Strengthening Air Quality Management Guidance:

Achieving Scale and Impact

CLEAN AIR FUND

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GHV

Foreword

Air pollution is one of the most significant environmental health issues affecting everyone. Globally, nine in ten people are exposed to air pollution that not only impacts public health but agricultural productivity, biodiversity, and the climate. Air pollution specifically impacts the most vulnerable in society, the young, the elderly, and those with preexisting health conditions.

To support governments to better manage air pollution, a plethora of tools, training materials, and guidance have been developed by a range of local, national, and international organizations, including the United Nations Environment Programme (UNEP). Despite the availability of these materials, less than a third of the countries we surveyed have successfully implemented monitoring networks or have air quality management (AQM) strategies. It is this disconnect – between the rising availability of guidance and the continued lack of concerted action on the issue – that prompted UNEP and Clean Air Fund to undertake an assessment to understand the challenges, gaps, and opportunities to improve the uptake of air quality guidance that we regularly produce.

This report includes insight from the suppliers of guidance materials and its users – including dozens of governments and agencies tasked with implementing AQM strategies. The assessment has provided an unparalleled understanding of how guidance materials can be expanded and strengthened, and how its delivery and uptake can be improved.

There is a need for guidance to be more context-specific, and for guidance suppliers to provide support in a more coordinated way. This report makes several recommendations to address these findings, based on the development of a coordinated system to improve access to existing guidance and relevant air quality management resources.

We hope that you – as providers of air quality guidance – join Clean Air Fund and UNEP in collaborating to act on this report's recommendations and ultimately help to enhance the capacity of air quality practitioners, particularly those in developing countries.

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Acknowledgements

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ABOUT GLOBAL HEALTH VISIONS

A woman-owned and -operated business, GHV is an agile network of results-oriented, passionate global health and development professionals providing targeted guidance to partners working on the biggest issues of our time. Our expertise improves the outcomes and impacts of our partners and contributes to a more just and equitable world. Ultimately, our work transforms ideas into social change through analysis, strategy, and action. For more information on Global Health Visions, please visit www.globalhealthvisions.com.

ABOUT CLEAN AIR FUND

The Clean Air Fund is a global philanthropic organization that works with governments, funders, businesses, and campaigners to create a future where everyone breathes clean air. We fund and partner with organizations across the globe that promote air quality data, build public demand for clean air, and drive action. We influence and support decision makers to act on air pollution.

ABOUT UNITED NATIONS ENVIRONMENT PROGRAMME

The United Nations Environment Programme (UNEP) has been the global authority that sets the environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment. UNEP's mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

Executive Summary

We need clean air to live, grow, and thrive. We are surrounded by air pollution, caused by burning fossil fuels, transportation and industry, agricultural practices, and natural sources, among others. Air pollution is getting worse, swiftly escalating to a global public health and environmental emergency that causes over seven million premature deaths every year and $8.1 trillion in health damages alone.[1] The impacts of air pollution are deeply inequitable: More than 90% of pollution-related deaths, and the greatest burden of economic losses, occur in low- and middle-income countries (LMICs).[2]

Reducing air pollution levels to quickly realize public health, environmental, and climate benefits, requires effective air quality management (AQM). AQM is typically undertaken by national and city governments and is complex and multifaceted. It involves technical disciplines to establish the scale and nature of the problem (e.g., monitoring and modeling of air chemistry) and policy planning and program implementation to reduce emissions. Carrying out these activities effectively requires extensive training, capacity strengthening, and funding. It also requires a well-coordinated approach across government and other stakeholders to adopt and implement strong policies and programs.

Intergovernmental organizations, national governments, academia, and nongovernmental organizations have developed numerous resources to support AQM (herein referred to as "AQM guidance"). **Yet AQM guidance has not been taken up at the scale or pace required to mobilize the commitment and action necessary to tackle this problem. Global Health Visions (GHV), in partnership with the Clean Air Fund and United Nations Environment Programme, undertook a needs assessment to understand why.**

We heard from nearly 100 AQM practitioners working across 119 countries

GHV gathered insights from close to 100 environmental officials, academics, and others contributing to AQM programs (herein referred to as "practitioners") across 119 countries, primarily in LMIC settings. This included a survey, in-depth interviews, and focus group discussions to better understand how practitioners currently access and utilize guidance, what deficiencies and gaps exist, and how guidance could be delivered in a more accessible and targeted manner. GHV also held in-depth interviews and meetings with AQM guidance developers to bolster our understanding of how they design and provide guidance and to identify key opportunities for collaboration to improve AQM.

Guidance is foundational to effective AQM, but gaps in content and delivery need to be addressed

Practitioners highlighted several key barriers to their AQM work, with lack of technical capacity and other knowledge standing out prominently, second only to lack of funding. This demonstrates a need for continued efforts to ensure the effectiveness of AQM guidance. Two critical areas in which guidance can be bolstered to better support practitioners were revealed through this research: 1) approaches to improve the delivery of guidance, and 2) areas to expand and strengthen guidance to address critical gaps.

Opportunities identified for improving delivery of guidance include:

- Online resources need to be streamlined for easier navigation and accessibility
- Opportunities for knowledge exchange with experts and peers are essential
- Training engagements should be longer, more cohesive, and tailored to participant capacities
- A common curriculum would minimize redundancy and enhance consistency

Key areas to expand and strengthen guidance include:

- Support is needed to collect, access, and utilize high-quality, credible air quality data
- Guidance on how to effectively communicate air quality data is critical
- Guidance that can be easily adapted for local contexts and capacities is highly valuable

Increased collaboration and consolidation of global efforts around AQM guidance would enhance efficiency and effectiveness

The findings in this report demonstrate the pressing need for more holistic AQM guidance centered on the demands of practitioners, particularly those in LMICs.

However, improved guidance alone is insufficient. **Enhanced coordination must underpin each of the opportunities and recommendations identified in this report.** Better coordination and consolidation at global, regional, and local levels, and across sectors is needed to accelerate the global response and national progress toward tackling air pollution.

Fortunately, the AQM community should not and does not have to start from scratch. At a minimum, it should take stock of and leverage current approaches by using existing working groups and platforms to share lessons learned, plan joint initiatives and investments, and identify opportunities for collaboration that address pressing challenges and gaps.

[1] "World Bank. 2022. The Global Health Cost of PM2.5 Air Pollution: A Case for Action Beyond 2021. International Development in Focus; Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/36501 License: CC BY 3.0 IGO."

[2] World Health Organization. 2018. Burden of disease from the joint effects of household and ambient Air pollution for 2016, v2 May 2018. https://cdn.who.int/media/docs/default-source/air-quality-database/aqd-2018/ap_joint_effect_bod_results_may2018.pdf

However, to effectively and swiftly advance AQM guidance to meet the scale and urgency of the air pollution challenge, a formal and multi-sectoral mechanism for collaboration should be established. **A new coordination mechanism would allow multiple organizations to collaboratively strengthen, accelerate, and scale development and delivery of AQM guidance.**

Critically, this mechanism should include strong representation from practitioners working in LMICs to ensure they are cocreating solutions and that their needs and recommendations are reflected in the development and delivery of future guidance. More formalized collaboration would help to reduce duplicative funding and guidance efforts. It would also help prioritize and carry forward a coordinated response to addressing the needs and gaps identified in this report through a shared workplan. Among the most timely and important opportunities are:

- **Codesign longer-term training engagements that are driven by a common curriculum**, ensuring length and applicability is fit for purpose to address the unique needs, capacities, and resource levels of the respective practitioners and provide access to ongoing support beyond the training as practitioners implement new knowledge and approaches.
- **Facilitate more opportunities for knowledge exchange** to allow for more cross-learning from peers and experts through regional workshops, development of case studies, use of apps and websites (e.g., WhatsApp, LinkedIn, etc.), and use of artificial intelligence (AI).
- **Develop a web-based knowledge platform that centers LMIC needs** in the delivery of guidance and provides user-friendly access to existing guidance, aggregated from multiple sources and organized by capacity level and specific criteria. Potentially, this platform could facilitate opportunities to interact and advance learning and virtual exchanges (e.g., through interactive tools). The approach to design and management of the platform should be informed by lessons learned and best practices from successful models of guidance dissemination in other areas of public health and climate.

Guidance alone will not solve air pollution. Increased political support and funding for AQM are critical to the success of guidance efforts. This demonstrates the need for continued efforts by the global community to raise awareness and urgency around air pollution. A new mechanism for collaboration on guidance could also be leveraged to design and implement joint initiatives to drive action, such as a **collaboratively funded, well-coordinated global campaign**, which could go far to spur national policy action.

Rapid scale-up of air quality management and action is urgently needed. Promisingly, several countries have shown long-term and sustained commitment to reducing air pollution, and these efforts have been met with success. We know how to reduce air pollution, but the political will, financing, technical knowledge and capacity to effectively implement AQM are insufficient in many contexts. A well-organized, harmonized, and curated approach to improve how guidance is delivered and developed is critical as a step toward strengthening AQM. Stakeholders committed to tackling air pollution, individually and collectively, must optimize existing efforts and support new opportunities to catalyze action. Through effective and coordinated AQM, many negative impacts of air pollution can be mitigated, saving millions of lives and trillions in economic damage, especially in LMICs.

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Key terms, Abbreviations and Classifications

KEY TERMS

Air Quality Management (AQM):
the activities undertaken to help protect human health and the environment from the harmful effects of air pollution (e.g., air quality monitoring, emissions inventory, source attribution, impact assessment, policy planning, and program implementation).

AQM guidance:
resources designed to support effective implementation of AQM, including but not limited to: case studies, academic literature, reports, specific guidelines for implementing directives, toolkits, trainings, regional communities of practice, e-learning, and knowledge exchanges.

AQM practitioners:
the end users who are using AQM guidance to support their work in protecting public health and the environment from air pollution (e.g., environmental officials within a Ministry of Environment or an Environmental Protection Agency at the national or municipal level, WHO country office staff).

ABBREVIATIONS/ACRONYMS

AI: artificial intelligence

AQM: air quality management

CAF: Clean Air Fund

CCAC: Climate and Clean Air Coalition

GHV: Global Health Visions

HIV/AIDS: human immunodeficiency virus, acquired immunodeficiency syndrome

IFC: International Finance Corporation

IGO: intergovernmental organization

LMICs: low- and middle-income countries

NGO: nongovernmental organization

SEI: Stockholm Environment Institute

UNEP: United Nations Environmental Programme

U.S. EPA: United States Environmental Protection Agency

WHO: World Health Organization

WMO: World Meteorological Organization

UNEP REGIONAL CLASSIFICATIONS

**We have used UNEP classifications to define regions throughout the report and have abbreviated them as follows:*

AFR: Africa

Asia.P: Asia Pacific

EU: Europe

LAC: Latin America and Caribbean

WA: Western Asia

NA: North America

I Introduction

Air pollution is a swiftly escalating global public health and environmental emergency that causes over seven million premature deaths every year[3]. That is more than deaths from malaria, HIV/AIDS, and tuberculosis combined. Poor air quality is also detrimental to the climate, compromises childhood development, and impedes economic growth.

Improving air quality requires robust air quality management (AQM). **AQM is complex and multifaceted.** It involves technical disciplines to establish the scale and nature of the problem (e.g., monitoring and modeling of air chemistry) and policy planning, implementation, and evaluation of programs to reduce emissions.

Carrying out these activities effectively requires extensive training, capacity strengthening, and funding.

Intergovernmental organizations (IGOs), national governments, academia, and nongovernmental organizations (NGOs) have developed numerous types of guidance and tools to support AQM (herein referred to as "AQM guidance"). While these resources provide important support to end users, **uptake is limited, and progress remains slow.**

Global Health Visions (GHV), in partnership with the Clean Air Fund and United Nations Environment Programme, conducted this needs assessment to gather insights on the key barriers and challenges involved in the development and use of AQM guidance, to better understand deficiencies and gaps, and to identify what solutions are needed to bolster and support better uptake and implementation.

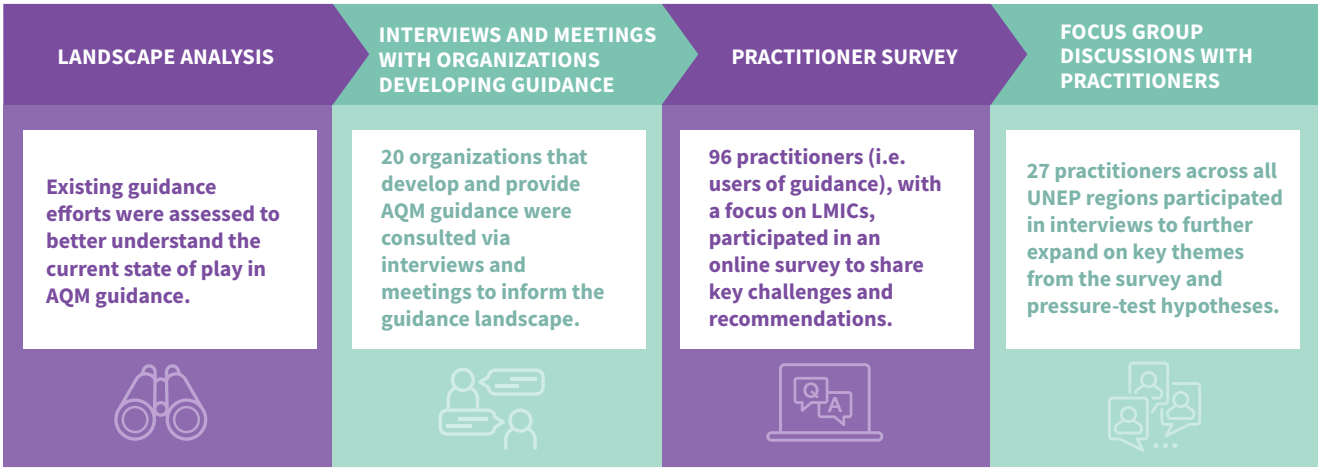
OUR OBJECTIVE

To improve air quality management by better understanding how guidance can be designed and delivered in a more collaborative way that better responds to the needs of end users.

[3] World Health Organization. 2018. Burden of disease from the joint effects of household and ambient Air pollution for 2016, v2 May 2018. https://cdn.who.int/media/docs/default-source/air-quality-database/aqd-2018/ap_joint_effect_bod_results_may2018.pdf

II Methodology

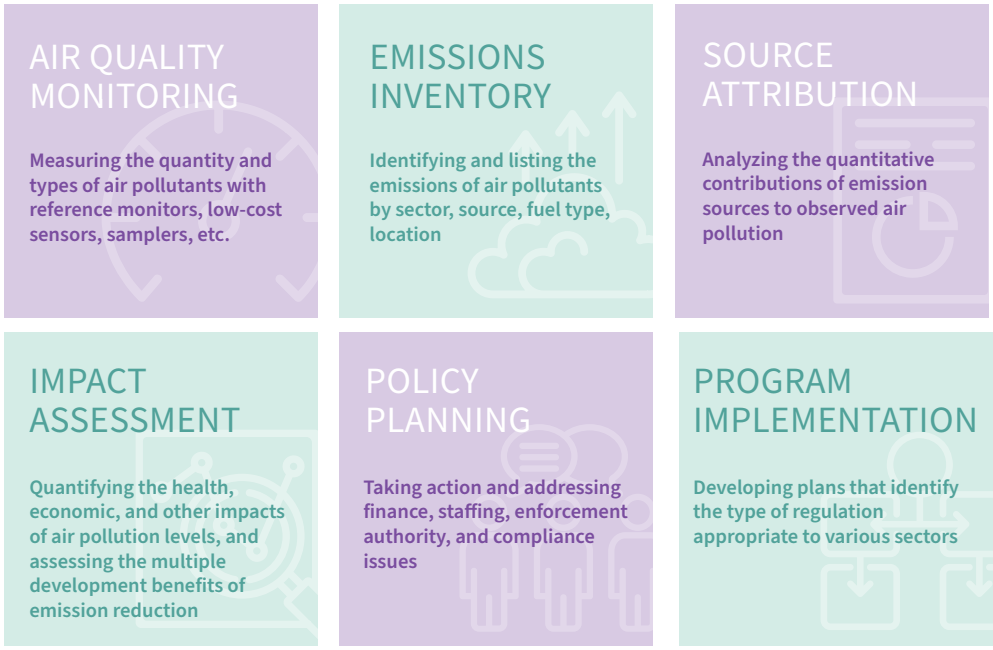
Our assessment focused on identifying AQM guidance needs, gaps, and opportunities, with an emphasis on gathering insights directly from the end users of guidance – in particular, environmental officials, academics, and others contributing to AQM (herein referred to as "practitioners") in LMIC settings. To that end, we collected information from close to 100 practitioners through an online survey and focus group discussions. We also conducted a landscape analysis and held interviews and several meetings with representatives from organizations that develop and provide guidance to bolster our understanding of the current AQM guidance landscape and to uncover how persistent gaps and challenges could be addressed. The list of organizations that participated in this assessment can be found in Annex 1.



Our assessment with practitioners sought to understand their experiences and current work in AQM around four guidance-related questions:

- **What are the barriers and challenges you currently face in carrying out AQM?**
- **How are you finding and using guidance?**
- **In which areas do you need more and stronger guidance?**
- **How can guidance be designed and delivered to better meet your needs?**

For the purposes of this assessment, we defined six key areas of AQM as: air quality monitoring, emissions inventory, source attribution, impact assessment, policy planning, and program implementation. We used these terms and definitions in the survey and discussions to gain a more detailed understanding of where practitioners are focusing their efforts, and where they need additional guidance most.

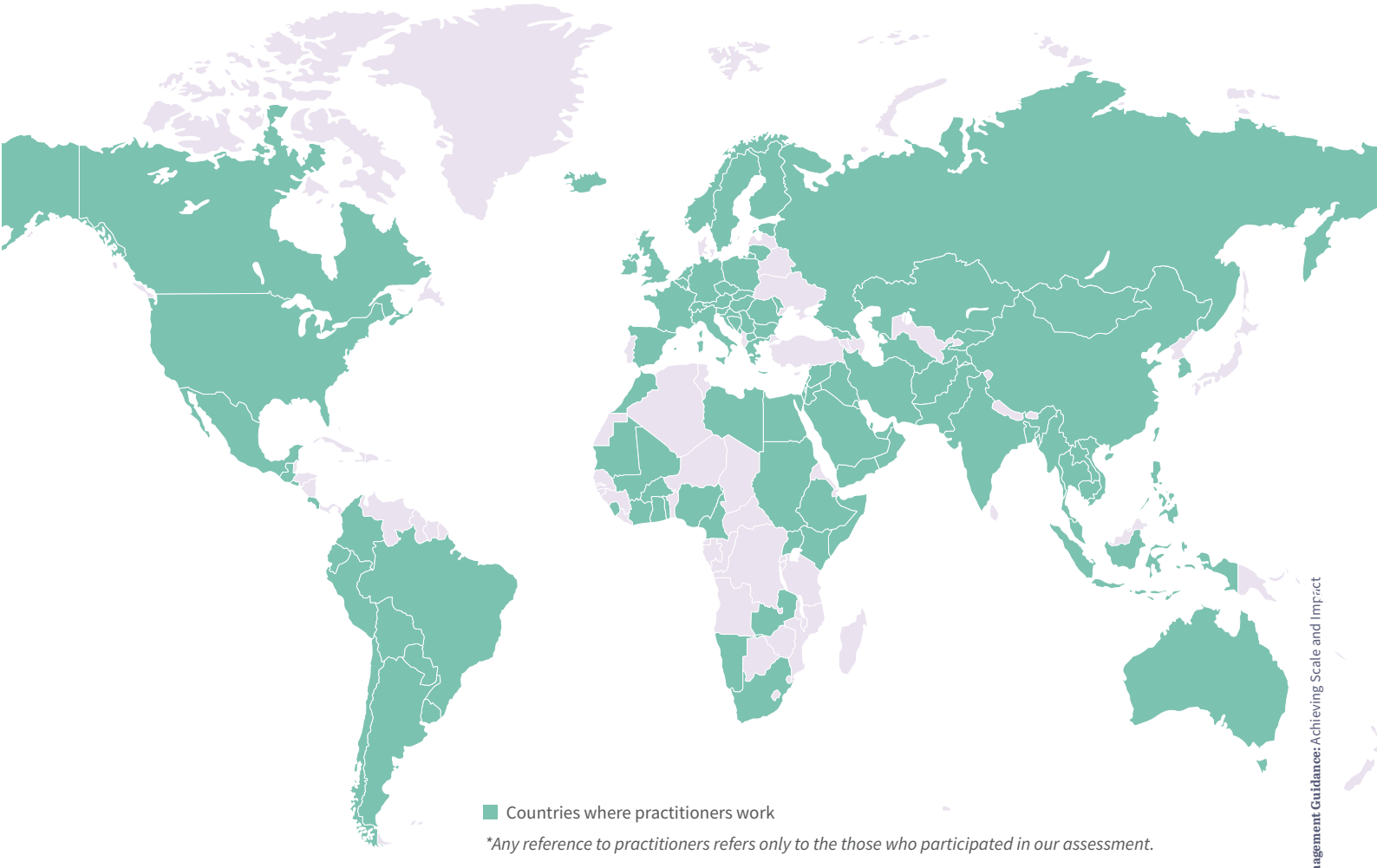


This assessment has several limitations. The practitioners selected for this assessment were identified by the project team and/or supporting agencies. The survey was offered in English, French, and Spanish and focus group discussions were conducted only in English. Therefore, information was not always gathered in the native language of participants. In addition, while we are speaking from practitioners' perspectives throughout, this small, curated sample is not wholly representative of all practitioners. Similarly, organizations that develop and provide guidance were selected by the project team and do not fully represent the vast number of organizations active in the AQM community nor the full set of available guidance. As a critical next step, a full landscaping of guidance developers, available guidance, and other resources will be critical to ensure that the recommendations put forward in this report leverage existing resources.

Who We Heard From

Nearly 100 practitioners working across 119 countries participated in the survey. Of those practitioners, 27 participated in focus groups with representation from all regions. We used UNEP classifications to define regions throughout the report and have abbreviated them as follows:

AFR: Africa
Asia P: Asia and the Pacific
EU: Europe
LAC: Latin America and Caribbean
WA: West Asia
NA: North America



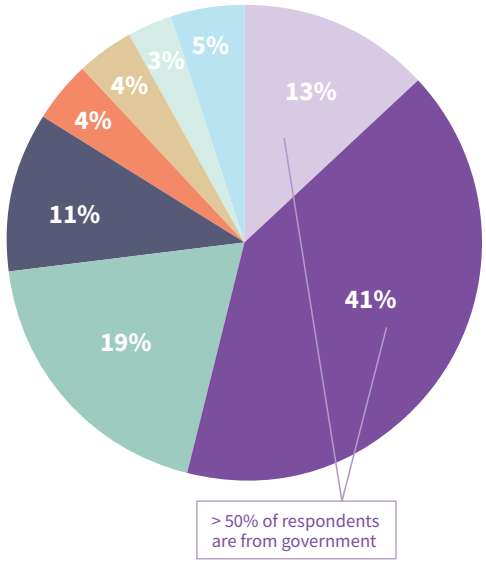
Countries where practitioners work

**Any reference to practitioners refers only to the those who participated in our assessment.*

Over half of the practitioners who participated in this assessment work in government

Government representation was particularly high from Africa, Asia Pacific, and Latin America and Caribbean and represents a broad spectrum of years of experience and seniority levels. The remaining practitioners work for academia/research institutes, NGOs, IGOs, technical consultancies, and donor agencies.

TYPE OF ORGANIZATIONS PRACTITIONERS WORK FOR

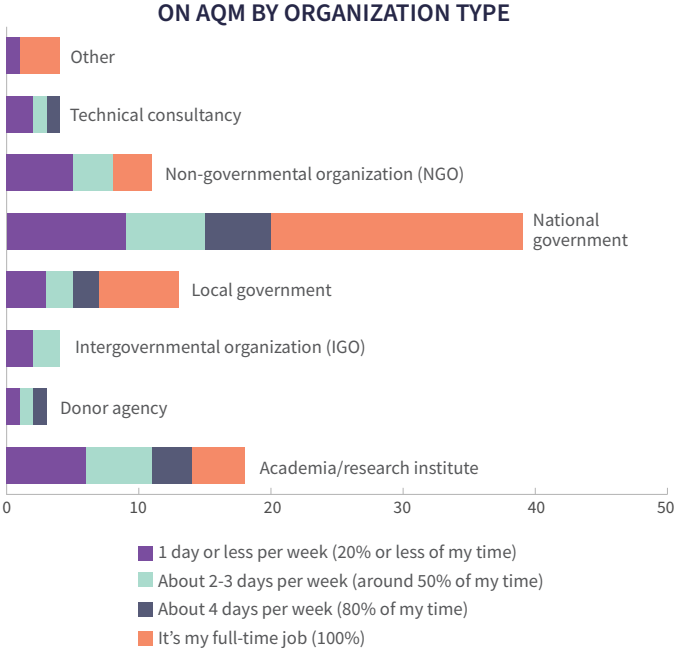


Few practitioners can dedicate themselves full-time to AQM

Fewer than half of government practitioners reported spending 100% of their time on AQM. Those from academia and NGOs spend limited time on AQM, with an average of 1-3 days per week. For many, competing priorities leads to an inability to fully engage in trainings and other opportunities to receive support for their AQM work. Additional details on the background of practitioners can be found in Annex 2.

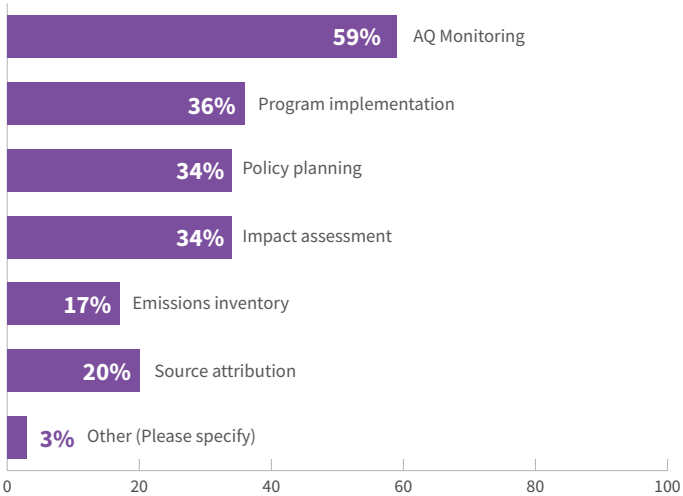
Air quality monitoring was the most widely cited area of focus, particularly among government and NGO respondents. Given that air quality monitoring is often seen as the first step in AQM – as a critical early component to understanding the scope of the problem – the high response rates for monitoring may reflect that many AQM efforts in LMICs are still nascent.

AMOUNT OF TIME PRACTITIONERS SPEND ON AQM BY ORGANIZATION TYPE



> There are simply not enough people with a mandate to address air quality. We expect a lot of these AQM managers, but we need to be realistic about what they actually have the capacity and ability to do and tailor our support accordingly."
>
> ***AQM Guidance Developer***

AQM AREAS WHERE PRACTIONERS FOCUS THEIR TIME



III Key Findings

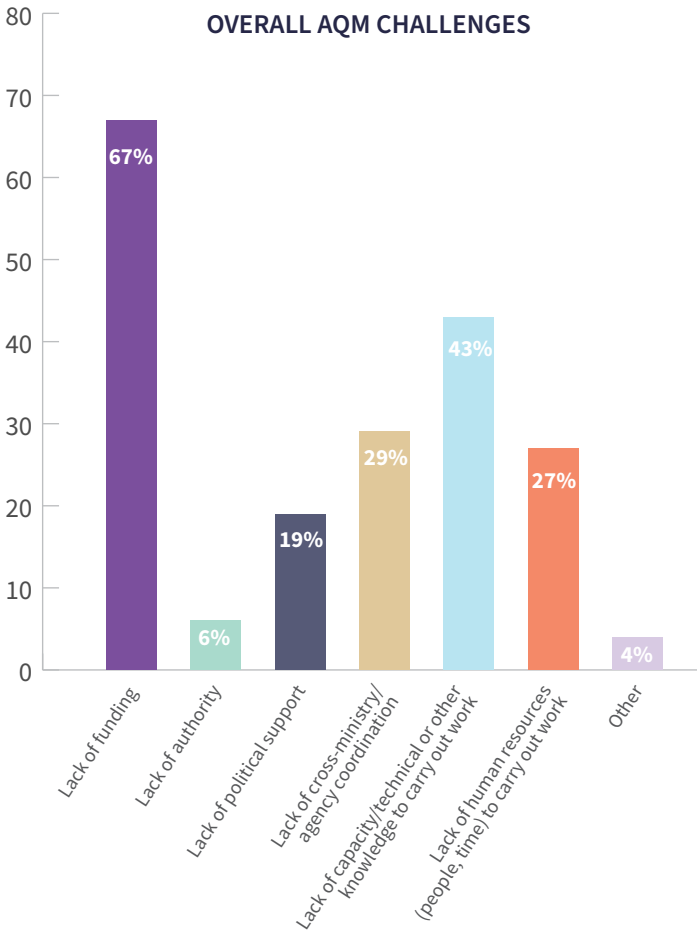
The findings and conclusions highlighted in this section reflect the perspectives of practitioners captured through the survey and focus group discussions, and the perspectives of guidance developers gathered through in-depth interviews and meetings. Details on how responses varied by region and practitioner type can be found in Annex 3.

A Guidance is foundational to effective AQM

Practitioners highlighted several key barriers to their AQM work, with lack of funding emerging as the most significant challenge. **Lack of technical capacity and other knowledge stood out prominently as the second greatest challenge, demonstrating a need for continued efforts to ensure the effectiveness of AQM guidance.** Other barriers included lack of human resources (people, time, and funds), cross-ministry coordination, and political support to carry out work.

Further probing revealed two critical areas in which guidance can be bolstered to better support practitioners: 1) improving the delivery of guidance, and 2) enhancing and expanding guidance to address critical gaps. Recommendations for addressing these areas are discussed in the next sections.

> "We need capacity building and knowledge exchange – and ensuring the right people are engaged in training and knowledge exchange."
>
> ***Asia Pacific region focus group participant***



B Delivery of guidance needs to be harmonized, accessible, and facilitate cross-learning

Online resources need to be streamlined for easier navigation and accessibility

More than half of practitioners search the internet and/or go to trusted websites to find guidance. WHO, UNEP, and US EPA websites are go-to resources across most regions. Websites and resource hubs managed by country governments and regional organizations are also key resources (e.g., websites maintained by Clean Air Asia and the Asian Development Bank).

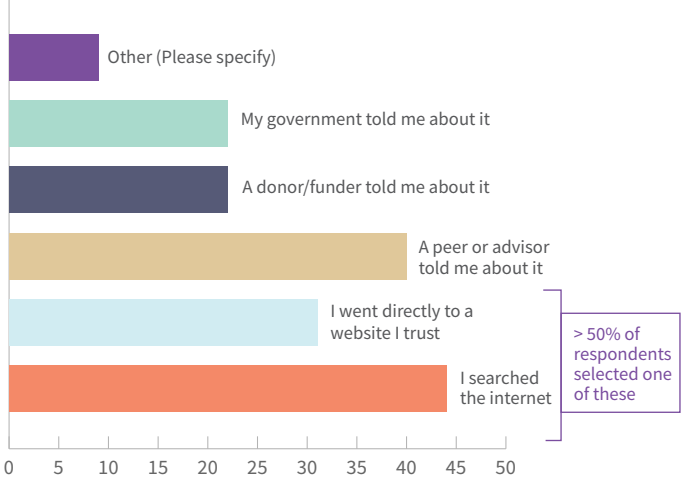
But while there are substantial resources online, the breadth and number available make finding the most relevant guidance time-consuming and tedious. This is compounded by the fact that content is often tailored only to expert practitioners and not available in local languages. Additionally, websites sometimes have inconsistent or contradictory information, and are outdated, leading to confusion about where the most up-to-date and accurate information can be found.

Streamlining online resources to ensure they are trusted, easy to access and navigate, and include the latest updates on AQM innovations and opportunities is needed.

> "Sometimes information, and especially the more technical information, is only in English. If information is on a website, it needs to be easy to access with specific subjects (e.g., it was hard to find information on the textile industry in the IFC guides). We need to know what equipment is needed, not just the parameters, and those parameters need to be realistic and achievable. They make sense for the U.S. but are difficult for us to reach."
>
> ***Latin America and Caribbean region focus group participant***

> "WHO and UNEP guidelines can be easily accessed through their websites, and asking them for specific guidance has provided some helpful and detailed information. Overall, you must be careful. General searches can have conflicting information."
>
> ***Africa region focus group participant***

HOW PRACTITIONERS SEEK OUT GUIDANCE



Opportunities for knowledge exchange with experts and peers are essential

When online guidance does not fit their unique contexts and demands, practitioners often look toward technical experts and consultants. This expert support is highly valued, and opportunities to engage with experts through multiple modalities should be expanded. This could include platforms to exchange virtually through expert (and peer) chat and two-way sharing of best practices.

In addition, gathering informal guidance and technical support from peers, especially in countries within the same region, is a common approach for finding context-specific guidance. While this type of informal approach has proven helpful, there is strong demand for more formal opportunities to learn from peers across similar contexts (e.g., industries, regions, climates, etc.). Case studies are seen as a particularly valuable way to generate cross-learning, along with regional workshops, and other platforms to share knowledge.

> "We receive lots of help and training from the Government of Mexico and U.S. EPA, but we use regulations from Mexico or Ecuador which are more relevant to our industries and capacity."
>
> ***Latin America and Caribbean region focus group participant***

Training engagements should be longer, more cohesive, and tailored to participant capacities

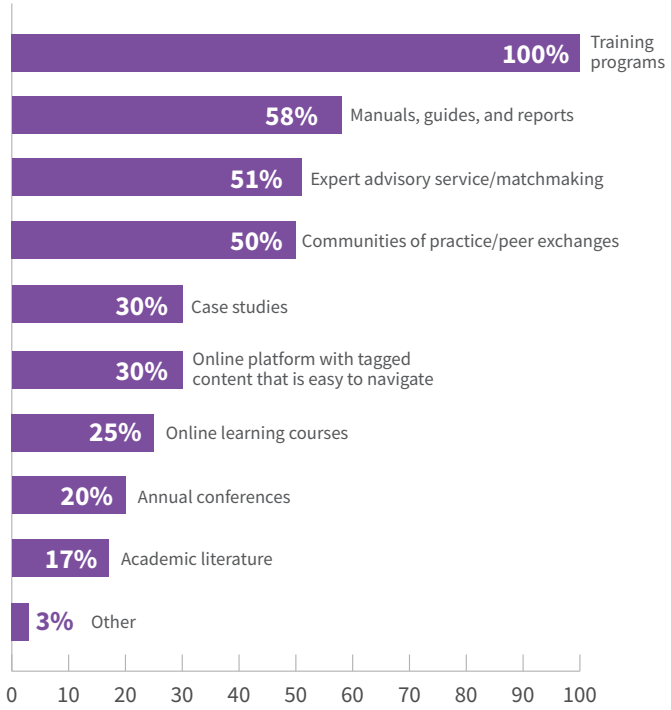
Practitioners identified trainings as the most helpful form of guidance. But a number of deficiencies limit effectiveness and lasting benefits. Trainings are generally not long enough, cutting short the necessary time to absorb, apply, and master skills after they have been taught. In addition, trainings often dive deeply into only one specific topic or are too broad and generalized. They also lack opportunities for follow-up support and the ability to troubleshoot with experts in real time.

Further, as practitioners are entering trainings with varying levels of knowledge, expertise, and different resource contexts (e.g., access to equipment, funding, and human resources), the benefits and applicability of trainings are often limited.

Trainings need to be longer, better-matched to the environment and capacity level of trainees, and offer access to dedicated experts for deeper engagement, follow-up, and hands-on/real-world application of topics.

> "It's hard to find training with hands on experience, but this is needed for measurement work. We need an opportunity to try out equipment with guidance to ensure we know how to use it – not just a PowerPoint training."
>
> ***LAC region focus group participant***

TYPES OF GUIDANCE PREFERRED BY PRACTITIONERS



"There is lots of online guidance and training programs organized by U.S. EPA, WHO, UNEP, around monitoring ambient air quality, data analysis, emissions inventory. Maturation for some programs is short and you don't have enough time to practice what you're being taught. Class sizes are too big, and trainers don't have enough time to provide 1:1 training. Some online guidance isn't open access and is expensive."

Africa region focus group participant

A common curriculum would minimize redundancy and enhance consistency

Practitioners, developers, and guidance providers acknowledged the need for better coordination and consolidation of content used in global and regional AQM. Practitioners receive guidance and support from multiple sources, leading to duplication and at times conflicting information. Development of harmonized content and a common curriculum that can be used across different contexts would reduce duplication and enhance consistency across guidance delivered by different agencies, institutions, and partners. Aligning around joint workplans for support that builds on organizational comparative advantages is another way to address this challenge.

"We need more alignment amongst global organizations providing guidance – better coordination amongst UN agencies, U.S. EPA, CCAC, WHO and WMO."

West Asia region focus group participant

C Guidance needs to be expanded and strengthened to address critical gaps

Support is needed to collect, access, and utilize high-quality, credible air quality data

Ensuring trust and transparency in air quality data and assessment methods is a necessary first step toward raising awareness about air pollution and achieving political buy-in for AQM. Gaining a robust view of the drivers and impacts of air pollution is critical for setting air quality goals and designing programs to respond to air pollution.

There is clear demand for increased guidance on how to conduct impact assessments (i.e., efforts to quantify the health and other benefits of emission reductions) and source attribution analysis (i.e., analyzing and quantifying the contributions of emission sources).

In addition, practitioners identified key areas where more direct support is needed for collecting and using monitoring data:

- which equipment to procure
- how to use and maintain equipment
- how to analyze air quality data

Lastly, harmonization of data collection efforts and open access to national and global data sets are also desired improvements.

AREAS WHERE MORE GUIDANCE IS NEEDED

RESPONSES	OVERALL RANK
Impact assessment	1
Source attribution	2
Policy planning	3
Program implementation	4
AQ monitoring	5
Emissions inventory	6

Equipment has to be properly calibrated; in-country practitioners need to know how to use it and maintain it – otherwise measurements are inaccurate and useless.

AQM guidance developer

"To raise awareness, we need data as evidence for policymakers, so they understand the seriousness of the situation and adopt policies. We need access to data in open platforms and training on data analysis."

Africa region focus group participant

"To translate that information [international standards] to our reality and to set limits and make policies is hard… and this is mixed with a lack of information and data at the national level."

Latin America and Caribbean region participant

Guidance on how to effectively communicate air quality data is critical

Lack of awareness regarding the extent of the problem and impacts of poor air quality on health and well-being, the climate, and economy are persistent barriers. Once data and knowledge are established, they must be strategically leveraged to spur political will, action, and coordination. Practitioners need guidance on how to translate scientific data and knowledge into accessible and targeted communications to stimulate stronger political will. This could include supporting design and dissemination of trainings and toolkits that outline how to communicate air quality data to policymakers and the public to ensure engagement with these audiences is effective and leads to appropriate action. (See D. Uptake of AQM guidance is dependent on a strong enabling environment for more.)

> "If change is going to happen, it's not us [international and regional organizations] that need to talk about this, it's the city that needs to communicate about the need for clean air action and what consequence it will have in the city."
>
> ***AQM guidance developer***

> "It's great to have your burden and source data, but nothing will get done if you can't effectively communicate this to policymakers and citizens; they need to know how to use the data to inform change."
>
> ***AQM guidance developer***

Guidance that can be easily adapted for local contexts and capacities is highly valuable

For guidance to be highly usable and relevant, adapting it to LMIC resource settings, various capacities, and major languages is crucially important. AQM guidance is often based on, or developed for, high-resource settings (e.g., Europe and the US), rendering the guidance unrealistic and/or irrelevant in LMIC settings where access to equipment, budgets, and capacity levels are often different, sometimes starkly so. Further, sources of emissions (e.g., fuels used for heating and cooking, dust conditions, specific industries, etc.) vary widely by country, which means context-specific guidance is often most relevant.

Importantly, practitioners see cross-learning with counterparts in other countries, technical support from experts, trainings, and case studies as the most effective pathways to adapt guidance to their context, rather than development of bespoke guidance for every context.

> "We need help to build new ambient air quality standards and it has been very difficult to find resources and experts around furnace and dryer emissions standards. We've engaged the U.S. EPA. Most emissions standards are not available in the same language and context. Information in the U.S. is overwhelming – and I don't have someone to ask."
>
> ***Asia Pacific region focus group participant***

D Uptake of AQM guidance is dependent on a strong enabling environment

While strengthening guidance delivery and design was the primary focus of this assessment, **guidance alone will not solve air pollution**. Several underlying challenges must also be addressed to create an enabling environment for the uptake of AQM guidance, including the need for increased funding, better coordination across government and adjacent sectors, and accelerated policy action by national governments.

Funding to address air pollution remains woefully low. Recent data shows that, despite being one of the single biggest health threats worldwide, air pollution still accounts for under 1% of total global aid spending.[4] An increase in global funding is critically needed to support investment in the technology, tools, and human resources that are necessary to carry out AQM effectively.

Better coordination at all levels of government and across sectors would drive better funding and policy decisions. Despite clear linkages, integrating action on air quality, health, and climate is not yet prioritized as needed. Air pollution must be tackled through both a whole-of-government approach (national and subnational, and across ministries) and whole-of-society approach (NGOs, academia, the private sector, donors, and the public). This will build awareness of the impacts of air pollution to our health, economies, and environment.

Strengthening data collection around air quality to better understand health and climate impacts is critical to foster political will and build broader awareness. For example, improved tracking of basic health records and improved screening and diagnosis of air pollution-related illnesses would further the evidence base and understanding of health impacts. There is also an opportunity to harmonize climate tracking data with air pollution inventories to further align action.

Additionally, increased political action among national governments is needed to adopt strong evidence-based policies, allowing AQM guidance to be successful. In order for guidance to be actionable, supportive policies, strategies, and legislation are crucial for the uptake, implementation, and regulation of AQM. This might include a national action plan or sectoral plans, Clean Air Act-type laws, or combinations of these.[5]

Establishment of enabling conditions for AQM to be successful is inextricably linked to the effectiveness of AQM guidance. Continued efforts by the global community are needed to simultaneously raise awareness and urgency around air pollution while continuing to provide targeted guidance and support for practitioners, especially in LMICs, who will drive national and local responses.

The following table provides a summary of the opportunities identified throughout the Key Findings section to optimize the design, content, and ultimate delivery of AQM guidance.

[4] Clean Air Fund. 2022. The State of Global Air Quality Funding 2022. https://www.cleanairfund.org/wp-content/uploads/State-of-Global-Air-Quality-Funding-2022-online.pdf
[5] United Nations Environment Programme. 2021. Actions on Air Quality: A Global Summary of Policies and Programmes to Reduce Air Pollution.

OPPORTUNITIES TO IMPROVE CONTENT AND DELIVERY OF AQM GUIDANCE

Delivery of guidance needs to be harmonized, accessible, and facilitate cross-learning	
Streamline online resources for easier navigation and accessibility	Consolidate and enhance cohesion across online resources to ensure they are credible, easy to access and navigate, and include the latest updates on AQM innovations and opportunities.
Provide more opportunities for knowledge exchange with experts and peers	Facilitate more regional/peer exchange of knowledge including case study development, regional workshops, and peer-to-peer exchanges, and provide more opportunities to access expert advice.
Codesign longer, more cohesive, and tailored training engagements	Align training content with the resources and contexts of the trainees, and invest in longer-term trainings developed collaboratively by providers.
Minimize redundancy and enhance consistency around a common curriculum	Develop consistent, harmonized, and curated guidance content that can be used at different stages of the AQM continuum and in different contexts as well as across agencies, institutions, and partners.
Guidance needs to be expanded and strengthened to address critical gaps	
Increase support for collecting, accessing, and utilizing high-quality, credible air quality data	Enhance guidance and support to practitioners on how to effectively collect and utilize air quality data, including which equipment to procure and how to use it, plus how to analyze data. Facilitate more open access to global data sets.
Provide guidance on how to effectively communicate air quality data	Provide guidance on how to translate scientific data and knowledge into accessible and targeted communications resources to stimulate political will and commitment.
Develop guidance that can be easily adapted for local contexts and capacities	Provide guidelines on how guidance can be adapted to LMIC settings (e.g., with limited access to equipment, resources, capacity, budget levels, language, etc.) and specific emissions sources (e.g., agricultural crop residue burning, wind-blown dust, etc.).

"Another challenge is the lack of air quality data and information. There is no nation-wide monitoring network, only a few monitoring stations and some passive sampling/sensor networks."

Asia Pacific region focus group participant

"People are affected by air pollution, but they don't understand the problem. They need to understand the problem to change behavior and drive demand and action from the government."

Africa region focus group participant

IV Recommendations

The findings in this report demonstrate the pressing need for more holistic AQM guidance centered on the demands of practitioners, and particularly those in LMICs. Future guidance efforts should aim to strengthen capacity and knowledge and facilitate cross-learning to move practitioners toward stronger AQM policies and programs.

As emphasized throughout the Key Findings section, there are numerous opportunities for individual organizations to optimize the design of existing guidance by developing new content to address key gaps and/or by adapting current content. The many resources available must also be assessed, and where necessary adapted, for relevance and applicability for practitioners addressing context- or source-specific challenges.

However, improved guidance alone is insufficient. **Enhanced coordination must underpin each of the opportunities and recommendations identified in this report.** Better coordination and consolidation at global, regional, and local levels, and across all sectors, is needed to accelerate the global response and national progress toward tackling air pollution.

The AQM community should not and fortunately does not have to start from scratch. At a minimum, it should take stock of and leverage current approaches by using existing working groups and platforms to share lessons learned, plan joint initiatives and investments, and identify opportunities for collaboration that address pressing challenges and gaps.

A formal mechanism for collaboration would enhance efficiency and effectiveness

But to truly spur the advancement in AQM guidance effectiveness that is required to meet the scale and urgency of the air pollution challenge, a formal mechanism for collaboration should be established. A new coordination mechanism would allow multiple organizations to collaboratively strengthen, accelerate, and scale development and delivery of AQM guidance.

Critically, this mechanism should include strong representation from practitioners working in LMICs to ensure they are cocreating solutions and that their needs and recommendations are reflected in the development and delivery of future guidance. The success of such a mechanism will hinge on building in processes to ensure practitioner needs are being addressed through representation and feedback loops as new content and delivery approaches are being developed.

More formalized collaboration would help to reduce duplicative funding and guidance efforts. It would also help prioritize and carry forward a coordinated response to address the needs and gaps identified in this report through a shared workplan. Among the most timely and important opportunities at hand are:

- **Codesign longer-term training engagements that are driven by a common curriculum**, ensuring length and applicability is fit for purpose to address the unique needs, capacities, and resource levels of the respective practitioners and provide access to ongoing support beyond the training as practitioners implement new knowledge and approaches.
- **Facilitate more opportunities for knowledge exchange** to allow for more cross-learning from peers and experts through regional workshops, development of case studies, use of apps and websites (e.g., WhatsApp, LinkedIn, etc.), and AI.
- **Develop a web-based knowledge platform** that centers LMIC needs in the delivery of guidance and provides user-friendly access to existing guidance, aggregated from multiple sources and organized by capacity level and specific criteria. This platform could facilitate opportunities to interact and advance learning and virtual exchange (e.g., through interactive tools, databases of regulations, studies, and approaches across countries). Design and management of the platform should be informed by lessons learned and best practices from successful models of guidance dissemination in other areas of public health or climate.

V Conclusion

Rapid scale-up of air quality management and action is urgently needed. Promisingly, several countries have shown long-term and sustained commitment to reducing air pollution, and these efforts have been met with success. We know how to reduce air pollution, but the political will, financing, and technical knowledge and capacity to effectively implement AQM are insufficient in many contexts. Stakeholders committed to tackling air pollution must optimize existing efforts and support new opportunities to catalyze action.

Strengthening how AQM guidance is developed and delivered provides a critical opportunity for optimizing the global response to air pollution. The findings in this report underscore the need for IGOs, NGOs, national governments, and others who develop AQM guidance to take stock of current efforts and identify ways to collectively advance more harmonized and curated methods for providing guidance.

Collective action is also needed to collaboratively develop standardized content, coordinate capacity-strengthening initiatives, and streamline and curate access to these resources. This will lay the foundation for new training opportunities and delivery mechanisms that effectively respond to the needs of AQM practitioners.

By developing a shared understanding of the key steps and actions critical to AQM guidance in specific regions and contexts – and a mechanism to deliver it – global partners can support an increase in the scale and impact of AQM. Ultimately, through effective and coordinated AQM, many negative impacts of air pollution can be mitigated, saving millions of lives and trillions in economic damage, especially in LMICs.

ANNEX 1

Participant organizations

Alioune Diop University of Bambey

Asian Institute of Technology

Birzeit University (Palestine)

Clean Air Fund

Climate and Clean Air Coalition

C40

Centre for Air Quality Management in Dakar

City of Johannesburg

Clean Air Asia

Department of Environment Bangladesh

Environmental Management Authority (Trinidad & Tobago)

Environmental Protection Agency (Ghana)

Environmental Protection Department (Barbados)

Environmental Defense Fund

Gdi

Institut Teknologi Sepuluh Nopember (Indonesia)

Mapúa University (Phillipines)

Ministry of Health Morocco

Ministry of Environment and Sustainable Development (Senegal)

Ministry of Environment and Natural Resources (El Salvador)

Metropolitan Municipaity of Lima

Norwegian Institute for Air Research

Orbis Air

Pakistan Environmental Agency

Ricardo

Secretary of Environment and Natural Resources (Mexico)

Secretary of Environment and Sustainable Development (Argentina)

Tehran University of Medical Sciences

Umweltbundesamt Environmental Agency of Austria

United Nations Development Program

United States Environmental Protection Agency

United States Agency for International Development

World Health Organization

World Meteorological Organization

World Resources Institute

World Meteorological Organization

World Bank

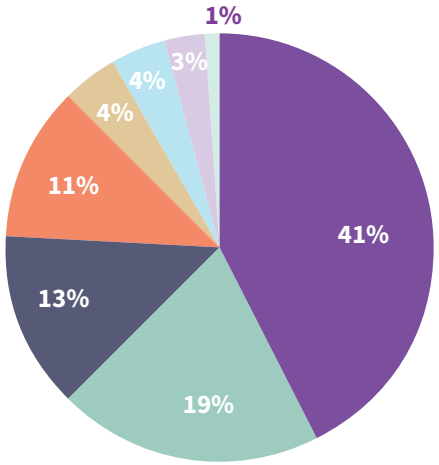
Zambia Environmental Management Agency

*Note that not all survey respondents indicated their organizational affiliation

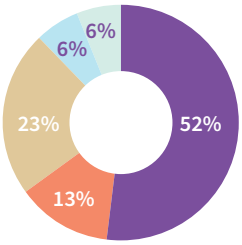
ANNEX 2

Analysis of practitioner background information

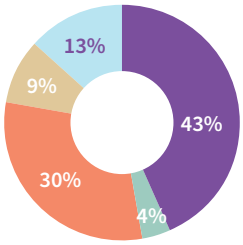
More than half of respondents work in local or national government. Representation from national government was particularly high from Africa, Asia Pacific, and Latin America and Caribbean (LAC).



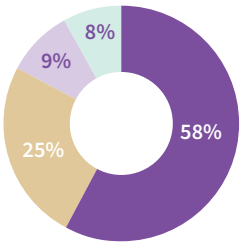
- National government
- Academia/research institutions
- Local government
- Non-governmental organization (NGO)
- Intergovernmental organization (IGO)
- Technical consultancy
- Donor agency
- Other



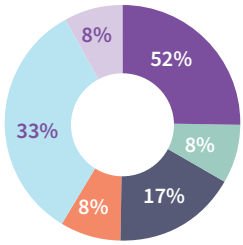
AFRICA



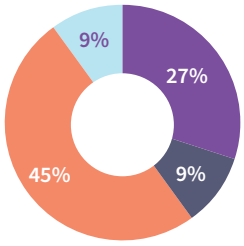
ASIA PACIFIC



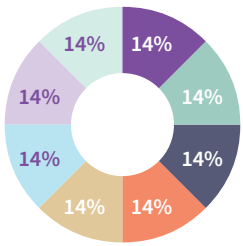
LATIN AMERICA AND CARIBBEAN



EUROPE



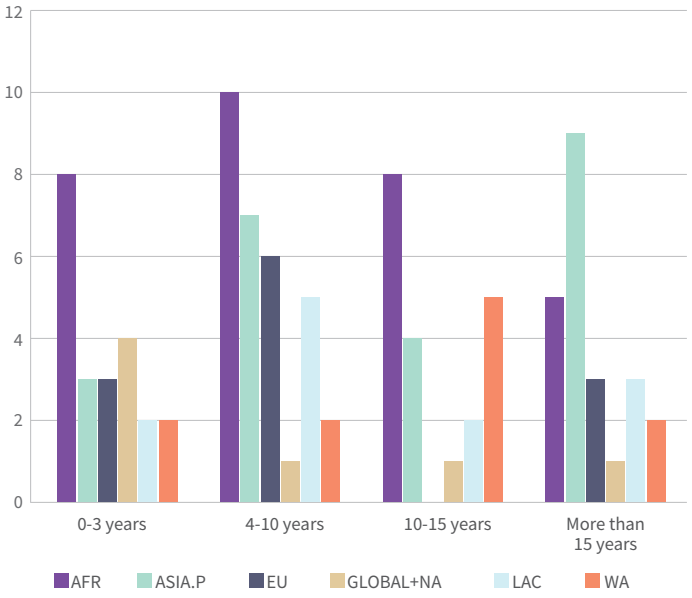
WEST ASIA



GLOBAL & NORTH AMERICA

Majority of respondents are manager-level with more than 4 years of experience. Latin America was the exception with nearly 1/3 of respondents identified as entry-level.

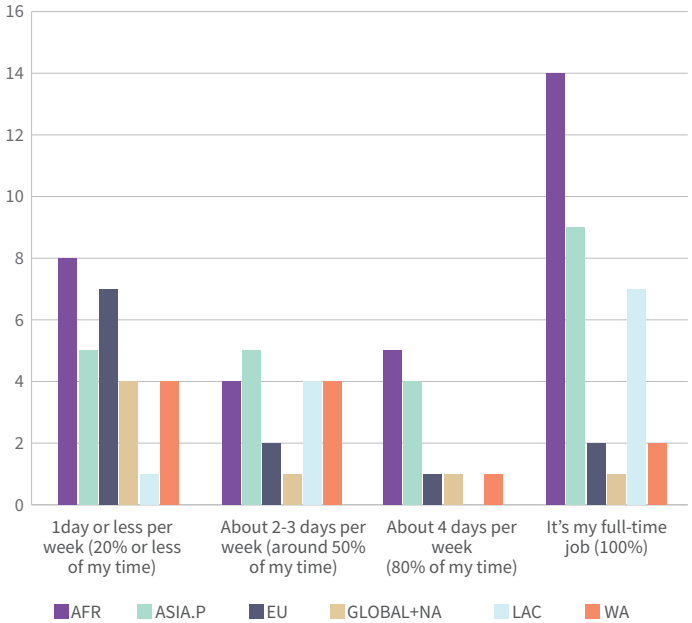
LENGTH OF TIME RESPONDENTS WORKED IN AIR QUALITY MANAGEMENT



	AFR	ASIA.P	EU	GLOBAL+ NA	LAC	WA
Entry-level professional	19%	13%	8%	0%	33%	9%
Manager/senior manager	35%	35%	42%	57%	33%	27%
Director/senior director	39%	30%	8%	0%	8%	55%
Executive leadership	3%	13%	8%	43%	0%	0%

Over 1/3 of respondents work full-time on AQM. Nearly half of government respondents spend 100% of their time on AQM, more than any other sector. Respondents from academia, NGOs, and other areas are more likely to spend 1-3 days per week on AQM.

NO. OF RESPONDENTS BY REGION & TIME SPENT ON AQM



ANNEX 3

Analysis of types of guidance sought by region and practitioner group

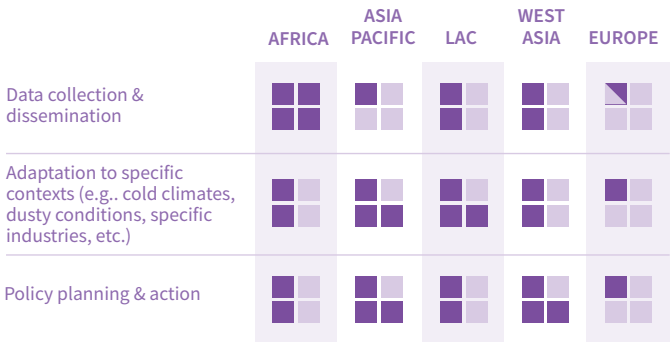
Content gaps and preferences for how guidance is delivered vary across practitioner groups and regions

The types of guidance sought vary by region. Gaps in capacity to collect and disseminate data are particularly prominent in Africa. Adaptation of guidance to specific contexts emerged as a significant challenge for practitioners in all regions, except Europe. The need for more support on how to approach policy planning and action emerged strongly from Asia Pacific and West Asia region participants.

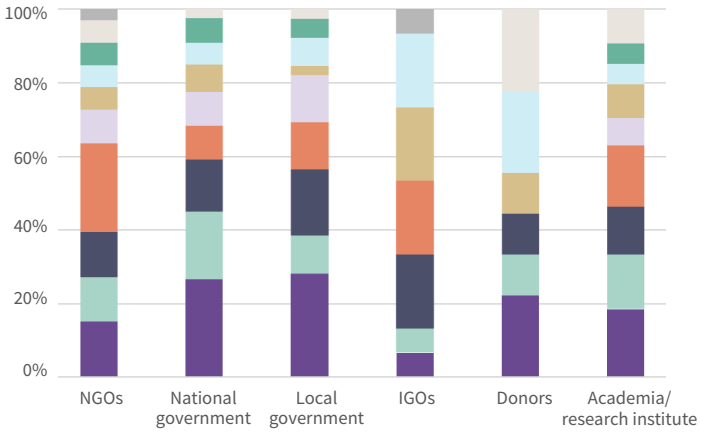
The way practitioners seek out guidance also varies by region. In Africa, Asia Pacific, and Latin America and Caribbean, practitioners often obtain guidance from technical experts and consultants. In the Latin America and Caribbean region, the US EPA is a go-to resource for practitioners. In Asia, practitioners sought out guidance from Clean Air Asia.

Local and national governments, academia, and research institutions favor training programs, while IGOs and NGOs favor communities of practice. Practitioners in Africa, Asia Pacific, West Asia, and Latin America and Caribbean favor trainings, whereas those in Europe favor communities of practice. A quarter of practitioners consulted noted that an online platform with tagged, easy-to-navigate content would be valuable.

FRACTION OF PRACTITIONERS SEEKING GUIDANCE BY REGIONS AND TYPE



SECTOR PREFERENCES FOR GUIDANCE DELIVERY



REGIONAL PREFERENCES FOR GUIDANCE DELIVERY