution, one of the greatest global health risks.

RECAP & RECOMMENDATIONS / CONTINUED

DATA SHARING: One-third (33%) of countries provide open access to maximally useful air quality data.

By sharing air quality data—a public good—governments can accelerate clean air progress: Sharing air quality data in a fully open manner (in real-time, in physical units, with specific coordinates, and programmatically accessible) unlocks the full potential of these data to support the data-driven applications needed to solve the air pollution crisis. Data transparency accelerates and maximizes clean air action because it allows everyone across civil society, the public sector and the private sector to apply their knowledge, skills and experience to achieve better outcomes for public health.

Our findings: We found that among countries with evidence of air quality monitoring, a majority (61%) are sharing data with the public in some format. Furthermore, almost all (98%) countries that share their air quality data fulfill at least one of the Key Criteria for Fully Open Data and 54% of countries that monitor and share meet all four criteria. Applying this to all countries surveyed, over half (61%) share air quality data publicly, and a third (33%) share the data in a way that maximizes potential uses.

Recommendations

To accelerate clean air progress, we recommend:

01 All governments should measure and track air quality.

Recognizing that resources are limited, a government just beginning to monitor could start by installing a reference-grade $PM_{2.5}$ monitor as described in Our Common Air's 2024 report, "*Accelerating Country-led Air Quality Reporting to Achieve Clean Air*" and *AQMx's Air Quality Management Guidance for Air Monitoring*. In some circumstances, air sensors may suffice.

RECOMMENDATIONS / CONTINUED

02 All governments should share the air quality data they generate in a fully open and accessible manner

Fully open means in physical units, at the station-level with station-specific coordinates, in daily or sub-daily (hourly, minutely) frequency reported in near real-time or a reasonably timely manner, and in a format that is programmatically accessible and machine-readable.

03 Funders, such as development banks and philanthropies, should support less-resourced governments.

Countries where a relatively small investment would close a serious data gap and effect positive national-level change are identified in the EPIC report, "EPIC's 2025 Clean Air Investment Update: A Tougher Landscape—and an Even Greater Opportunity."

04 Funders should include conditions for data transparency in funding agreements—and provide the resources to do that.

One example of funding with an open data sharing requirement is the EPIC Air Quality Fund.

Limitations and Errata

Limitations

We conducted the research with the utmost caution and rigor, but faced limitations.

Found evidence is just a fraction or snapshot of the existing monitoring system at the time of assessment. Websites, dashboards, and APIs can fail temporarily, change without notice, or return after the research date. A status of no current evidence is not proof that equipment is physically absent. In addition, no verified active network is not always the same as no equipment. Public evidence, especially when sought online, is uneven across languages and institutions. Official sites may be poorly indexed, inaccessible, or incomplete; social media and local-language reporting can contain evidence not visible through ordinary search. Search engines also favor third-party commercial pages, making discoverability more challenging.

Furthermore, third-party platform status is not necessarily indicative of the network status. The status of a station (e.g., data portal availability status) can reflect ingestion, identifier changes, or connectivity rather than actual physical operation. Puerto Rico, United Kingdom constituent systems, Montenegro, Serbia, and EEA participants illustrate this distinction.

Because of these limitations, activity status requires periodic review. Historically inactive, announced or installed, possibly active, no verified evidence, and even the evidence of monitoring in 2026 classifications can change as new documentation, outreach responses, or live data become available.

LIMITATIONS / CONTINUED

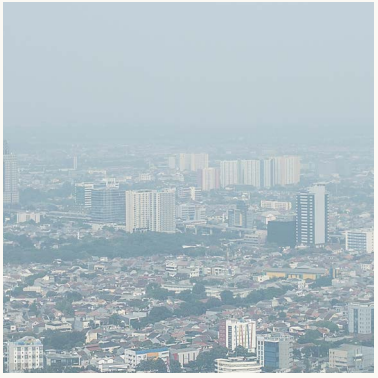
Our classification of "national" does not necessarily imply comprehensive or geographically uniform nationwide coverage. Although this classification simplifies comparison and tallying across countries, the final tally obscures important differences in network diversity, density, and geographic reach. A national network may provide broad but relatively sparse coverage across the country, while a subnational network may offer much denser and more geographically detailed monitoring within a particular state, province, region, or municipality. Accordingly, the national/subnational classification does not by itself indicate the density, representativeness, or geographic granularity of monitoring. Further, national precedence in our methodology can also mean that a less transparent national network is represented instead of a stronger subnational system, as in Kazakhstan and Uganda. Similarly, a single classification can obscure the presence of multiple agencies operating independent networks across different regions, as in Indonesia and Ukraine. Finally, where subnational networks are included in our inventory, they should not be interpreted as exhaustive. Our research captures notable subnational systems but does not attempt to enumerate every municipal, state, provincial, or other locally operated monitoring network worldwide.

The selection score is not a universal quality ranking. Countries are rated only on openness, but not on accessibility, network adequacy, or data quality. The assessment records what is disclosed but does not fully score interface usability, discoverability, consistency between products, documentation quality, or the number of steps required to obtain data. The "fully open" designation does not establish representative siting, density of network, population coverage, pollutant breadth, reference equivalence, calibration quality, validation, uptime, completeness, or policy impact; it strictly checks a country against the Key Criteria for Fully Open Data.

The methodology currently sums five yes/no openness-related attributes, then three ordinal attributes. Criteria are equally weighted, and a complete tie is resolved alphabetically with preservation of source data order. Thus, tied networks should be viewed as analytically equivalent for selection, not as ordered by substantive quality.

The operational definition excludes broader observation forms. Satellite products, indoor monitoring, research campaigns, source-compliance systems, and private networks can be highly valuable, but they are outside the main continuous government-linked air quality monitoring measure.

The analysis is descriptive. Patterns by income, region, small-state status, conflict, platform, or institutional model do not by themselves establish causation. The examples only support plausible mechanisms that would require more systematic testing.



JAKARTA, INDONESIA
6.2088° S / 106.8456° E

Errata

In 2024, errors in classification were made for these countries:

Albania

Stations were operational as early as 2010, as shown in the EEA AQ Viewer. However, data was previously batch-processed and not reported in real time until early 2026 in EEA for the first time, as reported in the *Mbrojmë Mjedisin: Buletin Periodik 4-Mujor, Botimi Nr. 15* [Protecting the Environment: Periodic Bulletin No. 15; in Albanian], published by the National Environment Agency of Albania in January 2026 (accessed from https://akm.gov.al/en/ova_doc/buletini-mjedisor-nr-15-mbrojme-mjedisin/).

Dominican Republic

In 2024, we did not find evidence of monitoring. However, in our current research, we found the government's data portal for environmental statistics.

Egypt

A webpage that details monitoring activities was found and confirmed the presence of air quality monitoring. However, no air quality data were found; instead, they publish air quality forecasts. In 2024, this was mistakenly categorized as a data access portal.

St. Vincent and Grenadines

Daily weather bulletins that sometimes contain broad air quality warnings were mistakenly taken as evidence of air quality monitoring.

Ukraine

In 2024, we did not find evidence of monitoring. However, in our current research, we found two current data portals for the Ukrainian Hydrometeorological Center that have reported data since 2023 and 2024.

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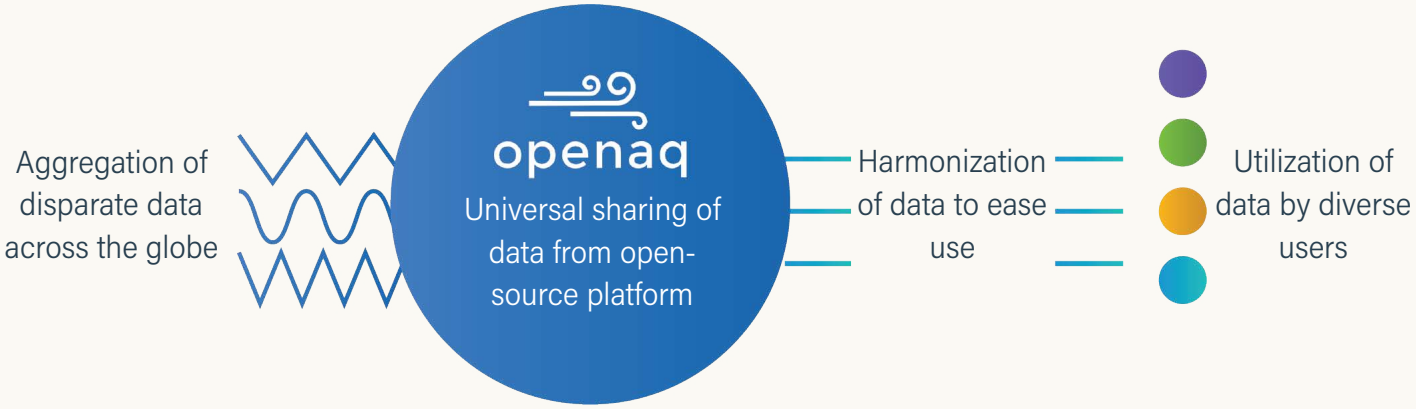
About OpenAQ



OpenAQ aggregates and harmonizes air quality data from disparate sources (station-level data produced by reference monitors and air sensors across the world) into a single format so that anyone across the public, private and civil society sectors can maximize the uses—and ultimate impact—of the data.

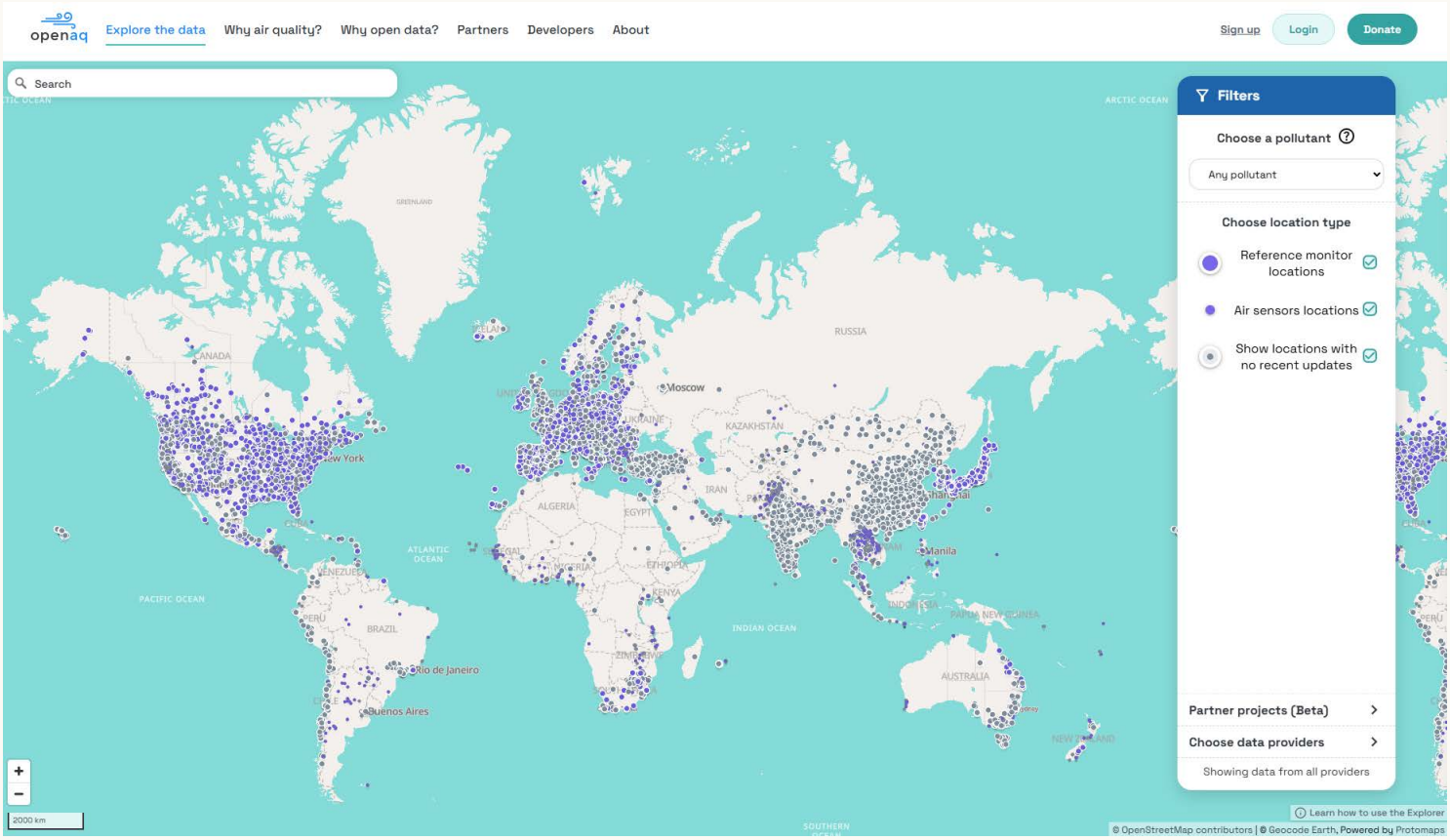
The OpenAQ data platform is the world's first and largest open-source, open-access database of outdoor air quality measurements, built to ensure everyone has unfettered access to the data they need to analyze, communicate, and advocate for clean air. By providing universal access to data, OpenAQ fulfills its mission to empower a global community of changemakers to solve air inequality—the unequal access to clean air.

The OpenAQ data platform is:

- a centralized "one-stop shop" for real-time and historical air quality data from monitors of all types
- universally and easily accessible—data are free; tools are provided to access and interact with the data
- uniquely valuable—data are harmonized for easy comparison and shared in physical units rather than as an air quality index
- built with open-source code

The OpenAQ Platform is used for a wide variety of applications: air quality, health and climate change research and analysis; air quality forecasting; air sensor calibration and satellite data validation; data-driven communications and journalism; advocacy for solutions; the development, assessment and enforcement of policy; as an educational/instructional resource, and more. By filling a basic data-access gap, OpenAQ empowers a wide variety of individuals, organizations and sectors across the globe to apply data in pursuit of a clean air future.

The OpenAQ Platform



As of October 2026, OpenAQ ingests air quality measurements from reference monitors and air sensors at more than 25,000 locations across 158 countries and territories.

25,000+
MONITORING LOCATIONS

158
COUNTRIES AND TERRITORIES

Additional Resources and References

Full list of countries and their category tags: https://link.openaq.org/2026-ReportWorksheet

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APPENDIX A

Detailed Methodology

The research methodology for the 2026 edition of Open Air Quality Data: The Global Landscape adheres to the methodology we formalized in 2022. Because this is not the first time that we have done this report, we already have existing data from previous years (2022, 2024). The data from the most recent year (2024) was carried over and double-checked for validity and currentness. If the source is found to be invalid or stale, we then updated the gaps using the procedure outlined here, and changes to search and query methods from the 2024 method were adapted as necessary (see more under "2. Identifying Relevant Studies").

We surveyed 193 United Nations member states and 5 dependencies or disputed territories with populations greater than one million.

As with previous versions of this report (2022, 2024), we used the methodological framework of 'scoping review' used in academic literature. This formal methodology was first developed in Arksey & O'Malley (2005) as distinct from the already well-established 'systematic review' methodology. Scoping review is more useful than the latter in the case of questions with broader scopes, and where the review does not plan to eliminate a wide variety of study methodologies with strict selection criteria. Scoping studies are also more useful when the review concerns an emerging field. Our study uses a scoping review framework to answer a broad question about the status of government-supported air quality monitoring in countries across the world. We allow for diverse types of monitoring technologies and different types of programs. We account for the evolving landscape of air quality monitoring with new technologies being featured in government programs. Scoping review methodology is increasingly being used in the field of air quality science and management to assess emerging sub-fields (Matz, et al. 2019; Coulby, et al. 2020; Kim, et al. 2021; Ward, et al. 2022). While scoping review methodology was developed primarily for reviewing academic literature, its scope can be expanded to include gray literature (reports, white papers, government documents, and the like) as well (Alvarez, et al. 2020). Because both primary and secondary evidence for air monitoring can also be found in gray literature, we decided to include that in this methodology as well.

DETAILED METHODOLOGY / CONTINUED

Research framework

The Arksey and O'Malley methodology includes five stages: (1) identifying research questions, (2) identifying relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing, and reporting the results. In addition, we incorporate two important extensions suggested to this framework. First, Levac et. al (2010) recommend adding the sixth stage of "incorporating consultation with stakeholders as a required knowledge translation component of scoping study methodology". This extension adds significant value by enabling us to consult air quality professionals as a credible resource with firsthand knowledge of air quality monitoring and data in different countries across the world. Additionally, Peters et. al (2020) deliberated another detail for stage 2—'identifying relevant studies'—suggesting that the search strategy can be iteratively refined as the researchers become more familiar with the evidence base and potentially learn new keywords, sources, and search terms. In this report, an iterative refinement from the 2024 to the 2026 search methodology was then implemented, and thus Sections 2 to 4 have been updated to reflect these changes.

This methodology serves as a basic research framework and comparative analysis that can generate temporal insights about how the landscape of air quality data has evolved. It makes it easy to communicate transparently to readers the details of the research undertaken. It facilitates the crowd-sourcing component of this project, where background research is publicly shared for the broader community to use and possibly identify gaps in the collected data.

1. Identifying the Research Question

For every country, the overarching question this study addresses is: What is the state of government-commissioned air quality monitoring?

Specific sub-questions include:

- Is there any evidence of an existing air quality monitoring program in the country that is implemented or sponsored by the government?
- Is there government monitoring at a national level?
- If monitoring doesn't exist at a national level, does any subnational (e.g., major metropolitan area of the country) level monitoring exist?
- If the government is monitoring AQ, is the data being shared publicly?
- How are countries sharing their data?
- Is there historical access to the data?
    - If historical data can be accessed by users, can it be accessed 1) from any time period in the past, or 2) from a limited time period in the past?

RESEARCH QUESTIONS / CONTINUED

Research questions

- Are data shared according to the four criteria of fully open data?
  - Are data shared in physical units?
  - Are the data provided at the most transparent geographic scale?
  - Are the data provided at a fine scale (e.g., daily or sub-daily levels)?
  - Are the data provided in a timely manner (i.e., within 24 hours of the timestamp at which the data are reported)?
  - Are the data provided in a programmatic (accessible via code or automation), machine-readable form or a downloadable delimited file?
- Are there metadata associated with the data, and what is the level of metadata shared about air quality monitoring data?
  - If metadata were provided, are they 1) comprehensive, or 2) limited.

2. Identifying Relevant Studies

We applied a search strategy that covers multiple types of resources available online. In our study, 'relevant studies' has a broader definition to include gray literature like reports by non-profit, intergovernmental organizations and official web pages of the departments of government concerned with air quality management in a country. The current search strategy was refined from the 2024 version (see *Open Air Quality Data: The Global Landscape, December 2024*) as data from 2024 was carried over into this year's report and as new sources of information about air quality monitoring in different countries were identified.

An official government webpage with ongoing dissemination of information (e.g., a data portal) regarding a country's air quality was the target of this search strategy for each country. Using such web pages allowed us to assess the openness of the air quality data according to our criteria. In the absence of finding a webpage, we relied on other sources that describe the monitoring operations. The following describes the final iteration of the search strategy that was applied to all the countries

- We carried over information from 2024 and checked if the data portals are still active and current.

Search strategy

- If the information is stale, we searched for the official website of government departments relating to environment, meteorology, health, statistics, climate change, or open data using Google as a search engine. Search phrases used were variations of the following: ***'<country name> ministry of environment', '<country name> department of environment', '<country name> department of statistics', '<country name> meteorological department', '<country name> department of health', '<country name> department of climate change', '<country name> open data portal.*** These phrases were also translated to languages that were listed as official languages of the country, as listed on Wikipedia. On each of these websites, we searched through the reports and news archives for information on the country's air quality monitoring program. In the event that a website is unreachable, we tried various means of determining if the website is live, temporarily unavailable, or is blocked outside of the region.
- If no evidence was found on an official government website, we searched for widely used air quality data aggregators—e.g., OpenAQ, aqicn/WAQI (World Air Quality Index Project), IQAir—if they are importing data from official government sources in the country. Additionally, we used the formula for search phrases: ***'<country name>'*** or ***'<capital city name>' + qualifier,*** where qualifiers include "air", "air monitoring", "air quality" or "$PM_{2.5}$". Google was used as a search engine to see if there are any other relatively less popular data aggregators that host official air quality data from the country.
- We reviewed reports from non-profit, intergovernmental and multilateral organizations, for example: World Health Organization, United Nations Environment Programme (UNEP), Clean Air & Climate Coalition, World Bank, Asian Development Bank, Economic Community of West African States (ECOWAS), UN FAO (Food and Agriculture Organization), etc. For example, UNEP in 2015 conducted a review of all countries for their air quality policies. The document for each country they reviewed has a section on the status of air quality monitoring.
- We searched for academic literature that could provide information about government-run air quality monitoring programs in the country. Using Google Scholar and these search phrases and their variations: ***'<country name> air quality', '<country name> air pollution', '<capital city name> air quality', '<capital city name> air pollution', '<country name> air monitoring'.*** We filtered the results to show studies published after 2015, as we are primarily interested in ongoing air quality monitoring in the countries.
- We searched for social media pages of governmental institutions for air quality information as these pages may have regular uploads of air quality data from a given database, which is sourced from its original location and recorded for reference.

Study selection and data charting

3. Study Selection

When applied to sources broader than academic literature or studies, including gray literature and government sources, this step translates to selecting satisfactory evidence that describes air quality monitoring in each country. In countries where the governments are actively sharing their air quality data, weblinks to those pages are the best available evidence. If the data are not being shared, we relied on descriptions about monitoring activities from official websites (for example, news or feature articles on the official government's webpage) or gray literature. The minimum standard for a descriptive account to be considered as evidence of an existing monitoring program in a country is that specific information should be present about the operation. For example, the webpage of the department of environment of a country listing 'air quality monitoring' as one of its 'services' does not qualify as satisfactory evidence. Examples of minimum level of evidentiary accounts that can be considered satisfactory could look like "Ministry operates three monitoring stations in the region XYZ", "Ministry has collected regular daily data on PM_{10}, TSP, NO_x in the capital city since 2010". For the information to be considered current, the page needs to have an indication of the date and that the monitoring is currently ongoing.

4. Charting the Data

We reviewed each country's documents (reports, webpages, academic literature) and categorized countries as either with existing government air quality monitoring programs or with no evidence of one. For countries that conduct monitoring and share the data publicly, their data-sharing practices were reviewed, and whether they meet the Key Criteria for Fully Open Air Quality Data set out in the report were assessed. Results were tabulated in a spreadsheet where each country is color-coded. In the past, a three-color system (green, yellow and red) was used (see *Open Air Quality Data: The Global Landscape, December 2024*). However, for this year, we aimed to produce a detailed and computable dataset, with colors being a secondary feature, and thus we restructured our spreadsheet as follows.

We also introduced some changes to some of the columns, and added new columns, for example:

- "monitor_2026" pertains to the presence of evidence of an active national or subnational government-operated continuous ground-based AQ monitoring system in 2026.

CHARTING THE DATA / CONTINUED

Dataset fields

- "top_monitor_lvl" is a new column that describes what is the highest level of monitoring that we found. This is to disambiguate national and subnational levels of monitoring. While the focus of this report is on national-level monitoring, we also tabulated subnational-level monitoring that we found to bring light to different hierarchies/ structures of air monitoring existing all over the world. However, the subnational-level monitoring tally is not meant to be exhaustive, as there could be many different subnational-level government monitoring programs that exist for a specific country, but would not have been possible for us to exhaustively find all. In addition, "subcountry_label" is meant to accompany the "top_monitor_lvl" column and provides the city or jurisdiction name. To differentiate between national and subnational-level monitoring, we used the following definitions:
  - National: the network of monitors is operated at the national level, or there is a government-led national aggregator that collects and transmits data from locally-operated subnational networks
  - Subnational: the largest network of monitors is operated at the subnational level, either guided by national policy or local laws. It must not be connected to any network beyond its subnational jurisdiction.
- The criterion "timely fine-scale" is now divided into two sub-criteria, namely "fine_scale" (C1) and "timely_report" (C2), to independently reflect both the granularity and frequency of data sharing. "fine_scale" refers to the granularity of reporting, of which, daily or subdaily merits a "yes", while "timely_report" refers to the frequency and recency of updating, for which data reported with 24 hours would merit a "yes".
- "station_info" is now strictly fulfilled only if coordinates are explicitly provided; previously, mere presence in a map interface was taken as fulfillment of this criterion.
- "has_historical" is a new column that describes how much historical data (i.e., limited time, or indefinite time in the past) is accessible from the data portal/platform.
- "metadata_level" is a new column that describes if and how much metadata was shared, and is quantified as comprehensive, partial or minimal. Examples of metadata considered include ownership, instrument or method, and licensing info. Metadata for measurement methods or instrument details may either be available as row-based, or collected in an external webpage with a description of the measurement methods used.

The full data dictionary is in Appendix B.

Collating, reporting, and summarizing results

This year's report approaches the global assessment on a network basis, with data collection design in accordance with a database paradigm. This means that each row represents a unique network of air quality monitoring that is further classified into subnational and national levels with their own reporting agencies. Consequently, transparency criteria were evaluated and communicated independently for each system, instead of evaluating only the system with the highest level of transparency, as in previous years' reports.

In numbers, 223 AQ monitoring systems or networks across 198 countries (193 UN member states and 1 observer state) and jurisdictions with a population of 1 million or more (Hong Kong, Kosovo, Puerto Rico and Taiwan) are holistically assessed this year. In addition to independent evaluation performed for each system mentioned in last year's report, this year adds 10 new data sources.

As this database was further processed for analysis, the report followed the previous years' methodology, where one representative network is chosen for evaluation in each country. In other words, all quantitative economy-level results in this report use the final selected row in the 198-row output. The selection rule is intentionally simple:

1. If an economy has only one source record, retain it.
2. If national and subnational records coexist, national network presence always takes precedence.
3. If multiple eligible records remain, select the record with the highest sum of five transparency-related criteria: physical data, station information, fine-scale reporting, timely reporting, and programmatic access. Each 'yes' receives one point.
4. If still tied, compare the summed ordinal scores for data granularity, historical access, and metadata level.
5. If all scores remain equal, select the top tied network alphabetically with the order of source data preserved. The final output used for this report is fixed and is not reselected during analysis.

The same scoring rule applies when multiple national records remain, as in Indonesia and Ukraine. National precedence means the selected economy record is not necessarily the most transparent network anywhere in the country. Kazakhstan and Uganda, for example, are represented by their partially transparent national systems even though fully open subnational systems are documented in Almaty and Kampala.

COLLATING + REPORTING / CONTINUED

In addition, we highlight special cases where innovation and creativity stand out with respect to data sharing, albeit not fulfilling the Key Criteria for Fully Open Data, e.g., sharing air quality data in the form of air quality indices or sharing them through social media. These insights are presented in the report.

Although this survey has been conducted since 2020, changes to the methodology and the number of countries included since the 2022 report limit comparability across years. Therefore, trend analyses in this report include only historical data from the 2022 and 2024 reports.

Consultation and Validation of the Tally

Upon completion of the tally in batches, we consulted with the OpenAQ community, which includes air quality experts, professionals, and community advocates, some of whom may have used the OpenAQ platform to access air quality data, are subscribed to our newsletter or social media channels, are involved in the field of open air quality data, and/or directly affiliated with our organization in some capacity, to find whether any gaps exist in our findings. This was especially important for countries where we were not able to find evidence of air quality monitoring through Steps 1 through 3. We put out a call sharing an aggregate list of countries where we found no evidence of air quality monitoring (to seek what we may have missed), and conducted personal communications with these contacts. As we received inputs from contributors, these were validated and then incorporated in our spreadsheet and included in the final tallies.

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APPENDIX A

Methodology references

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APPENDIX B

Data Dictionary

This data dictionary is used in tallying the data. See the full list:
https://link.openaq.org/2026-ReportWorksheet

Column name	Description	Inputs
iso_alpha2	ISO 3166-1 two-letter country codes of the country, territory, or dependency according to the International Organization for Standardization	<XX>
country_label	Name of country, territory, or dependency (World Bank naming convention)	<country>
monitor_2024	Is there any current evidence of government-operated continuous ground-based AQ monitoring system in 2024?	yes, no
monitor_2026	Is there any current evidence of active government-operated continuous ground-based AQ monitoring system in 2026? If there is very weak evidence (e.g. sporadic ad-hoc announcement of AQI band instead of specific numbers, signs of satellite data interpolation without a physical ground-based network), or evidence pointing that the system is not working anymore at a reasonable capacity (e.g. only 1 working cluster out of 12 city clusters), or lack of currency/activity, a "no" would be determined	yes, no

DATA DICTIONARY / CONTINUED

Data Dictionary

Column name	Description	Inputs
activity_status	Observational activity of the AQ network based on available public information. This is to further contextualize the state of the countries, if known, where no evidence of an active ground-based AQ monitoring system is found. - active: the default status if an AQ monitoring network is active - announced_or_installed_but_not_verified: there's a government-originated news, announcement, or webpage indicating installation of sensors or stations - possibly_active_but_no_current_evidence: there are strong leads to recent monitoring in recent years, but no currentness to the evidence - historically_existed_but_inactive: a network existed but is now not operational - no_verified_monitoring_evidence: nothing is known about whether there exists monitoring activities	active, announced_or_installed_but_not_verified, possibly_active_but_no_current_evidence, historically_existed_but_inactive, no_verified_monitoring_evidence
top_monitor_lvl	What is the largest network of monitoring in the country or territory, as indicated in the evidence found? - National: the network of monitors is operated at the national level by a national agency, or there is a government-led national aggregator that collects and transmits data from locally-operated subnational networks - Subnational: the largest network of monitors is operated at the subnational level either guided by national policy or local laws/jurisdictive body. It must not be connected to any network beyond its subnational jurisdiction. It is possible for a national agency to manage a subnational network if all stations/sensors deployed at this time is within the administrative boundary of a subnational unit	national, subnational, n/a

DATA DICTIONARY / CONTINUED

Data Dictionary

Column name	Description	Inputs
subcountry_label	If the largest network of monitoring is subnational or there are existing evidences of subnational monitoring, what is the name of the subnational administrative unit (city, province, etc.) that conducts monitoring?	<subnational admin unit name>, n/a
reporting_agency	What is the name of the government agency that's reporting air quality data from this evidence?	
is_public	Is the government monitoring data publicly accessible? Any (1) medium of reporting (e.g. live dashboard, statistical reporting, web app, social media posts, etc.), (2) aggregation level of data across any number of reporting dimensions (e.g. daily average across a number of monitors), and (3) format of data reporting (e.g. AQI or physical) counts for this question. In other words, as long as the data are surfaced to the public in direct access manners in some ways at the expected time complying with the cycle of data publication (i.e. for governments with an annual data reporting cycle, a 2025 report would qualify for a "yes" in the 2026 Global Landscape report), this will be either considered a "yes" or "restricted". - To qualify as a "yes", the data must be unobstructedly available to anyone anywhere. - If access is limited geographically (e.g. data are only available in certain countries or regions), "restrictive" access would be applied. - If the data are unavailable or can only be accessed in a way that is not immediate (e.g. outreach or a pending approval form is required), "no" would be applied to this field.	yes, no, restricted, n/a

DATA DICTIONARY / CONTINUED

Data Dictionary

Column name	Description	Inputs
access_url	Link to public portal, website, or external platform where AQ data can be publicly accessed	<url>, n/a
primary_ev	Links to Evidence of Air Monitoring - Primary: This type of evidence is found on the website of the government entity (e.g., government data portal, news article or informational page found on the government entity's website)	<url>, n/a
secondary_ev	Links to Evidence of Air Monitoring - Secondary: This type of evidence is found in non-government websites such as third-party websites or reports, e.g., WHO or World Bank reports, scientific or news articles that reference government monitoring, third-party data aggregators.	<url>, n/a
phys_data	**A - Physical Data:** Data are currently shared in physical units (e.g., ppb, ppm, µg/m3, etc), not as Air Quality Index (AQI), Air Pollution Index, Pollution Standard Index, or other indicator that summarizes measurements. 'Current' is evaluated as in the current year or aligning with the entity's data publishing schedule (e.g. if the data are published yearly, then in 2026 at this time of this report, if physical data from 2025 are published, the entity would qualify for a 'yes').	yes, no, n/a

DATA DICTIONARY / CONTINUED

Data Dictionary

Column name	Description	Inputs
station_info	**B - Station Level and Coordinates:** Data are provided at the most transparent geographic scale at which they are collected (i.e. station-scale) and with location metadata in the form of readily available geographic coordinates, ideally to five places past the decimal.	yes, no, n/a
is_fine_scale	**C1 - Fine scale frequency:** Data are provided at daily or sub-daily levels with time-of-collection stamps and averaging periods. For example, clearly date-stamped daily averages or time-stamped hourly averages would qualify as a "yes".	yes, no, n/a
timely_report	**C2 - Timely reporting:** Data are provided in near real-time or in a timely manner, which we define as within 24 hours of the timestamp at which data are reported.	yes, no, n/a
prog_access	**D - Programmatic access:** Data and metadata as defined in the preceding criteria are publicly and currently accessible in a programmatic and machine-readable form (API, JSON) or a downloadable delimited file (CSV, TSV, TXT, XLSX, Parquet). 'Currently' is evaluated as within ~1 month from the current date.	yes, no, n/a

DATA DICTIONARY / CONTINUED

Data Dictionary

Column name	Description	Inputs
is_transparent	Is air quality data transparent (does it meet the 4 criteria of transparency outlined above)? This is evaluated based on how the data are presented on the government portal, unless they have an official liaising partner (e.g. Clarity, EEA), in which case both would be evaluated in combination. In the case that a government has different data products, each with different levels of transparency, all data products will be considered in combination for transparency criteria. Any irreconcilability among the data products will be noted and flagged accordingly.	fully, partial, no, n/a
data_granularity	The granularity of AQ as publicly reported. - hourly: hourly or sub-hourly measurements - daily: daily averages - sporadic: data are aggregated across several days e.g. weekly, monthly, yearly	hourly, daily, sporadic, n/a
has_historical	Is access with relative ease to historical data available? - "3-indefinite": users can access data from any time - "2-limited": users can access data from a limited time window - "1-none": users can only access the most recent data or not at all	1-none, 2-limited, 3-indefinite, n/a
metadata_level	What is the level of metadata shared about AQ data that is being monitored? - "3-comprehensive": rich metadata is readily available (at least ownership, instrument and/or measurement method, and licensing info must be shared to qualify as comprehensive) - "2-partial": some metadata is shared - "1-minimal": no metadata other than site name is shared	1-minimal, 2-partial, 3-comprehensive, n/a

APPENDIX C

Country Tally

Afghanistan — Brunei Darussalam

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Afghanistan	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Albania	yes	yes	yes	yes	yes	yes	yes	national
Algeria	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Andorra	yes	yes	yes	yes	yes	yes	yes	national
Angola	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Antigua and Barbuda	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Argentina	yes	yes	yes	yes	yes	yes	yes	subnational
Armenia	yes	yes	yes	no	yes	no	no	national
Australia	yes	yes	yes	yes	yes	yes	yes	subnational
Austria	yes	yes	yes	yes	yes	yes	yes	national
Azerbaijan	yes	no	n/a	n/a	n/a	n/a	n/a	national
Bahamas	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bahrain	yes	no	n/a	n/a	n/a	n/a	n/a	national
Bangladesh	yes	yes	yes	yes	yes	yes	no	national
Barbados	yes	yes	no	no	yes	yes	no	national
Belarus	yes	yes	yes	no	yes	yes	no	national
Belgium	yes	yes	yes	yes	yes	yes	yes	national
Belize	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Benin	yes	no	n/a	n/a	n/a	n/a	n/a	subnational
Bhutan	yes	yes	yes	no	yes	yes	yes	national
Bolivia	yes	yes	no	no	no	no	no	subnational
Bosnia & Herzegovina	yes	yes	yes	yes	yes	yes	yes	national
Botswana	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Brazil	yes	yes	yes	yes	yes	yes	yes	national
Brazil	yes	yes	yes	yes	yes	yes	yes	subnational
Brunei Darussalam	yes	yes	yes	no	yes	yes	no	national

APPENDIX C / CONTINUED

Country Tally

Bulgaria — Ecuador

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Bulgaria	yes	yes	yes	yes	yes	yes	yes	national
Burkina Faso	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Burundi	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cabo Verde	yes	yes	yes	yes	yes	yes	yes	national
Cambodia	yes	yes	yes	no	yes	yes	no	national
Cameroon	yes	no	n/a	n/a	n/a	n/a	n/a	subnational
Canada	yes	yes	yes	yes	yes	yes	yes	national
Central African Republic	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Chad	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Chile	yes	yes	yes	yes	yes	yes	yes	national
China	yes	yes	yes	no	yes	yes	no	national
Colombia	yes	yes	yes	yes	yes	no	yes	national
Comoros	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Congo, Dem. Rep.	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Congo, Rep.	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Costa Rica	yes	no	n/a	n/a	n/a	n/a	n/a	n/a
Côte d'Ivoire	yes	yes	yes	yes	yes	yes	no	national
Croatia	yes	yes	yes	yes	yes	yes	yes	national
Cuba	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cyprus	yes	yes	yes	yes	yes	yes	yes	national
Czechia	yes	yes	yes	yes	yes	yes	yes	national
Denmark	yes	yes	yes	yes	yes	yes	yes	national
Djibouti	yes	yes	yes	no	yes	yes	no	national
Dominica	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dominican Republic	yes	yes	yes	no	no	no	yes	national
Ecuador	yes	yes	yes	no	yes	yes	yes	subnational

APPENDIX C / CONTINUED

Country Tally

Egypt — Iceland

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Egypt	yes	no	n/a	n/a	n/a	n/a	n/a	national
El Salvador	yes	yes	no	no	yes	no	no	national
Equatorial Guinea	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Eritrea	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Estonia	yes	yes	yes	yes	yes	yes	yes	national
Eswatini	yes	yes	yes	no	yes	yes	no	subnational
Ethiopia	yes	yes	yes	no	yes	yes	yes	subnational
Fiji	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Finland	yes	yes	yes	yes	yes	yes	yes	national
France	yes	yes	yes	yes	yes	yes	yes	national
Gabon	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gambia	yes	yes	yes	yes	yes	yes	yes	national
Georgia	yes	yes	yes	yes	yes	yes	yes	national
Germany	yes	yes	yes	yes	yes	yes	yes	national
Ghana	yes	yes	yes	no	yes	yes	no	national
Greece	yes	yes	yes	yes	yes	yes	yes	national
Grenada	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guatemala	yes	yes	yes	yes	yes	yes	yes	national
Guinea	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guinea-Bissau	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guyana	yes	yes	yes	no	yes	yes	no	national
Haiti	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Honduras	yes	yes	yes	no	no	no	no	subnational
Hong Kong	yes	yes	yes	yes	yes	yes	yes	national
Hungary	yes	yes	yes	yes	yes	yes	yes	national
Iceland	yes	yes	yes	yes	yes	yes	yes	national

APPENDIX C / CONTINUED

Country Tally

India — Liechtenstein

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
India	yes	yes	yes	yes	yes	yes	yes	national
Indonesia	yes	yes	no	no	yes	yes	no	national
Indonesia	yes	yes	yes	no	yes	yes	no	national
Iran	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Iraq	yes	no	n/a	n/a	n/a	n/a	n/a	national
Ireland	yes	yes	yes	yes	yes	yes	yes	national
Israel	yes	yes	yes	yes	yes	yes	yes	national
Italy	yes	yes	yes	yes	yes	yes	yes	national
Jamaica	yes	no	n/a	n/a	n/a	n/a	n/a	national
Japan	yes	yes	yes	yes	yes	yes	yes	national
Jordan	yes	yes	yes	no	yes	yes	no	national
Kazakhstan	yes	yes	yes	no	yes	yes	no	national
Kazakhstan	yes	yes	yes	yes	yes	yes	yes	subnational
Kenya	yes	yes	yes	yes	yes	yes	yes	subnational
Kiribati	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kosovo	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kuwait	yes	yes	yes	yes	yes	yes	no	national
Kyrgyzstan	yes	yes	yes	yes	yes	yes	yes	subnational
Laos	yes	yes	yes	no	yes	no	no	national
Latvia	yes	yes	yes	yes	yes	yes	yes	national
Lebanon	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lesotho	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Liberia	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Libya	yes	no	n/a	n/a	n/a	n/a	n/a	national
Liechtenstein	yes	yes	yes	yes	yes	yes	yes	national

APPENDIX C / CONTINUED

Country Tally

Lithuania — New Zealand

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Lithuania	yes	yes	yes	yes	yes	yes	yes	national
Luxembourg	yes	yes	yes	yes	yes	yes	yes	national
Madagascar	yes	yes	yes	no	yes	yes	no	national
Malawi	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Malaysia	yes	yes	no	no	yes	yes	no	national
Maldives	yes	yes	no	no	yes	yes	no	national
Mali	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Malta	yes	yes	yes	yes	yes	yes	yes	national
Marshall Islands	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mauritania	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mauritius	yes	yes	no	yes	yes	yes	no	national
Mexico	yes	yes	yes	yes	yes	yes	yes	national
Micronesia, Fed. Sts.	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moldova	yes	yes	no	no	no	no	no	national
Monaco	yes	yes	no	no	yes	yes	no	national
Mongolia	yes	yes	yes	yes	yes	yes	no	national
Montenegro	yes	yes	yes	yes	yes	yes	yes	national
Morocco	yes	no	n/a	n/a	n/a	n/a	n/a	national
Mozambique	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Myanmar	yes	yes	no	no	no	yes	no	subnational
Namibia	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nauru	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nepal	yes	yes	yes	yes	yes	yes	yes	national
Netherlands	yes	yes	yes	yes	yes	yes	yes	national
New Zealand	yes	yes	yes	yes	yes	yes	yes	national

APPENDIX C / CONTINUED

Country Tally

Nicaragua — Sao Tome & Principe

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Nicaragua	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Niger	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nigeria	yes	yes	yes	yes	yes	yes	yes	subnational
North Korea	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
North Macedonia	yes	yes	yes	yes	yes	yes	yes	national
Norway	yes	yes	yes	yes	yes	yes	yes	national
Oman	yes	yes	yes	no	yes	yes	no	national
Pakistan	yes	yes	yes	no	yes	yes	no	subnational
Palau	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Palestine	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Panama	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Papua New Guinea	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paraguay	yes	yes	yes	yes	yes	yes	yes	national
Peru	yes	yes	yes	yes	yes	yes	yes	subnational
Philippines	yes	yes	yes	no	yes	yes	no	national
Poland	yes	yes	yes	yes	yes	yes	yes	national
Portugal	yes	yes	yes	yes	yes	yes	yes	national
Puerto Rico	yes	yes	yes	yes	yes	no	yes	national
Qatar	yes	yes	no	no	yes	yes	no	national
Romania	yes	yes	yes	yes	yes	yes	yes	national
Russian Federation	yes	yes	yes	no	yes	yes	no	subnational
Rwanda	yes	yes	yes	no	yes	yes	no	national
Samoa	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
San Marino	yes	yes	yes	no	yes	no	no	national
Sao Tome & Principe	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a

APPENDIX C / CONTINUED

Country Tally

Saudi Arabia — Taiwan

Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Saudi Arabia	yes	yes	no	no	yes	yes	no	national
Senegal	yes	yes	no	no	yes	no	no	subnational
Serbia	yes	yes	yes	yes	yes	yes	yes	national
Seychelles	yes	yes	yes	no	yes	yes	yes	national
Sierra Leone	yes	no	n/a	n/a	n/a	n/a	n/a	national
Sierra Leone	yes	yes	yes	yes	yes	yes	yes	subnational
Singapore	yes	yes	yes	no	yes	yes	yes	national
Slovakia	yes	yes	yes	yes	yes	yes	yes	national
Slovenia	yes	yes	yes	yes	yes	yes	yes	national
Solomon Islands	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Somalia	yes	no	n/a	n/a	n/a	n/a	n/a	national
South Africa	yes	yes	yes	yes	yes	yes	yes	national
South Korea	yes	yes	yes	yes	yes	yes	yes	national
South Sudan	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spain	yes	yes	yes	yes	yes	yes	yes	national
Sri Lanka	yes	yes	yes	no	yes	yes	no	national
St. Kitts and Nevis	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
St. Lucia	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
St. Vincent and the Grenadines	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sudan	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Suriname	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sweden	yes	yes	yes	yes	yes	yes	yes	national
Switzerland	yes	yes	yes	yes	yes	yes	yes	national
Syria	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Taiwan	yes	yes	yes	yes	yes	yes	yes	national

APPENDIX C / CONTINUED

Country Tally

Tajikistan — Zimbabwe

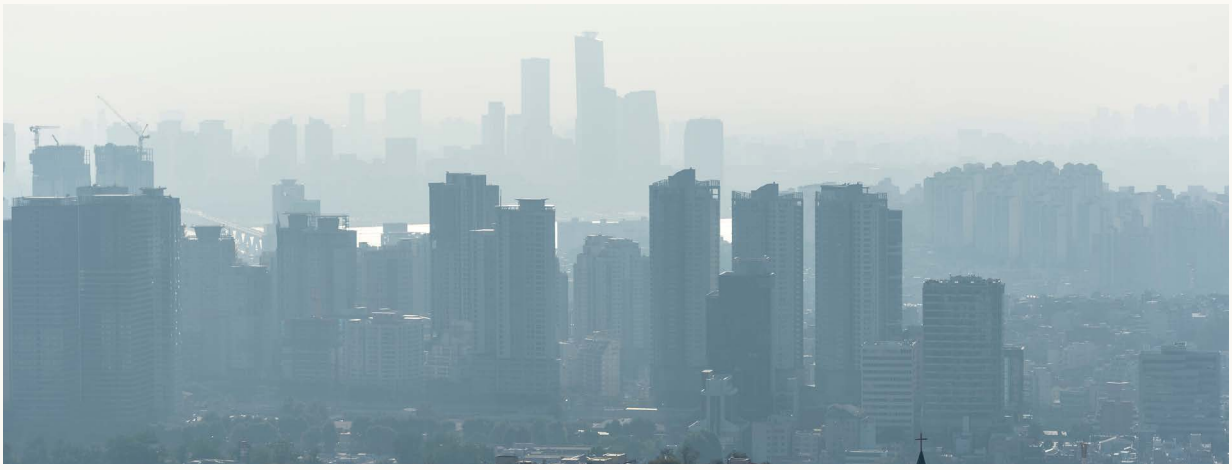
Country	Monitoring	Public access	Physical data	Station coords.	Fine scale	Timely Reporting	Programmatically Accessible	Top level
Tajikistan	yes	yes	yes	yes	yes	yes	no	national
Tanzania	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Thailand	yes	yes	yes	yes	yes	yes	yes	national
Timor-Leste	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Togo	yes	no	n/a	n/a	n/a	n/a	n/a	subnational
Tonga	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trinidad and Tobago	yes	yes	yes	yes	yes	yes	yes	national
Tunisia	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Turkmenistan	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tuvalu	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Türkiye	yes	yes	yes	yes	yes	yes	no	national
Uganda	yes	yes	yes	no	yes	yes	no	national
Ukraine	yes	yes	yes	yes	yes	no	no	national
Ukraine	yes	yes	yes	no	yes	no	yes	national
United Arab Emirates	yes	yes	yes	no	yes	yes	no	national
United Kingdom	yes	yes	yes	yes	yes	yes	yes	national
United States	yes	yes	yes	yes	yes	yes	yes	national
Uruguay	yes	yes	yes	no	yes	yes	yes	national
Uzbekistan	yes	yes	yes	no	yes	yes	no	national
Vanuatu	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Venezuela	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Viet Nam	yes	yes	yes	yes	yes	yes	no	national
Yemen	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Zambia	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Zimbabwe	yes	yes	yes	no	yes	yes	no	national



MEXICO CITY, MEXICO
19.4326° N / 99.1332° W



SANTIAGO, CHILE
33.4489° S / 70.6693° W



SEOUL, SOUTH KOREA
37.5665° N / 126.9780° E

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