IDENTIFYING POLICY PRIORITIES FOR IMPROVING AIR QUALITY IN PAKISTAN

Insights from literature and key stakeholders

improving global RESPIRE respiratory health
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NIHR Global Health Research Unit on Respiratory Health (RESPIRE)

RESPIRE aims to reduce the number of deaths and wider health and societal impacts from respiratory diseases in some of the world's most disadvantaged populations.

Co-led by the University of Edinburgh and Universiti Malaya, RESPIRE partners based in Bangladesh, Bhutan, India, Indonesia, Malaysia, Pakistan, Sri Lanka and the UK collaborate to deliver low-cost, scalable policy and clinical interventions to reduce respiratory disease and death in Asia.

RESPIRE is funded by the UK National Institute for Health and Care Research (NIHR), using UK international development funding from the UK Government to support global health research.

PROJECT REPORT

Identifying policy priorities for improving air quality in Pakistan: Insights from literature and key stakeholders

The Asthma & Allergy Institute Pakistan (Islamabad), The Initiative (Islamabad), The Aga Khan University (Karachi), Neoventive Solutions (Islamabad)

Date of Publication: July 2025

Version: Version 1.0

Disclaimer:

This research was funded by the UK National Institute for Health and Care Research (NIHR) (Global Health Research Unit on Respiratory Health (RESPIRE); 16/136/109 and NIHR132826) using UK international development funding from the UK Government to support global health research. The views expressed in this publication are those of the author(s) and not necessarily those of the NIHR or the UK Government.


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PREFACE

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Air quality is a critical and growing public health concern in Pakistan. The link between poor air quality and rising cases of asthma, respiratory infections, and long-term lung conditions is well established. Yet, despite multiple national and provincial frameworks, efforts to improve air quality remain fragmented and under-resourced. The IPPTA Pakistan project was developed to help close the gap between policy and implementation by generating actionable, research-informed priorities through a participatory and structured engagement process.

Supported by the National Institute for Health and Care Research (NIHR) under the RESPIRE programme, this initiative combined a desk-based policy review with technical consultation and broad-based stakeholder dialogue. We sought to understand not just what policies exist, but how they are perceived, implemented, and experienced by those working across sectors and levels of governance. The three-phase process—comprising a scoping review, expert consultation, and a multi-stakeholder workshop followed by a prioritization survey—allowed us to build a shared understanding of key challenges and identify interventions with the strongest stakeholder backing.

Throughout this process, it became clear that improving air quality in Pakistan requires more than technical solutions. It requires political commitment, institutional clarity, effective coordination, and stronger public engagement. Stakeholders repeatedly called for reforms that align health, environmental, and development agendas; ensure transparency in data systems; and promote community-level ownership of clean air as a right and necessity. The prioritization survey reinforced these themes and pointed to practical, high-impact areas where collective action can begin.

This report is both a product of research and a roadmap for the future. It offers funders a clear account of our methods and results, provides policymakers with grounded and context-specific recommendations, and gives civil society and researchers a platform to continue shaping the air quality agenda in Pakistan

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We are deeply grateful to NIHR and the RESPIRE network for enabling this work, and to all those who participated in the consultations. Their contributions reflect a shared urgency and commitment to making air quality a public health priority. It is our hope that this report will inform ongoing efforts, foster meaningful collaboration, and support lasting improvements in the air we all share.

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EXECUTIVE SUMMARY

Air pollution is a major threat to public health, environmental sustainability, and economic stability in Pakistan. Although national and provincial policy frameworks exist, implementation remains fragmented. To address this challenge, a three-phase stakeholder engagement process was conducted under the RESPIRE Identifying Policy Priorities for Tobacco Control and Improving Air Quality: Stakeholder Engagement in Pakistan under the IPPTA project. This summary presents key findings, challenges, and opportunities that emerged across all phases to guide future action.

EXECUTIVE SUMMARY

The IPPTA engagement in Pakistan comprised three interconnected phases:

A. Scoping Review and Policy Mapping:

A comprehensive desk review mapped existing air quality policies, identified implementation gaps, and outlined barriers and recommendations. Findings are being prepared for academic publication and provided a foundation for stakeholder discussions.

B. Stakeholder Engagement Meetings:

A comprehensive desk review mapped existing air quality policies, identified implementation gaps, and outlined barriers and recommendations. Findings are being prepared for academic publication and provided a foundation for stakeholder discussions.

- ### Online Technical Consultation (13 January 2025):

  Twelve participants joined the meeting, including three technical consultants and three observers affiliated with climate-related projects, as well as six members of the Pakistan research team. This session validated the scoping review, helped identify key policy domains, and shaped the agenda for the in-person workshop. Discussions highlighted the need for standardized air quality data, health system integration, and leveraging international climate platforms.

- ### In-Person Multi-Stakeholder Workshop (24 February 2025):

  Held at Serena Hotel, Islamabad, this workshop brought together thirteen invited guests (including technical experts from the online meeting) and the research team. Attendees included representatives from academia, research, government, policymaking bodies, professional associations, media, and civil society. It served as the primary forum for in-depth discussion and generation of thematic recommendations.

C. Policy Prioritization Survey:

Conducted with in-person workshop participants, the survey rated eleven proposed interventions on a Likert scale. The exercise was designed to help align advocacy and policy strategies with stakeholder consensus.

Key Themes from the In-Person Stakeholder Workshop

1. Policy & Governance:

Policies often lack clear, time-bound, and measurable objectives, limiting their effectiveness and implementation. Fragmented governance structures lead to overlapping responsibilities and weak enforcement. There is a need for clearer institutional roles and empowered, legally supported local enforcement mechanisms.

2. Data & Transparency:

Air quality and health data systems are often disjointed and lack credibility. An integrated digital infrastructure is needed for effective data sharing and decision-making. Participants highlighted that reliable and accessible data are essential for tackling air pollution, with the absence of transparent data being a major barrier to action.

3. Awareness & Engagement:

Low environmental literacy and insufficient awareness campaigns obstruct change. Community engagement, school education, and the involvement of trusted figures such as health professionals and parliamentarians, alongside media, are essential for driving improvements.

4. Cross-Sectoral Collaboration:

Addressing air pollution necessitates collaboration across multiple sectors, including health, environment, transport, industry, urban planning, and civil society. Participants emphasized the importance of public-private partnerships and the active involvement of academia in the policymaking process to develop effective solutions.

5. Political & Financial Commitment:

Political commitment and funding for air quality are inadequate, often undermined by low accountability and vested interests. Reframing air pollution as a public health and economic issue could increase support by using economic arguments for budget decisions, linking air quality to productivity gains, and quantifying healthcare savings.

Policy prioritization survey:

Twelve stakeholders evaluated eleven policy interventions using a five-point Likert scale. The top three interventions with the highest weighted scores were:

- **Multi-sector stakeholder alliances** – Emphasizing the need for structural reform and unified action.
- **Enhanced inter-departmental collaboration** – Targeting the reduction of
- bureaucratic silos.
- **Centralized air quality monitoring systems** – Highlighting demand for transparent, real-time data.

Moderate support was observed for enforcement and public-private partnerships, while carbon pricing received mixed responses. These priorities offer a guide for near-term advocacy while indicating areas needing further consensus-building.

CONCLUSION:

Pakistan's air pollution crisis demands coordinated, long-term, and health-centered strategies. The IPPTA engagement—through a scoping review, expert consultation, multi-stakeholder dialogue, and prioritization survey—offers a roadmap for action. Stakeholders emphasized the importance of governance reform, improved data systems, collaboration, political support, and public engagement as critical to achieving cleaner air and improved respiratory health.

LIST OF ABBREVIATIONS

AAIP - Allergy & Asthma Institute Pakistan

AKU - The Aga Khan University

AQI - Air Quality Index

AQTF - Air Quality Task Forces

CAP - Clean Air Policy

CCF - Climate Change Framework

EPAs - Environmental Protection Agencies

EPHS - Essential Package of Health Services

HMIS - Health Management Information System

IPPTA - Identifying Policy Priorities for Tobacco Control and Improving Air Quality

LMICs - Low- and Middle-Income Countries

MCC - Ministry of Climate Change

MoNHSRC - Ministry of National Health Services, Regulations and Coordination

NAP - Pakistan National Adaptation Plan Framework

NCAP - National Clean Air Policy

NCCP - National Climate Change Policy

NEAP - The National Environmental Action Plan

NEP - National Environmental Policy

NOC - No Objection Certificate

OPD - Outpatient Department

PCAAP - Punjab Clean Air Action Plan

PEPA - Pakistan Environmental Protection Act

PIPS - Pakistan Institute for Parliamentary Services

PM - Particulate Matter

PSCP - Punjab Smog Control Policy

RESPIRE - NIHR Global Health Research Unit on Respiratory Health

SDPI - Sustainable Development Policy Institute

ABOUT RESPIRE

The RESPIRE program (NIHR Global Health Research Unit on Respiratory Health) is a global health initiative funded by the UK's National Institute for Health and Care Research (NIHR). It aims to address the burden of respiratory diseases in low- and middle-income countries (LMICs) through collaborative research, capacity strengthening, and the development of evidence-based interventions.

ABOUT THE PROJECT

Chronic respiratory diseases are among the leading causes of illness and mortality globally, with their burden disproportionately affecting low- and middle-income countries, particularly in South and Southeast Asia. Tobacco smoking and air pollution are two of the most significant and preventable risk factors contributing to this burden. Despite existing national policies aimed at reducing these risk factors, gaps in implementation, enforcement, and stakeholder engagement persist, limiting their effectiveness.
To address these challenges, this multi-country stakeholder engagement study—led by the University of Edinburgh under the NIHR-funded RESPIRE Global Health Research Unit—was conducted in seven countries: Bangladesh, India, Malaysia, Pakistan, Bhutan, Sri Lanka, and Indonesia. The study aimed to identify and prioritize feasible and impactful policy responses for tobacco control and air quality improvement, with a particular focus on the perspectives of local stakeholders who play a direct role in shaping or implementing relevant policies.

In Pakistan, the burden of air pollution poses a significant threat to public health and is a key contributor to the country's rising rates of chronic respiratory diseases. Ambient and indoor air pollution—resulting from sources such as vehicular emissions, industrial discharges, burning of solid fuels, and unmanaged waste—remain pervasive across urban and rural areas alike. Despite increasing awareness and multiple policy documents introduced over the past two decades, challenges in implementation, coordination, and enforcement continue to hinder meaningful progress in air quality management.

Under the RESPIRE IPPTA project, the focus in Pakistan had been on identifying policy priorities to improve air quality through structured stakeholder engagement. The initiative is led by the Allergy and Asthma Institute Pakistan (AAIP), in partnership with The Initiative Islamabad, The Aga Khan University Karachi and Neoventive Solutions Islamabad. These organizations have long-standing experience in advocating for respiratory health and environmental protection, making them well-positioned to facilitate this national dialogue. This work was carried out to identify the existing policies on air quality and to prioritise the existing policies for actionable items with relevant stakeholders to contribute towards preserving air quality.
The study aimed to document existing initiatives and challenges, and promote cross-sectoral collaboration and build momentum toward more effective policy action in Pakistan." The outcomes included a clearer understanding of existing policies, policy gaps and opportunities, identification of locally driven research priorities for future studies, and the generation of actionable policy briefs to support advocacy and decision-making.

The project followed a structured three-stage approach:

1. Scoping Review of academic and grey literature
2. Stakeholder engagement
3. Identifying policy priorities for advocacy

1.SCOPING REVIEW

1. SCOPING REVIEW

As the initial phase of the project, the scoping review aimed to map the existing policy landscape and produced a baseline document to guide subsequent steps. To conduct this review, a comprehensive search strategy was implemented, encompassing both grey literature and peer-reviewed scientific sources. Academic literature was explored through databases including PubMed, Scopus, and Google Scholar. In parallel, we reviewed the websites of national and international agencies working on air quality and environmental control to identify relevant policy documents, reports, and briefs. In total, the scoping review included eight academic studies and nineteen grey literature documents. Table 1 gives an overview of air-quality related existing policies in Pakistan.

The scoping review titled **'Current Landscape and Future Directions of Policies Addressing Air Quality Improvement in Pakistan: A Scoping Review'** has been planned to be submitted for publication in a relevant scientific journal.

Table 1: Overview of Air Quality policies in Pakistan

Year	Policy	Policy description	Implementation Status
National Policies			
2023	National Clean Air Policy(NCAP)	The first-ever national-level policy identifies a priority intervention in the top 5 sectors: Household, Transport, Industry, Waste, and Agriculture	No information on implementation yet.
2023	Pakistan National Adaptation Plan (NAP) Framework	Dealing with climate change through coordination and climate finance mobilization.	No information on implementation yet.
2021	National Climate Change Policy	Policy measures for climate resilience and reducing emissions from various sectors. Climate adaptation and mitigation.	Key initiatives include the Ten Billion Tree Tsunami Programme and the Clean Green Pakistan Movement. No concrete data on other measures.
2012	National Climate Change Policy	Related to the sectors of agriculture, forestry, water, and coastal lands, along with their biodiversity and protection of the ecosystems of Pakistan.	Development of a framework for the implementation of Climate Change Policy.
2005	National Environmental Policy	To resolve and conserve the environmental issues through sustainable means, not only for the purpose of improving the overall development of the state, but also to improve the quality of life of its citizens.	No information on implementation status.
2001	The National Environmental Action Plan (NEAP)	The NEAP was launched with the goal of improving environmental quality, promoting sustainable resource use, and ensuring that development is environmentally sustainable.	Key objectives, such as the introduction of unleaded gasoline and a reduction in sulfur in diesel, have been achieved.
1997	Pakistan Environmental Protection Act (PEPA)	Rehabilitation and conservation of the Environment and Sustainable Development Goal.	This act established key institutions, including the Pakistan Environmental Protection Council and the Environmental Protection Agencies (EPA), which were formed at the provincial level.

Table 1: Overview of Air Quality policies in Pakistan

Year	Policy	Policy description	Implementation Status
Provincial Policies			
2023	Punjab Clean Air Action Plan	Regulation of industrial processes, air pollution, and urban pollution control, and development of emergency response systems.	No information on implementation yet.
2017	Punjab Smog Control Policy	Policy suggests health and traffic advisories, traffic management, catalytic converters in vehicles, capacity building in monitoring & forecasting high air pollution episodes.	Building upon the 2017 policy, the Punjab government approved the Punjab Clean Air Policy to combat air pollution further.
2014	KPK Environment Protection Act	Conservation & rehabilitation of the environment, pollution control, and sustainable development.	A Climate Change Cell was established within the EPA in 2014 to study the impacts of climate change and devise coping strategies. This cell played a pivotal role in formulating the province's first Climate Change Policy in 2017.
2014	Sindh Environment Protection Act	Provides a legal framework for the protection, conservation, and improvement of the environment in Sindh province.	In 2016, the Sindh EPA published the SEQS, which applies to all industrial and municipal effluents, gaseous emissions, motor vehicle exhaust, noise, and ambient air.
2012	Baluchistan Environment Protection Act	Provides a legal framework for the protection, conservation, and improvement of the environment in Baluchistan province.	No information on implementation status.

2. STAKEHOLDER ENGAGEMENT

2.1 Online Consultation

An online technical consultation was held as part of the IPPTA project's stakeholder engagement process. The meeting convened experts in pulmonology, public health, environmental and occupational health, and air quality research, representing national academic institutions, public health bodies, and implementation partners.

The session began with an overview of the IPPTA project, including its objectives, timeline, partners, and completed milestones. This was followed by a presentation of scoping review findings on national and provincial air quality policies, setting the stage for a focused discussion on policy gaps, implementation barriers, and strategic opportunities.

The consultation also helped refine the agenda and stakeholder mapping for the upcoming in-person workshop, ensuring that key themes and priorities were carried forward.

2.2 Key Insights and Strategic Directions

2.2.1 Policy Fragmentation and Weak Implementation

Participants observed that while Pakistan has a number of policies addressing air quality, their implementation remains fragmented and inconsistent. Institutional ownership is weak, and political commitment is limited. Many policies lack clear operational pathways and are disconnected from scientific evidence due to data gaps and low technical capacity. There was consensus on the need to distinguish between air quality-specific initiatives and broader climate change frameworks to avoid dilution of focus.

2.2.2 Institutional and Operational Barriers

The ministries responsible for environment and climate change were seen as under-resourced and institutionally neglected, with little coordination across sectors. Monitoring systems are either non-existent or severely underutilized, and public awareness is minimal, leading to weak accountability. Participants stressed the urgency of strengthening institutional structures, particularly at the provincial level.

2.2.3 Data and Technology Gaps

Limited measurement of emissions from key sectors—especially transport, industry, and agriculture—hampers effective policymaking. Technologies such as satellite monitoring remain underexploited. There was strong support for building robust, disaggregated data systems to enable evidence-based decision-making.

2.2.4 Capacity Strengthening

The institutional capacity of Environmental Protection Agencies (EPAs) at federal and provincial levels emerged as a key concern. Participants recommended targeted training in environmental monitoring, data analysis, and the use of emerging technologies to improve enforcement and oversight.

2.2.5 Public and Political Engagement

Enhancing public understanding of the health impacts of air pollution was viewed as essential for driving change. Community-led initiatives and civil society engagement were seen as critical to fostering social accountability. Participants pointed to successful examples from Punjab, where political leadership and multisectoral action had yielded measurable results.

2.2.6 Collaborative and Strategic Approaches

Several forward-looking recommendations emerged from the discussion:

- **Establish a Collaborative Platform:** A centralized network—potentially involving institutions such as Aga Khan University, Indus Hospital, and professional societies, like the Pakistan Chest Society and others—could act as a hub for research dissemination, grant support, and joint advocacy.
- **Pilot Stakeholder Engagement Models:** The idea of piloting the collaborative platform during the upcoming workshop was proposed, with an emphasis on engaging provincial EPAs and political actors to ensure legitimacy and impact.
- **Bridge the Research–Policy Gap:** Tools are needed to translate scientific findings into policy-relevant metrics, particularly those highlighting health and economic implications.

- **Enable Citizen Advocacy:** Participants recommended mechanisms to support evidence-based citizen engagement, including public campaigns, community mobilization, and structured civil society participation.
- **Explore Sustainable Financing:** Innovative funding mechanisms, such as a carbon tax, were discussed as potential sources to finance long-term air quality interventions.

2.3 In-Person Workshop

As part of the IPPTA project in Pakistan, a systematic and context-driven approach was adopted to identify and engage key stakeholders for a consultation on air quality policy priorities. A structured stakeholder mapping and prioritization process was undertaken to ensure inclusive representation from sectors with both influence and interest in air quality management.

The process began with the development of a Stakeholder Matrix, listing relevant institutions and individuals from government ministries, regulatory bodies, academia, research institutions, healthcare, environmental NGOs, the private sector, and civil society. Each stakeholder was assessed based on two key criteria: (1) their influence in policy and decision-making, and (2) their level of engagement with air quality issues. This evaluation informed the strategic selection of participants who could contribute substantially to the consultation and support future policy implementation. Purposive sampling ensured a balanced mix of technical, policy, and grassroots perspectives. Selected participants included environmental and public health researchers, officials from the Ministry of Climate Change and the Ministry of National Health Services, Regulations and Coordination (MoNHSRC), provincial environmental protection departments, healthcare professionals, and civil society representatives. Priority was given to individuals actively involved in environmental health policy or implementation.

To validate and refine the stakeholder list, the project team held in-person consultations with senior officials at the MoNHSRC, including the Director General of Health, Program Directors, and public health and environmental regulation leads. These discussions helped identify additional key actors and ensured alignment with institutional priorities. All selected stakeholders were contacted individually, briefed on the project's objectives, and invited to participate in the in-person consultation workshop. Written informed consent was obtained prior to participation. The workshop provided a platform for participants to discuss key challenges, policy gaps, and actionable priorities for improving air quality in Pakistan. This rigorous identification and engagement process ensured broad-based, meaningful participation, positioning the consultation to yield contextually relevant and policy-relevant insights.

2.3.1 Themes of Discussion during In-Person Workshop

2.3.1.1 Theme 1: Policy & Governance

The workshop revealed that, while Pakistan has created various environmental and public health policies, their effective implementation into measurable, locally adapted actions is lacking. Participants expressed concerns about the persistent gap between policy development and execution, which hinders efforts to improve air quality and health outcomes. They noted that even well-designed strategies struggle due to inadequate political prioritization, unclear accountability, and poor planning.

• Need for locally adapted and sustained policies

Participants underscored the critical issue of insufficient localization and operationalization of policies at the city or district level, despite the significant disparities in pollution sources and urban spatial structures across various regions. A stakeholder from academia expressed the complexity of the situation by saying:

"Broadly, vehicle is one big element. Industry is one major issue. So, if you want to do something with your eyes closed, at least those are there. But in Punjab—Lahore, for example—there is biomass together with industry, agriculture, and residence. So, Lahore is a different city. In Karachi, there is a little segregation—industry on one side, and then some residential areas. So, it's a different city."

Stakeholders voiced their frustration regarding the ad hoc approach to environmental health initiatives, which tend to be reactive and fragmented. One stakeholder noted that action plans are primarily developed only in response to crises rather than through a framework of sustained, long-term strategic planning. For instance, interventions are typically implemented when pollen levels in Islamabad or smog levels in Punjab reach alarming heights, leading to increased health concerns such as asthma and allergies. Unfortunately, once these acute episodes diminish, the momentum for action fades, resulting in a return to inaction.

Participants also highlighted that the policies are often devised in silos, lacking engagement with relevant stakeholders, particularly at the district and city levels. This disconnect, leads to policies that may seem comprehensive on paper but lack the practical feasibility necessary for effective implementation. Furthermore, the absence of clearly defined implementation roadmaps—including funding allocations, institutional responsibilities, and enforcement mechanisms—results in even the most well-intentioned policies remaining ineffective and dormant.

• Need for specific, measurable targets for air quality goals

One of the key issues raised was the lack of specificity in many air quality-related policies. While overarching goals, such as reducing smog or enhancing urban air standards, are articulated, few policies contain quantifiable indicators, timelines, or designated agency responsibilities. Consequently, measuring progress, evaluating effectiveness, and holding institutions accountable becomes difficult. One stakeholder proposed the inclusion of four to five specific implementation indicators to accurately assess whether a policy is being effectively executed. Building on this point, another participant highlighted that the current policies lack measurable criteria; e.g., they do not specify the percentage reduction in air pollution that could be achieved through the completion of certain initiatives or activities.

A stakeholder working in the field of environmental health emphasized the significance of this issue:

"So, we need to pinpoint our focus and create a roadmap for implementation. What do we need to achieve in one year? What about in two years? Currently, there is no systematic information available for implementation, as there is no comprehensive document from the EPA."

A health policy expert pointed out that the absence of performance metrics and institutional audits compromises agencies' accountability for environmental outcomes. This lack of evaluative frameworks makes it difficult to assess the effectiveness of policies intended to protect public health and the environment.

"What's missing here is that the stakeholders are not present to take ownership of those policy documents. Some indicators—if someone must assess, implement, or report on them—then that person isn't even at the table. Which positions are these? These are roles that a Deputy Director, a Section Director, or someone at the Secretary level would handle. Who is going to monitor, generate a report, and submit it to the national dashboard?"

• Weak institutional architecture undermining implementation

A major concern expressed during the workshop is the lack of an adequate governance framework for air quality management in Pakistan. Participants emphasized that environmental issues often take a backseat in the priorities of mainstream policymakers. The institutional landscape is further complicated by diffuse responsibilities, overlapping mandates, and limited inter-departmental accountability. There was a unanimous consensus among participants regarding the urgent need for robust and empowered institutions capable of implementing sustainable, cross-sectoral strategies to mitigate air pollution. While provincial EPAs are legally mandated to spearhead air quality initiatives, they are widely perceived as under-resourced, technically constrained, and politically marginalized within the broader governmental structure.

A stakeholder identified unplanned urbanization, deforestation, and a lack of local government engagement as significant factors contributing to poor air quality. They cited Punjab as an example, where the government sought to address this by empowering deputy commissioners to spearhead the implementation of air quality policies. This strategy aimed to enhance coordination across vital departments—including local government, industry, forestry, and environmental agencies—by consolidating authority in the hands of a single individual at the district level.

Enforcement remains a critical blind spot within planning processes. Even when laws exist, such as those enforcing emissions control or fuel quality standards, their implementation is often hindered by a lack of enforcement strategy. One stakeholder highlighted the situation in Lahore, where transportation contributes significantly to air pollution. In response, the Punjab government introduced a requirement for No Objection Certificates (NOCs) to ensure vehicles meet suitability standards. However, the initiative encountered considerable resistance, with the excise department contending that it could not effectively carry out the enforcement of this measure.

• **Governance hindered by political interference and bureaucratic turnover**

Many participants emphasized the need to empower EPAs to enforce compliance effectively. Even when designated departments undertake enforcement actions, such as shutting down polluting industries or penalizing non-compliant vehicles, their decisions are frequently overturned due to political interference or legal loopholes.

Bureaucratic hurdles and the rapid turnover of officials were identified as significant barriers to the implementation of air quality policies and other initiatives. It is essential to support and protect the officials responsible for these efforts, as the current environment often sees them changed within just a few months, hindering their ability to settle into their roles. If an official takes justified and strict action, they risk being replaced. Participants stressed that without clear institutional ownership of air quality responsibilities, no amount of technical planning or advocacy will lead to sustained impact.

• **Public access to services and viable alternatives required for implementation**

A stakeholder highlighted that effective policy hinges on three interconnected components: policymaking, public awareness, and service delivery. Although considerable progress has been made in terms of awareness and policy formulation, the service delivery component remains notably insufficient. For example, individuals may be informed about the requirement for a vehicle fitness certificate, yet no accessible facilities exist to issue such certifications. Likewise, although there are prevalent calls for air quality monitoring, essential tools like monitoring devices are often unavailable. Recommendations for source apportionment studies exist, but there is no institutional framework to support their implementation. Recognizing that it is unrealistic to expect the government to address all issues alone, the stakeholder emphasized the pressing need to actively engage other stakeholders—either directly or through public-private partnerships—to establish and maintain these vital services.

"The service arm is missing. You keep raising awareness and making policies, but without a service component, it won't work. You tell people not to do this or that, but what's the alternative? You have to provide that too."

During the discussion, it was emphasized that vehicular emissions significantly contribute to air pollution throughout Pakistan. One stakeholder suggested that advocacy efforts are needed within the chamber of commerce to prevent the importation of outdated machinery from developed countries, which tends to be more polluting and less fuel-efficient. Additionally, It is crucial to phase out 2-stroke engines and older car models.

Another participant proposed a practical solution for reducing vehicular emissions: limiting the number of cars allowed in urban areas. Examples from other countries, such as France's alternating access system based on even- and odd-numbered license plates, demonstrate effective and feasible strategies. These measures can be successfully implemented through coordinated efforts among the relevant departments. Lastly, participants highlighted the need for simplified public dashboards to enhance transparency and encourage public support for air quality reforms.

• **Need for built-in impact assessment in climate and air quality policies**

Many participants emphasized Stakeholders also highlighted the importance of demonstrating the impact of investments in climate and environmental initiatives through systematic and longitudinal monitoring. One stakeholder, with experience in public health and academia, emphasized that given the significant financial commitment to these projects, it is essential to conduct an impact assessment based on factual data rather than relying solely on modeling. This approach is critical to determine the true value of the investment. Therefore, it is advisable to allocate a budget for impact assessment at the project's outset.

In this context, another stakeholder from a governmental background referenced the impact assessment of the Billion Tree Tsunami reforestation project in Khyber Pakhtunkhwa province. They noted that the project led to an impressive temperature reduction of 10 degrees Celsius (from 38 to 28 degrees) in a desert region during June, achieved over a span of three years.

An additional opportunity exists in creating feedback loops between policy and research. It is vital for academic institutions and think tanks to be formally involved in the monitoring and evaluation of air quality plans.

Summary of Theme 1: Policy and Governance	
Challenges	**Recommendations**
Policies are not localized or adapted to city/district contexts	Develop context-specific policies based on local pollution sources and urban layouts
Ad hoc and reactive planning; no long-term strategy	Institutionalize sustained, proactive planning at all administrative levels
Lack of quantifiable objectives, timelines, or indicators	Define clear, measurable policy targets and performance indicators
Weak institutional coordination and fragmented mandates	Establish empowered lead agencies with cross-sectoral authority.
Enforcement gaps due to capacity constraints and political interference	Strengthen legal mandates of EPAs and protect implementing officials from political/bureaucratic shifts
Service delivery infrastructure is missing (e.g., vehicle fitness centers, AQ monitors)	Develop service delivery mechanisms through public-private partnerships.
Limited public access to alternatives (e.g., fuel-efficient vehicles, clean technology)	Regulate the import of outdated high-emission vehicles and machinery, and incentivize the use of cleaner technology.
Poor communication of policy implementation and progress	Create public dashboards for transparency and accountability
No built-in impact assessments for climate/air policies	Allocate funding for longitudinal impact assessments and involve academic partners

2.3.1.2 Theme 2: Data & Transparency

A key theme from the workshop was the importance of reliable, timely, and publicly accessible data in combating air pollution and its health effects. Participants from various sectors highlighted that the lack of transparent, verifiable data poses a significant barrier to effective action. They agreed that credible data is crucial for building public trust, informing policy, and communicating risks to communities.

• **Data silos and weak institutional integration**

Participants emphasized the existence of a fragmented data landscape, where health, environmental, and air quality data are collected in isolation by different agencies. Specifically, health data related to air pollution-related illnesses—such as asthma and heart disease—tends to remain siloed within individual institutions and is seldom shared with environmental agencies.

A health policy advisor noted that while air quality monitors operate in major cities, the data collected by the EPAs is often not made publicly available. The lack of coordination hampers timely data sharing through official platforms. This advisor also pointed out that satellite measurements are consistent with ground-based monitors, enhancing the reliability of the data, yet its value is undermined by slow dissemination.

"Data sharing is very important—such as data from children's hospitals, asthma cases, and the increased incidence of myocardial infarctions during high air pollution days—and how this information is communicated to other departments, like the EPA. There should be stronger collaboration with hospitals and practitioners."

This stakeholder also pointed out that private healthcare providers possess a substantial amount of clinical data that is often overlooked in surveillance systems. They also highlighted a promising initiative focused on developing a dashboard that links air pollution levels with hospital admission rates. This project aims to integrate existing air quality monitors with data from hospitals regarding the number of asthma patients, especially children, during times of elevated pollution. While these initiatives mark significant progress, they remain in the early stages and are localized, underscoring the necessity for broader systemic integration and coordination among institutions.

One stakeholder involved in respiratory health research provided an example of effective integration between environmental and health data. At their institute, research on pollen and regional allergies is directly linked to hospital data, allowing for the tracking of how ecological exposures—such as smog—affect health outcomes, including asthma exacerbations, Chronic Obstructive Pulmonary Disease, and flu-like symptoms. This approach also captures indirect consequences, such as missed work and school days, providing valuable insights into the overarching health and economic burden. This example illustrates the significance of linking environmental science with clinical data to inform more effective interventions.

• **Lack of public access and official validation**

A stakeholder expressed concerns about the reliance on unofficial sources for air quality index readings. They pointed out that while each provincial EPA is capable of generating accurate Air Quality Index (AQI) readings, media reports frequently depend on private sources or online data, some of which are notably unreliable. This can lead to confusion and unnecessary public alarm.

The stakeholder emphasized that only EPA-approved AQI readings should be shared to ensure consistency and credibility in public reporting. They emphasized the need to verify the timing and methods of data collection by private sources, as pollution levels can vary greatly during peak traffic periods. They noted that the EPA routinely collects four sets of data, calculates an average, and then shares these validated figures with the media. In response, another participant stated that it is the EPA's responsibility to share their readings with the public:

"The EPA doesn't put up their measurements on the web. Then people conduct their own measurements, and rumors start spreading. So, the first thing is that the EPA has to step up and say: this is the air quality of our city; this is the air quality of our provinces. We are the source. Since the EPA has the authority, they should communicate this everywhere."

Another academic stakeholder emphasized that journalists should either receive accurate interpretations of environmental and health statistics or seek expert input independently, as misinterpretations can result in data being reported out of context and misinforming the public.

• **Data manipulation and lack of trust**

Several participants underscored the damaging effects of secrecy and manipulation in health data. A public health expert pointed to instances of unethical inflation of patient numbers in health reports to secure additional funding. This stakeholder noted that such distortions ultimately undermine long-term credibility and hinder informed resource allocation.

"Even when patient statistics exist, they're not always reliable. I've seen with my own eyes how numbers go from 6 to 60, and 60 to 600—just to secure funding."

Summary of Theme 2: Data & Transparency	
Challenges	**Recommendations**
Multiple institutions collect data relevant to air quality and health, but remain uncoordinated and fragmented.	Promote systematic data integration across agencies, including EPAs, hospitals, and meteorological departments.
Clinical health data, including from private sector providers, is not routinely shared.	Enable cross-sectoral sharing of clinical and environmental data through formal collaboration mechanisms.
The public relies on unverified online sources due to the absence of authoritative communication.	Position EPA as the primary source of accurate air quality information and promote visibility of official data
Journalists may misinterpret environmental and health statistics due to a lack of technical support.	Facilitate access to expert interpretation and training for journalists on environmental health data.
Instances of inflated patient data undermine credibility and resource planning.	Introduce independent audits and accountability mechanisms to ensure accurate and ethical health data reporting.

2.3.1.3 Theme 3: Awareness & Engagement

Public engagement has emerged as a fundamental pillar for any long-term strategy aimed at improving air quality in Pakistan. Participants emphasized that meaningful environmental change cannot be achieved without an informed and mobilized public. They noted that while technical solutions and policy frameworks are critical, their success ultimately depends on societal awareness, trust, and behavioral shifts among various population groups.

• **Environmental literacy and civic empowerment**

Several workshop participants highlighted a significant gap in environmental literacy, despite increasing public frustration regarding deteriorating air quality in urban centers. They observed that many citizens remain unaware of the specific pollutants they encounter, how these exposures can impact their health, the protective measures they can adopt, and the rights they should advocate for.

This communication gap is further exacerbated by widespread misconceptions and misinformation, often resulting from limited proactive outreach by public authorities. Stakeholders referenced the issue of farmers burning agricultural waste, often without understanding the associated health risks, primarily due to a lack of viable alternatives. Such actions arise not from apathy but from a genuine lack of awareness and accessible options.

A representative from a respiratory health professional society underscored the urgent need to raise awareness among the public, students, and workers about environmental health hazards. They emphasized that meaningful change must originate at the community level through increased awareness and public pressure. When individuals are informed, they can advocate against harmful practices—such as unregulated vehicles and industrial pollution—thereby prompting government action. Even basic actions, such as filing formal complaints, can help generate momentum for enforcement.

"At the very least, the public should speak out against it (sources of air pollution). They should lodge an FIR (First Information Report)—whether or not it leads to action, there should still be a formal complaint. People should say that this rickshaw shouldn't be here, or that this car shouldn't be here. Until this change happens, there will be no progress."

• Advocacy through professional and political channels

A participant with a background in public health and academia highlighted the importance of prioritizing air pollution and health on government agendas. They advocated for the appointment of a dedicated champion from either academia or public health to lead this initiative, ensuring sustained momentum and visibility, particularly during non-crisis periods. The speaker underscored the important role that professional organizations in pediatrics, cardiology, and respiratory health can play in advocacy, which requires minimal financial investment and can be effectively amplified via social media platforms.

Additionally, a stakeholder pointed out that public health professionals are not fully leveraging available advocacy platforms, such as the Pakistan Institute for Parliamentary Services (PIPS) and various women's parliamentary groups. These entities could serve as powerful tools for raising awareness, as elected officials play a crucial role in shaping public agendas within their constituencies.

"We aren't going to women's caucuses, we aren't going to the parliamentarians—we should. Because they'll go into their circles, and when they bring it up there, they'll create the most awareness. Since they take their votes from those places, when they tell someone about something, it becomes an agenda of the people."

• Strengthening media capacity for environmental reporting

A significant barrier is the limited capacity of journalists and media outlets to accurately report on environmental health issues. This often results in a weakened communication of risks, which can lead to apathy or sensationalism. One stakeholder, while discussing the media's role in advocacy, emphasized that journalists must first grasp the issues themselves for the media to effectively raise public awareness. Although the media is frequently cited as a key partner in health and climate initiatives, the need for capacity building among journalists is often overlooked.

"There must be a component of journalist training and capacity building on environmental health issues—environment, climate change, air quality, and their relationship with health. Only when I understand it myself can I explain it to others. If I don't know, what can I possibly say to anyone else?"

• **Education and tailored communication strategies**
Participants advocated for a comprehensive strategy to enhance environmental literacy, underscoring the necessity for tailored communication approaches that address the diverse segments of the community. Social media was identified as a powerful and cost-effective tool to bolster advocacy efforts and engage wider audiences.

A stakeholder from academia, specializing in environmental science, stressed that policies cannot remain abstract concepts; they must be communicated to the community in clear, relatable language that resonates with people's daily lives, highlighting the tangible benefits of adhering to these policies.

Additionally, a public health research stakeholder highlighted the significance of environmental education, particularly for children as the next generation, to help shape community behavior and enhance awareness of the intricate relationship between humans and the environment.

Summary of Theme 3: Awareness & Engagement	
Challenges	**Recommendations**
Low environmental literacy and limited understanding of pollution sources and health impacts	Develop clear, relatable communication materials tailored to diverse audiences.
Underutilization of professional bodies as advocacy channels	Mobilize health professional associations for strategic advocacy
Inadequate use of parliamentary platforms for awareness	Engage parliamentary groups and elected officials to amplify environmental health issues
Weak capacity of journalists to report on environmental health	Capacity-building for media professionals to strengthen their reporting on environmental and health issues
Poor translation of policies into understandable messages for the public	Simplify and contextualize policy communication using local language and lived experiences

2.3.1.4 Theme 4: Cross-Sectoral Collaboration

During the workshop, participants highlighted that addressing air pollution in Pakistan requires coordinated collaboration across multiple sectors, including health, environment, transport, industry, urban development, education, agriculture, and civil society. However, they noted that such collaboration is often rare, poorly structured, and hindered by institutional silos, jurisdictional confusion, and a lack of shared goals.

• **Weak coordination across government sectors**
Several participants highlighted that although environmental and health stakeholders often collaborate in areas such as planning documents and national strategies, they seldom engage in practical, coordinated actions. One stakeholder emphasized the necessity of adopting a Health in All Policies (HiAP) approach to ensure that health considerations are integrated across various policy domains. Additionally, they called for the enforcement of the One Health policy to promote more effective collaboration among sectors.

Participants also pointed out that institutional cultures and interdepartmental dynamics can impede collaboration. Ministries and departments frequently lack the incentives to share information or resources, resulting in mixed messaging and parallel policies that lack coherence. A significant challenge identified was the siloed operation of government departments, where narrowly defined mandates allow cross-cutting issues, such as air pollution, to be overlooked. With few mechanisms for joint planning, budget allocation, or shared monitoring, the result is fragmented implementation and subpar outcomes.

Stakeholders stressed the need for more decisive leadership and coordination in policy implementation. One individual underscored the potential of inter-ministerial forums to facilitate collaborative policymaking and implementation across departments, while another emphasized the important role of Chief Secretaries in this process.

> **"There are a lot of communication gaps among departments. Since the Chief Secretary is the main authority in each province, they should take the lead in implementing multisectoral initiatives—this has been my experience. Departmental Secretaries cannot go beyond their specific domains, so Chief Secretaries should lead both policy creation and implementation."**

• Limited role of academic and research institutions

A representative from academia emphasized that researchers at universities gather extensive data that includes both manual and automated monitoring, satellite information, AQI comparisons, source contribution analysis, and spatiotemporal studies. However, academic institutions are frequently marginalized in the policy development and revision processes. They proposed that establishing a clear role for academia would enhance the likelihood that policies are grounded in accurate and relevant evidence.

Participants also highlighted a significant gap in the involvement of other non-governmental stakeholders, including public health professionals and frontline implementers, in decision-making processes. This gap can result in policies that do not reflect local contexts and implementation realities, highlighting the need for more inclusive participation.

Additionally, a stakeholder with a background in policy advising remarked on the growing importance of academic involvement in policy dialogues. They cited recent intersectoral meetings where researchers played a pivotal role. They highlighted that numerous air pollution studies, such as multicenter cohort studies from Harvard, constitute the evidence base for developing air quality guidelines and inform national planning.

• Need for source apportionment and case studies

A public health academic noted the absence of case studies in Pakistan, which are essential for understanding the causes and impacts of climate and air quality issues, and for evaluating the effectiveness of related measures.

Several stakeholders highlighted the significance of source apportionment studies in determining and quantifying the contributions of various emissions sources to overall air pollution levels in different cities and regions of Pakistan. They emphasized that conducting these studies is essential for developing effective strategies to enhance air quality by identifying the primary sources of pollution, such as transportation, stubble burning, and industrial activities. Each city presents its own unique challenges; for instance, Lahore, Karachi, Islamabad, and Peshawar each exhibit distinct pollution profiles. Therefore, apportionment studies conducted in each of these cities will empower authorities to implement targeted and efficient measures tailored to the specific needs of each region.

Additionally, a public health academic pointed out the lack of case studies in Pakistan, which are crucial for understanding the causes and effects of climate and air quality challenges, as well as for assessing the effectiveness of related interventions.

Summary for Theme 4: Cross-Sectoral Collaboration	
Challenges	**Recommendations**
Coordination across government departments is limited, with few formal mechanisms for joint planning and implementation.	Empower Chief Secretaries and utilize inter-ministerial forums for coordination; encourage a Health in All Policies approach.
Lack of localized data on pollution sources limits the effectiveness of interventions.	Conduct source apportionment studies in major cities to inform targeted strategies.
Limited engagement of non-government actors weakens the relevance and feasibility of policies.	Involve academics, health professionals, and implementers in decision-making processes.

2.3.1.5 Theme 5: Political & Financial Commitment

Participants consistently highlighted that the absence of sustained political will and inadequate financial commitment are critical barriers to addressing air pollution in Pakistan. Although the issue receives increased attention during smog season—especially in cities like Lahore—it remains underprioritized in national planning, budgeting, and legislative agendas.

• **Weak political prioritization and competing interests**

The political context surrounding air pollution is marked by conflicting interests, a lack of incentives, and minimal accountability. Elected officials may perceive environmental regulations as threats to their economic base or political allies, particularly in agriculture and industry. As a result of these vested interests, regulatory enforcement is frequently inconsistent and politically selective.

A clinical academic offered a pointed reflection on the political economy of environmental regulation, emphasizing how entrenched interests can often undermine enforcement efforts:

"It was widely stated that crop-burning is the major issue. But most provincial and national assembly members are landlords, and without crop-burning, the agricultural cycle doesn't work. So they'll never stop it—they'll divert blame to India or fuel burning instead."

Participants in the discussion underscored that air pollution is often relegated to a peripheral status within policymaking frameworks, frequently treated solely as a seasonal crisis. An academic stakeholder highlighted that Pakistan has historically prioritized climate-related disasters; however, there has been a recent shift towards addressing smog and air pollution, suggesting that meaningful implementation of policies will require time. This stakeholder emphasized the critical role of forecasting tools and seasonal data in shaping effective timing and strategies for control measures, particularly during high-risk winter smog episodes.

Additionally, a stakeholder with a background in national health policy and academia observed that while many policies and strategic plans are well-conceived, their implementation remains insufficient. This shortcoming can largely be attributed to the fact that advocacy for air pollution control is predominantly driven by academics and technical experts, indicating a need for broader engagement and support across various sectors to advance the agenda effectively:

"It's not that the policy is not good—the policy is very good as per the needs and gaps. The EPHS package was made with very good costing. Same for the clean air policy, national action plan, and climate change policy, they have all the components. But implementation is not happening, probably because the political will is not behind it, and those who need to prioritize it are not doing so. Who is prioritizing it? Academics, thinkers, technical people like us. But those in the bureaucratic environment or policymaking are not."

Air pollution should be reframed as a public health crisis rather than merely an environmental issue. By highlighting its health impacts, stakeholders can align air quality with crucial political priorities. One stakeholder noted:

"Unfortunately, till now, climate and air pollution are not considered public health issues. They need to be raised to that level. We know that many non-communicable diseases are secondary to pollution—it is directly related to overall health. So instead of treating climate and pollution as entirely separate issues, they should be closely integrated with the health agenda."

• Leveraging innovation and co-benefits for sustainable financing

Stakeholders emphasized the importance of innovative, contextualized, and cost-effective solutions, highlighting the pivotal role of academia, particularly young researchers. A representative from a government department expressed the government's enthusiasm for funding air pollution and smog-related projects originating from academic institutions, offering financial support for initiatives deemed beneficial. They encouraged university students and faculty to present projects addressing pressing issues, such as smog in Punjab, to the relevant government bodies in order to secure funding. Additionally, they cited the example of neighboring India, where students frequently implement environmental solutions, such as biofuel production and home or community composting, after completing their education.

"The Environmental Protection Department (EPD) has announced 50 million in seed money to support research aimed at converting existing motorcycle engines to electric, and invited anyone who can provide the technology to convert engines running on non-renewable energy sources into electric. The seed money is 50 million, and the cost for the engine conversion will be borne by the consumer."

An academic and environmental health researcher underscored the importance of focusing on co-benefits as a means to overcome financial constraints, particularly by prioritizing prevention, which is generally more cost-effective than treatment. For instance, promoting physical activity not only reduces carbon emissions but also aids in preventing non-communicable diseases, thereby offering multiple advantages from a single intervention. The researcher emphasized the need to quantify these co-benefits in economic terms to enhance policy decision-making. While endorsing the idea of an essential health service package, they critiqued its current emphasis on treatment rather than prevention. They argued that most funding is allocated to treating illnesses instead of preventive measures, which could have a comparable impact at a significantly reduced cost.

Another stakeholder pointed to entrepreneurship as a viable solution to financial challenges. They recommended that students, universities, and government institutions be encouraged to launch start-ups or business initiatives, as these ventures could generate revenue and contribute to sustainability.

Furthermore, stakeholders suggested utilizing an economic framework to inform budgetary decisions. This approach involves presenting cost-benefit analyses of clean air policies, linking improvements in air quality to productivity gains, and quantifying savings in healthcare costs.

An academic stakeholder illustrated how compelling a case could be made for replacing motorbikes with electric scooters, highlighting that such a transition could deliver multi-sector benefits, including enhanced air quality, reduced crime, and substantial long-term financial savings.

"In Lahore, where smog is an issue, and in other metropolitan cities, if you just cut down on motorbikes, we can minimize the crime rate, improve outdoor air quality, and save a lot of money through health and economic benefits. Currently, around $1.57 billion is being spent, and we could save about $10.51 billion over 10 years with one intervention—providing battery-operated scooties and phasing out motorbikes. People in planning and financial institutions understand things in monetary terms."

• Strategic use of financial instruments and global funding opportunities

A stakeholder noted that the Punjab government is gradually working towards the implementation of carbon taxes, beginning with a carbon credit system designed to incentivize reductions in emissions. In the initial phase, industries are encouraged to adopt environmentally friendly practices, with the government providing financial support for projects related to emission reduction and renewable energy. This phased strategy aims to strengthen technological capacity and industry preparedness before the introduction of carbon taxes. The initiative is in line with Punjab's 2024 Climate Action Plan and is viewed as a strategic move to enhance access to international climate funding, similar to approaches taken by countries such as India and Bangladesh. However, another stakeholder expressed doubts regarding the sustainability of carbon credits in a country like Pakistan, particularly considering its substantial debt and the challenges of imposing additional taxes on its citizens.

Additionally, a stakeholder emphasized the potential of green bonds as an effective financial mechanism to fund climate-related projects. These instruments provide access to significant financing through soft loans, making them appealing for both the public and private sectors. Green bonds can promote public-private partnerships and encourage collaborations among various organizations, including government entities, to advance their initiatives.

Moreover, a stakeholder proposed the introduction of green awards or incentives for media professionals to bolster environmental advocacy. Given the financial struggles and low morale faced by many journalists, such incentives could offer much-needed support. Similar to how academic institutions receive financial backing for research projects, media outlets could be incentivized with monetary rewards to produce research-driven articles and videos on environmental issues. These incentives would not only uplift the media sector but also foster capacity building by promoting deeper engagement with climate topics.

Summary for Theme 5: Political & Financial Commitment	
Challenges	**Recommendations**
Air pollution is underprioritized in political and legislative agendas except during smog season.	Reframe air pollution as a public health issue to elevate its priority within political and planning processes.
Preventive health measures receive less funding than treatment-based interventions.	Promote economic arguments for prevention, including cost-effectiveness and health co-benefits.
Academic institutions remain underutilized in developing cost-effective, context-specific solutions.	Encourage academic institutions and students to propose practical, locally adapted projects to government bodies for financial support.
Public and private sectors face financial constraints in implementing air quality measures.	Leverage green bonds and other soft-loan financial instruments to support collaborative, climate-focused projects.
Journalists lack the financial incentive to report on climate issues.	Introduce green awards or monetary incentives to encourage media coverage of environmental topics.

3. STAKEHOLDER PRIORITIZATION OF AIR QUALITY INTERVENTIONS

At the end of the in-person workshop, twelve key stakeholders evaluated eleven proposed action items for improving Pakistan's air quality, which were developed during preliminary expert consultations. Participants assessed each proposal using a five-point Likert scale (from "Least important" to "Most important"), with the unique flexibility to rate any number of policies as important - reflecting absolute rather than relative perceptions of value. We subsequently calculated weighted scores (assigning 5 points for "Most important" down to 1 point for "Least important") to establish a clear priority ranking among the interventions. This analytical approach, combining qualitative assessment with quantitative scoring, provides nuanced guidance for focusing advocacy efforts and strategically allocating resources toward the highest-impact interventions.

The stakeholder prioritization process reveals critical insights that should shape both advocacy strategies and policy development. The results demonstrate where consensus exists for immediate action and where more nuanced approaches will be needed to build broader support.

Three interventions emerged with particularly strong consensus, making them prime candidates for near-term policy advocacy:

• **Multi-sector stakeholder alliances (Score: 61)** stood out as the clear priority, reflecting widespread recognition that current fragmented governance structures hinder effective air quality management. The unanimous support across stakeholder groups suggests this approach would face minimal opposition while creating platforms for coordinated action.

• **Enhanced inter-departmental collaboration (Score: 59)** similarly points to bureaucratic silos as a major barrier. The high ranking indicates policy proposals should emphasize mechanisms for breaking down these barriers, such as inter-agency task forces or joint planning requirements.

• **Centralized air quality monitoring systems (Score: 56)** emerged as the most supported technical solution, highlighting stakeholders' demand for reliable, transparent data to inform decisions and ensure accountability. This creates a strong foundation for advocating investments in comprehensive monitoring infrastructure.

4. STRATEGIC CONSIDERATIONS FOR POLICY DESIGN

While these consensus areas present clear opportunities, the results also reveal important considerations for shaping effective policy proposals:

- The strong showing for governance solutions (alliances, collaboration) suggests policy frameworks should prioritize structural reforms over isolated technical fixes

- The solid but not outstanding support for stricter enforcement (Score: 53) indicates such measures may need to be paired with capacity building to address implementation concerns

- Mid-tier priorities like public-private partnerships (Score: 48) may be best positioned as components of larger policy packages rather than centerpiece solutions

- The polarized response to carbon pricing (Score: 32) suggests such market-based approaches will require careful phasing and confidence-building measures if included

5. RECOMMENDATIONS FOR POLICY ADVOCACY

Lead with governance reforms - Initial policy proposals should focus on the high-consensus areas of stakeholder alliances, inter-agency collaboration, and monitoring systems

Address implementation concerns - For enforcement measures, include provisions for technical assistance and phased implementation to build confidence

Package incremental measures strategically - Incorporate mid-tier priorities as supporting elements within broader reform packages

Approach contentious policies deliberately - For carbon pricing or other divisive measures, consider pilot programs or research initiatives as first steps

This stakeholder-driven analysis provides a roadmap for sequencing policy advocacy efforts, beginning with areas of strongest consensus while laying groundwork for more challenging reforms. The findings suggest that proposals which first establish collaborative governance structures and reliable data systems will create the foundation needed for subsequent, potentially more contentious measures to gain traction.

6. WAY FORWARD

• Research and Capacity Building

Promoting collaborative research on the health and environmental impacts of air pollution is essential for informed policymaking. Building local institutional and technical capacity—particularly in environmental monitoring, enforcement, and governance—should be a priority. Partnerships between research institutions, public agencies, and development actors can enhance the evidence base and support the design of context-appropriate intervention.

• Strengthening Institutional Coordination

Improving inter-sectoral coordination is critical to effective air quality management. Establishing formal platforms that bring together stakeholders from the environment, health, transport, and urban development sectors can reduce fragmentation and promote policy coherence. Clarifying institutional mandates will help minimize duplication of efforts and foster greater accountability in implementation.

• Enhancing Data Infrastructure and Accessibility

Expanding the air quality monitoring network across urban and rural regions will improve the spatial and temporal accuracy of pollution data. Standardizing measurement protocols and ensuring open access to real-time data are essential steps toward transparency and public trust. Collaborations with academic and technology partners can further enhance data analysis, modeling, and translation into actionable policy insights.

• Promoting Sustainable Transportation

To reduce vehicular emissions, policy measures should incentivize the adoption of electric vehicles and non-motorized transport options, while upgrading and expanding public transport infrastructure. Enforcing stricter emissions standards will also be key to mitigating urban air pollution from the transport sector. The Punjab government has introduced a mandatory vehicle emissions testing program for vehicles older than three years. Compliant vehicles receive a green sticker; non-compliant ones face fines up to PKR 5,000. Free testing is available in Lahore until August 31, 2025. Vehicles without a green sticker may be denied entry to major motorways during smog season (epd.punjab.gov.pk)

• Public Awareness and Community Engagement

Sustained public awareness efforts are needed to highlight the sources and health impacts of air pollution. Community engagement should be promoted through citizen science initiatives, participatory monitoring, and locally driven campaigns. Empowering citizens to take part in advocacy and data collection can strengthen accountability and foster a culture of environmental stewardship.

7. CONCLUSION

There is a variety of national and provincial policies that acknowledge air pollution as a significant issue in Pakistan; however, implementation remains weak due to barriers like poor institutional coordination, limited data, inadequate financing, and insufficient political will. While frameworks exist at the provincial level, they are often poorly executed. The engagement of the IPPTA in Pakistan aimed to gather insights from policymakers, public health professionals, and environmental experts to identify key policy actions and understand the barriers to implementation. Stakeholders advocate for a collaborative, data-driven, and health-focused approach to enhance air quality, highlighting the importance of public awareness, financial mechanisms, regulatory frameworks, and technological innovations. These insights are intended to inform future research, advocacy, and more coordinated strategies for improving air quality and respiratory health in Pakistan.

Annex 1: Participants in Online Consultation Meeting

Date: 13 January 2025 | Format: Virtual Meeting (Online)

Name	Affiliation	Expertise/Role
Core Contributors and Technical Experts		
Dr. Sohail Akhtar	Indus Hospital & Health Network	Consultant Pulmonologist; Environmental Lung Diseases- Professor of Pulmonology
Dr. Ejaz Ahmed Khan	Health Services Academy	Public Health; Environmental Epidemiology- Professor
Dr. Zafar Fatmi	Aga Khan University	Environmental & Occupational Health; Air Pollution- Professor and Section Head, Environmental, Occupational Health and Climate ChangeProject Team (RESPIRE/IPPTA)
Project Team (RESPIRE/IPPTA)		
Dr. Osman Yusuf	RESPIRE Team - Chief Consultant, The Allergy & Asthma Institute, Pakistan.	Respiratory Health Research / Project Lead
Dr. Amina Khan	RESPIRE Team -Director The Initiative Pakistan	Public Health Research / Project Co-Lead
Dr. Sajid Bashir Soofi	RESPIRE Team - The Aga Khan University	Professor of Pediatrics, Associate Director Centre of Excellence in Women and Child Health, Project Co-Lead
Dr. Shabina Ariff	RESPIRE Team - The Aga Khan University	Professor of Pediatrics, Consultant Neonatologist, Project Co-Lead
Dr. Hareem Fatima	RESPIRE Team - The Aga Khan University	Public Health Research, Senior Instructor Research (Pediatrics and Child Health)
Ramsha Tariq Baig	RESPIRE Team- The Allergy & Asthma Institute, Pakistan	Stakeholder Engagement Lead; Session Moderator- Policy Research Fellow
Maham Zahid	RESPIRE Team- The Initiative	Research & Knowledge Translation- Research Fellow
Dr. Genevie Fernandes	RESPIRE Team	Policy Research and Engagement- Senior Fellow
Observers (Affiliated with Climate Projects)		
Dr. Mariam Shafique	Aga Khan University	Public Health Research
Dr. Neyama Alladin	Aga Khan University	Public Health Research
Dr. Asma Abdul Malik	Aga Khan University	Public Health Research

Annex 2: Stakeholders Participating in the In-Person Workshop

Name	Designation
Academia & Research	
Dr. Zafar Fatmi	Professor and Section Head, Environmental, Occupational Health and Climate Change (Aga Khan University)
Dr. Sohail Akhtar	Professor and Consultant Pulmonologist (Indus Hospital Network)
Dr. Ejaz Ahmed Khan	Professor Health Services Academy, Islamabad
Dr. Zenab Tariq Baig	Assistant Professor, Department of Environmental Sciences (University of Haripur, Khyber Pakhtunkhwa)
Dr. Razia Safdar	Senior Policy Advisor and Head, Centre for Health Policy Innovation (Sustainable Development Policy Institute)
Government & Policymaking	
Dr. Maryam Sarfraz	Ex Director Programs (Ministry of National Health Services Regulations and Coordination, Government of Pakistan)- Associate Professor, Health Services Academy Islamabad.
Mr. Afsar Khan	Deputy Director, Climate Change (Environmental Protection Agency, Khyber Pakhtunkhwa)
Dr. Omar Awan	Deputy Project Director (Directorate General of Health, Punjab)
Ms. Maria Safeer	Deputy Project Director (Environmental Protection Agency, Punjab)
Dr. Rubina Aman	Pulmonologist, Former Head of Department (Pakistan Institute of Medical Sciences / Riphah International Hospital)
Clinical & Professional Bodies	
Dr. Kaleem Ullah Toori	President (Federal Chapter, Pakistan Chest Society)
Media	
Mr. Waqar Bhatti	Investigative Reporter, Health & Environment (The News International)
Advocacy & Civil Society	
Mr. M. Taha Masood	Patient Advocate, Activist

Annex 3: Weighted Priority Scores for Air Quality Policies

Name	Designation	Weighted Score
1	Forming a multi-sector stakeholder alliance to drive action	61
2	Enhanced collaboration among departments and provinces	59
3	Advocacy efforts from experts for cleaner air and policy influence	58
4	Creating a centralized monitoring and reporting system for air quality	56
5	Stricter enforcement of air quality regulations for industrial/transportation sectors	53
6	Increasing the number of air quality monitoring stations for real-time data	50
7	Promoting partnerships between the public and private sectors	48
7	Strengthening institutional capacity through training and technical support	48
8	Funding allocation for environmental projects/well-developed financial mechanisms	47
8	Identifying pathways for the implementation of air quality policies	47
9	Exploring the feasibility of implementing a carbon tax	32

Key for Weighted Scoring:

Most Important = 5 points

Very Important = 4 points

Important = 3 points

Somewhat Important = 2 points

Least Important = 1 points

Formula:

Score = (Most Important × 5) + (Very Important × 4) + (Important × 3) + (Somewhat Important × 2) + (Least Important × 1)

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For more information on RESPIRE and our research, please visit the website usher.ed.ac.uk/respire

This research was funded by the NIHR 16/136/109 and NIHR132826 using UK international development funding from the UK Government to support global health research.

The Initiative
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Neoventive Solutions
THE UNIVERSITY of EDINBURGH
UNIVERSITI MALAYA
FUNDED BY NIHR | National Institute for Health and Care Research
UK International Development
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