Air Quality, Energy and Health
Science and Policy Summaries

An introduction

Foreword

For nearly 70 years, the World Health Organization (WHO) has been at the forefront of global efforts to advance clean air for better health. Through its leadership in setting evidence-based air quality guidelines, convening multisectoral stakeholders, collecting relevant data and supporting countries in implementing effective policies, WHO has played a central role in protecting populations from the health risks of air pollution.

The recent Second WHO Global Conference on Air Pollution and Health, held in Colombia in March 2025, built upon this legacy. It convened ministers of health, environment and energy, and key stakeholders from across sectors, catalysing global momentum to accelerate action on air pollution, energy access and climate change.

World Health Organization

This momentum was further strengthened by the adoption of the *Updated road map for an enhanced global response to the adverse health effects of air pollution* at the Seventy-eighth World Health Assembly (WHA78) in May 2025. This bold framework outlines an ambitious goal of achieving a 50% reduction in mortality from anthropogenic sources of air pollution by 2040, while promoting integrated actions across sectors.

At the heart of this collective effort is the WHO Science and Policy Summaries (SPS) series. These concise, evidence-based snapshots synthesize the latest scientific knowledge, highlight pressing challenges and identify vulnerable groups and sector-specific solutions to reduce air pollution and promote health. They provide a powerful evidence-based risk communication mechanism to develop a common understanding of the priorities for action among diverse stakeholders. By focusing on sectoral solutions – ranging from clean household energy, sustainable transport, agriculture and green spaces, to land use planning, power generation, industry and waste management – the SPS provide practical pathways for governments and stakeholders to act decisively and inclusively. Notably, the series also addresses key policy instruments such as transboundary conventions and air quality legislation, essential levers for achieving clean air and public health gains across borders and jurisdictions. Furthermore, the series explores critical intersections with climate change, gender, equity and regional dynamics, ensuring that no one is left behind.

Developed through a rigorous, collaborative process led by WHO, with contributions from its Global Air Pollution and Health Technical Advisory Group (GAPH-TAG), the Scientific Advisory Group (SAG) on Air Pollution and Health, world-renowned scientists, WHO collaborating centres on air quality

2nd WHO Global Conference on Air Pollution and Health, Cartagena, Colombia, 24-28 March 2025.
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and health and key United Nations (UN) partners including the World Meteorological Organization (WMO), UN Environment Programme (UNEP), Food and Agriculture Organization (FAO), UN Economic Commission for Europe (UNECE), UN Children's Fund (UNICEF) and UN Human Settlements Programme (UN-Habitat) as well as the World Bank and the Climate and Clean Air Coalition (CCAC), and government agencies and nongovernmental organizations (NGOs), the SPS series represents a collective commitment to evidence-based policy and action. All SPS have undergone thorough peer-review and multistakeholder input, ensuring that they reflect the latest knowledge and best practices in the field.

This SPS series is not only a distillation of cutting-edge science, but a powerful call to action. The health impacts of air pollution are clear, and the evidence is more than sufficient to drive decisive action. It is time for governments, development agencies, private sector leaders and civil society to prioritize cross-sectoral collaboration, leveraging the health argument to drive cleaner air and broader societal benefits.

> *"This SPS series is not only a distillation of cutting-edge science, but a powerful call to action. The health impacts of air pollution are clear, and the evidence is more than sufficient to drive decisive action*

This means mobilizing climate and development finance, strengthening health data systems to better track impacts and interventions, investing in research and capacity-building to empower the next generation of health and environmental leaders, and creating sustainable partnerships across sectors. These integrated actions will not only reduce air pollution but also promote equitable, healthy and sustainable communities worldwide.

As we move forward, let us recognize that addressing air pollution is not only a matter of environmental stewardship but also a critical investment in public health, economic resilience and the well-being of future generations. Together, we can create a world where clean air is a fundamental right, not a privilege. Together, let us turn science into action, ensuring clean air and energy access become a reality for every person, everywhere.

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Introduction

Air pollution is a major environmental and long recognized public health issue *(1)* and one of the five leading risk factors for noncommunicable diseases (NCD) worldwide *(2)*. Air pollution affects all regions of the world – but low- and middle-income countries (LMICs) bear the brunt of the harmful emissions according to Sustainable Development Goal (SDG) 11.6.2 (air quality).

These populations are consistently exposed to concentrations that exceed even the highest recommended interim target for airborne particulate matter according to the WHO air quality guidelines *(3, 4)* by several fold throughout their lifetime. Consequently, LMICs account for 93% of the disease burden (SDG 3.9.1: Mortality from air pollution) with about 6.4 million deaths from the five major associated causes of death: stroke, ischaemic heart disease, chronic obstructive pulmonary disease, lung cancer and acute lower respiratory infections from particulate matter alone in 2021 *(5)*. Air pollution not only harms the respiratory and cardiovascular systems, but the entire body with adverse impacts on the reproductive, metabolic and neurological systems. At-risk groups include children and pregnant women, older people, those with pre-existing conditions and outdoor workers, with the former groups likely to experience lifelong health consequences from early-life exposure.

One of the critical roles of the health sector is to provide care to patients, but prevention is another critical task. The health workforce can play a role in reducing the morbidity and mortality burden from air pollution. Health care providers can directly help their patients to mitigate the consequences of air pollution by discussing its role and approaches to mitigating its adverse effects, such as reducing time outdoors when pollution is high. The health care sector could join in multisectoral actions to improve air quality and mitigate climate change through informing and advocating. The recent call for clean air action, to which 47 million health professionals signed up, shows the potential for their voices to make a difference *(6)*.

The SPS series was started in anticipation of the Second WHO Global Conference on Air Pollution and Health, which took place in March 2025 in Cartagena, Colombia *(7)*. During the conference, countries, cities and civil society organizations pledged urgent action and dedicated resources for clean air for health *(8).* To support actions for clean air, the SPS provide a large body of evidence to inform countries and key stakeholders about how to engage in sectoral actions that improve health. The SPS support the implementation of the recently adopted and strongly endorsed WHO *Updated road map for an enhanced global response to the adverse health effects of air pollution (9)*,

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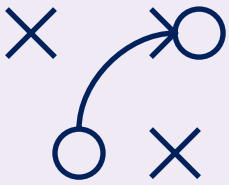
which provides a framework for WHO's 14th Global Programme of Work (2025–2028) as well as for the upcoming Fourth High-Level Meeting of the UN General Assembly on Noncommunicable Diseases. It is time to commit and take evidence-based informed decisions to improve air quality, particularly in LMICs.

Objectives



The SPS series provides a holistic overview of air pollution, energy access and health, emphasizing climate, gender and equity co-benefits. Through data-driven analysis, the SPS assess progress, find gaps, address challenges and highlight opportunities for reducing air pollution to protect health. The series also serves as an important evidence-based risk communication mechanism to inform intergovernmental discussions by offering comprehensive insights derived from inclusive multistakeholder consultations using plain language and content accessible to a general audience.

Each SPS was developed by a multistakeholder group from academia, government organizations and NGOs as well as UN agencies with relevant expertise and mandates; involving inclusive stakeholder consultations and collaboration to gather and synthesize information and data.

Happy child smiling in a rural countryside setting in Thailand, surrounded by nature.

Topics in the SPS series

The SPS cover a wide range of subject matter related to air pollution, energy access, climate linkages and health. The planned topics are listed below; this will be updated as more subjects are tackled.

Exposure and health effects of air pollution

The following SPS provide a comprehensive overview of the scale and nature of exposures and health effects for various categories of pollution as well as for specific vulnerable groups.

- **Health effects of air pollution – evidence and implications** (technical brief) View →
- **Health effects of air pollution – evidence and implications** (technical brief with a special focus on noncommunicable diseases) View →
- **Exposure to health damaging air pollutants** (technical brief) View →
- **Household air pollution and related health impacts** (technical brief) View →
- **Indoor air pollution – sources other than household air pollution** View →
- **Indoor air pollution – radon** View →
- **Health burden of air pollution and its economic consequences** View →
- **Air quality monitoring and modelling for health impact assessment and beyond** View →
- **Air pollution and children's health** View →
- **Air pollution and outdoor workers' health** View →
- **The health sector's role in addressing air pollution and health** View →
- **Air pollution and health in the Sustainable Development Goal indicators and beyond 2030** View →

Climate changes linkages

The SPS below provide insights on the linkages between air pollution and climate change and the synergistic effects on health.

- **How climate affects air pollution and vice versa – implications for health** View →
- **Health and air pollution co-benefits of climate change mitigation** (technical brief) View →
- **The synergies of heat stress and air pollution and their health impacts** (technical brief) View →
- **Understanding the health impacts of sand and dust storms** (technical brief) View →
- **Climate change, air pollution, pollen and health** (technical brief) View →
- **Wildfires and health** View →

Sectoral solutions for health

The sector-specific SPS identify context-specific issues that allow air quality management efforts to recognize and prioritize interventions and strategies that enhance the health benefit in critical sectors.

- **Open waste burning – sectoral solutions for air pollution and health** (technical brief) View
- **Transport – sectoral solutions for air pollution and health** (technical brief) View
- **Green spaces – sectoral solutions for air pollution and health** (technical brief) View
- **Agriculture – sectoral solutions for air pollution and health** (technical brief) View
- **Household energy – sectoral solutions for air pollution and health** (technical brief) View
- **Land use – sectoral solutions for air pollution and health** (technical brief) View
- **Industry – sectoral solutions for air pollution and health** (technical brief) View
- **Phasing out coal-fired electric power generation and implications for public health – Canada: a success story** View
- **Transboundary cooperation for our shared air to protect public health** (technical brief) View
- **Air quality legislation and implications for health** (technical brief) View

Regional perspectives on air pollution and health

The regional SPS focus on specific challenges faced by the regions and highlight context-specific policy processes and case stories that have led to air pollution reductions.

- **Regional perspectives on air quality and health: WHO African Region** View
- **Regional perspectives on air quality and health: WHO Region of the Americas** View
- **Regional perspectives on air quality and health: WHO European Region** View
- **Regional perspectives on air quality and health: WHO Eastern Mediterranean Region** View
- **Regional perspectives on air quality and health: WHO South-East Asia Region** View
- **Regional perspectives on air quality and health: WHO Western Pacific Region** View

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Agricultural crops growing on farmland with wind turbines in the background.

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