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EXECUTIVE SUMMARY

PRIORITY ACTIONS TOWARDS BREATHING CLEAN AIR, PROTECTING PUBLIC HEALTH AND ENSURING A HEALTHY ENVIRONMENT

United Nations Special Rapporteur on the human right to a clean, healthy and sustainable environment,
Astrid Puentes Riaño.

Executive Summary of the Report A/HRC/61/47.

PHOTO: Quang Nguyen Vinh / Pexels



KEY MESSAGES

- Air pollution is a **solvable** human rights crisis.
- Air pollution impacts are **preventable**.
- Air pollution solutions are **feasible and affordable.** For this, a reorientation of funding is needed.
- Harms and risks are **unequally distributed**. Among the most vulnerable populations are children, older persons, and pregnant people.

PHOTO: Figure8photos / Getty

I. THE IMPORTANCE OF CLEAN AIR

Clean air is an essential element of the human right to a clean, healthy and sustainable environment, and for enjoying human rights, including the rights to life and health.

Yet, **most people do not breathe clean air,** primarily because of insufficient health and environmental protections and because economic growth and industrial activities are too often prioritized.

The scientific evidence proving the health risks posed by air contamination is extensive and conclusive. **Air pollution is linked to around 8 million premature deaths annually worldwide, with some variation between estimates,** while also causing or worsening many other health harms. **It impacts all organs of the human body both throughout life and in utero.**

Air pollution thus **undermines the rights to life, health, a healthy environment and an adequate standard of living**, among others.

More than

90%

of global air pollution-related deaths are linked to outdoor fine particulate matter ($PM_{2.5}$) in concentrations that exceed World Health Organization guidelines.

Chronic exposure to polluted air has cumulative, long-term effects and causes or aggravates:



- Strokes
- Respiratory Problems
- Heart Attacks
- Reproductive Harms
- Dementia
- Depression
- Cancer
- Developmental Delays

BACKGROUND PHOTO: Pakhnyushchyy / Getty
PHOTO: CottonBro / Pexels

Almost all humans are exposed to polluted air, but children are the most vulnerable, along with older persons, pregnant people, people with pre-existing health conditions, and members of marginalized groups, especially those living in urban areas.

Harms and risks are unequally distributed. Low and middle-income countries and regions, especially urban areas, have the highest levels of hazardous air pollution. Populations in situations of vulnerability suffer disproportionate harms, thus impacting rights to equality and non-discrimination and imposing a major burden on public health systems. The combination of health impacts from air pollution with climate-related stressors, particularly extreme heat, creates a double burden, increasing the risks faced by such populations. Some air pollutants further aggravate climate change and thus impact health both directly and indirectly.

Clean air is not as expensive as may be feared, but the costs of inaction are high.

The World Bank asserts **it is feasible and affordable to implement clean air policies.** By 2040, these measures could halve globally the number of people exposed to $PM_{2.5}$ concentrations exceeding up to 5 times WHO limits. But **a redirection of financial resources is required.** Financing and subsidies still flow disproportionately to air pollution drivers such as the fossil fuel industry, with less than one percent of that amount globally spent on outdoor air pollution control.

Considering international and human rights obligations, and that improvements in environmental conditions can dramatically lower exposure and thus improve population health, States must act urgently to prioritize health protections and improve air quality. All private actors should support these efforts through concrete action to prevent, reduce, and remediate pollution.

In 2019, **mortality and morbidity** from $PM_{2.5}$ air pollution cost

$8.1 TRILLION

USD globally.



PHOTO: Utah fires / NASA

II. MOST AFFECTED POPULATIONS


PHOTO: Stayhereforu / Pexels

Children are most vulnerable because their bodies are still developing, and their immune systems are not fully formed.

Early childhood exposure to high pollutant concentrations can lead to impaired cognitive development, chronic illnesses such as asthma, and greater vulnerability to behavioral and emotional disorders that bring lifelong impacts.

In 2021, approximately
700,000 children
< 5 years old died from preventable causes linked to air pollution – nearly 2,000 per day.

Physiological and immunological changes during pregnancy create a more vulnerable state for both **pregnant people** and babies. Due to multiple health impacts, approximately 1 in 3 preterm births globally is associated with air pollution. **Babies** born prematurely face increased risks of lifelong disabilities and illnesses.


PHOTO: Vlada Karpovich / Corelens


PHOTO: Tianya1223 / Pexels

Individuals with **pre-existing heart or lung disease and other underlying health conditions** are especially vulnerable to air pollution. With increasing age, humans undergo a gradual decline in respiratory, cardiovascular, and immune function. This decline, along with other pre-existing health conditions and historical exposure, makes **older persons** more susceptible to morbidity and mortality from air pollution.

Poor air quality is closely linked with increased prevalence of strokes and cardiovascular, respiratory, and other chronic illnesses. It can also increase the risk of neurodegenerative diseases and osteoporosis.

Proximity to pollution sources is the most decisive factor determining who breathes clean air.

Vulnerability is most acute in urban areas of **low- and middle-income countries** where persistent air pollution hotspots are most common. Industrial facilities, transport corridors, extractive industries and other pollution-intensive activities are often located near marginalized communities, sometimes described as "sacrifice zones" (A/HRC/49/53).

The most affected people and communities are frequently both racialized and marginalized so that structural inequalities deepen the problem. Poor nutrition, lacking or inadequate access to health care and information about risks increase harm.

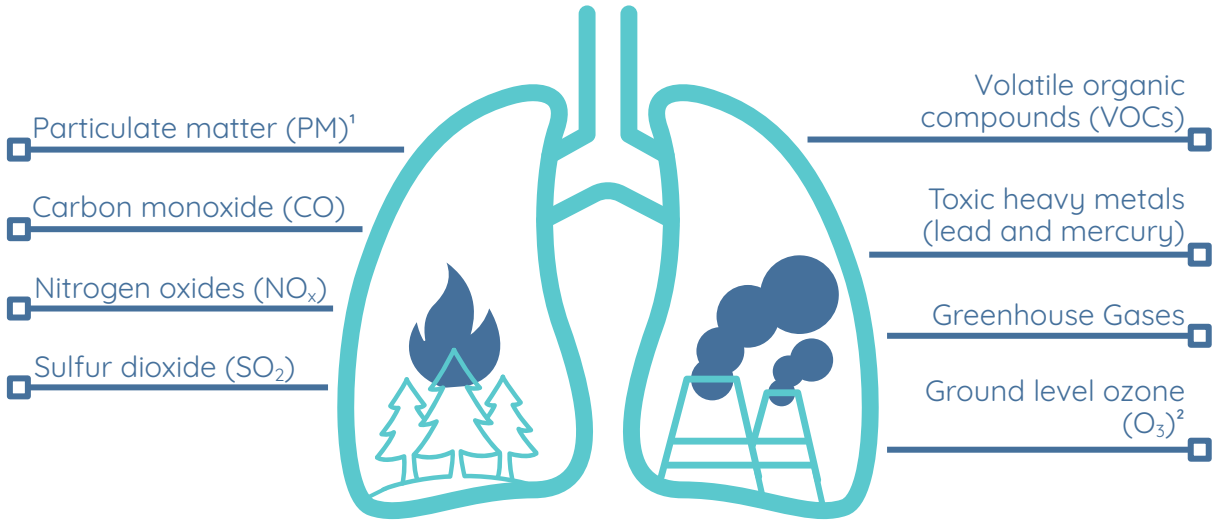
Highly polluted areas are home to about
716 MILLION
of the world's lowest-income people.

Health impacts from prolonged air pollution exposure in these communities include **elevated rates of asthma, bronchitis, lung cancer, lead poisoning, heart disease, and other chronic conditions.**

~92%
of pollution-related deaths occur in low and middle-income countries.

III. MAIN DRIVERS OF DANGEROUS AIR POLLUTION

Critical air pollutants emitted from human activities:



[1]Especially small-diameter ($PM_{2.5}$).
[2]Ground level ozone (O_3) is formed when NO_x and VOCs react in the presence of sunlight.

TO IMPROVE AIR QUALITY AND PROTECT HEALTH, STATES MUST ADDRESS POLLUTION FROM:

Fossil-fuel powered transportation.

Non-electric powered vehicles are major contributors to urban smog due to poorly controlled tailpipe emissions, fuel leaks and evaporation. Traffic congestion and hot temperatures exacerbate the risk due to higher emissions and increased ozone formation.

Fossil-fuel derived electricity.

Rapidly increasing energy demand in the Global South and the electrification of transportation, manufacturing, heating and cooling world-wide are driving an extraordinary increase in electricity demand.

In 2024, fossil fuels met

+50%

of rising demand as alternatives did not to keep pace.

Skyrocketing data digitalization and storage, artificial intelligence and cryptocurrencies add to the surge in energy consumption.

Electricity consumption in cities continues to drive high urban air pollution exposure, especially in developing nations. The burning of fossil fuels continues to produce emissions that directly harm human health, while also exacerbating climate change.

Fossil-fuel production.

Fossil fuel production contributes to air pollution in myriad ways.

Extraction of oil, gas and coal releases methane (CH_4) and VOCs that drive ozone (O_3) formation and impact health. Processing and refining also release hazardous air pollutants such as benzene, formaldehyde and toluene. Surface coal mining is a significant source of particulate matter pollution, while flaring - the burning of waste gas during oil extraction - emits air pollution and toxic substances that brings substantial health harms to nearby communities.

PHOTO: Kamitana / Canva Pro

Residential heating and cooking.

Coal or biomass burning in homes is a critical source of dangerous indoor air pollution, especially affecting women and children in poor regions. Insufficiently insulated buildings require much more energy to heat and cool, thus contributing to added pollution.

Human-driven fires and agriculture.

Wildfires and agricultural burning release extremely harmful levels of $PM_{2.5}$ and other pollutants. Deforestation, land-use change, and climate-related factors have brought more frequent and larger fires that push air contamination and corresponding hospital admissions to extremes. Impacts are both transboundary[3] and local. Large-scale agriculture also contributes substantial emissions of particulate matter. Methane and nitrogen compounds that form smog, as well as VOCs from pesticide and herbicide use.

Consumer products and fireworks.

Paints, cleaners and other chemical products that evaporate contribute important levels of VOCs to urban environments. As seen in Delhi and Mexico City even celebratory fireworks can cause severe peaks of air pollution, worsening acute health risks around holidays.

Because air pollution main drivers are human-made, they can and must be prevented and addressed through human action.



[3]Impacts caused in the territory or in areas under the jurisdiction or control of a State other than the State of origin, regardless of whether the affected States share a common border.

IV. STATE AND PRIVATE SECTOR LEGAL OBLIGATIONS

The obligation to protect the environment and prevent significant harm is part of customary international law, an obligation that is erga omnes[4] *and applies to transboundary harms such as air pollution.*

States must act with stringent due diligence, based on the best available science and considering the probability, foreseeability, severity and magnitude of potential harms.

States have the obligation to **regulate and take measures to effectively control industrial contamination,** both from single sources and from complex activities of multiple sources. Actions to guarantee clean air must **provide effective deterrence** and be timely, appropriate and consistent. **States must also refrain from contributing to air pollution.**

The obligation of States is to prevent the risk. For air pollution, courts have determined that imminent risk refers to proximity, both physical and in time. It should be held internationally, as regional human rights systems have determined, that **victims do not need to prove a direct link between alleged health impacts and the exposure when:**



[4]An *erga omnes* obligation applies to all States without exception because a State is part of the international community. This applies even if a State has not ratified a treaty containing the obligation.

PHOTO CREDITS: A) Photo Courtesy: Noornisha, Chennai, India. Global Climate and Health Alliance.
B) Argentina Fires 2026, NASA.
C) Dimitry Anikin, Pexels.

State inaction may amount to a violation of human rights.

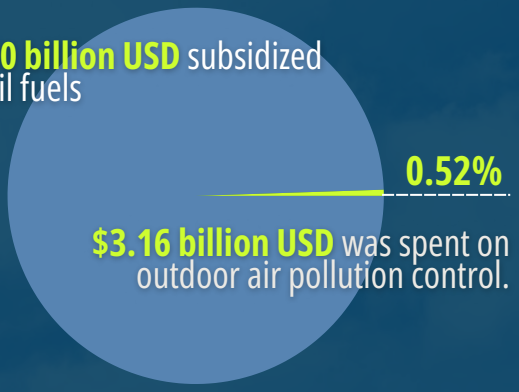
Scientific uncertainty cannot justify inaction when risks of significant or irreversible harm exist, and States must act promptly applying the **precautionary principle. Effective enforcement and monitoring are indispensable** to ensuring compliance and safe-guarding health.

Protecting human rights and preventing significant harm requires **effective planning and comprehensive, integrated and prior** Environmental, Social and Human Rights Impact Assessments. Climate impacts should be considered. Health must be incorporated as a cross-cutting concern.

States must also **provide timely and accessible information** meaning that quality data must be updated, comprehensive, reliable, disaggregated, open, user-friendly and real-time. The disclosure of air pollution information should be a socially inclusive process.

State responsibility under international law may further arise from fossil fuel production or consumption and the granting of licences or subsidies, owing to the direct link to greenhouse gas emissions and the resulting failure to protect the climate system and the environment, which also aggravates air pollution and its human rights impacts.

Between 2018 and 2024, globally, an average of:



Businesses must respect human rights and take immediate, effective measures to prevent and mitigate risks across their operations.

Private sector actors must:

a) Avoid causing or contributing to harm.
b) Conduct ongoing human rights due diligence.
c) Provide remediation when violations have occurred.

PHOTO: Vvoevale/ Canva Pro

V. RECOMMENDATIONS AND PRIORITY ACTIONS TO ACHIEVE CLEAN AIR

Air pollution requires urgent preventive and corrective action.

Strengthened international cooperation, the sharing and replication of successful initiatives, and increased coordination between health and environmental authorities are prerequisites to success. The private sector must collaborate and conscientiously seek improvements to make clean air possible.



Ensuring access to information, public participation and access to justice for all, and at all levels of government, is critical, as is enacting stringent due diligence standards. The higher the risk posed by polluting industries and projects, the greater the standard of protection and stringent due diligence that is required.

The health burden of outdoor **air pollution** translates into **economic damages** that are equivalent to roughly

5% global GDP.

This is about

1.5X

the economic harm that COVID-19 brought globally in 2020.

PHOTO: Chienmuhou / Getty Images

PRIORITY ACTIONS TOWARDS CLEAN AIR

UNDERSTAND

- Priority contaminants
- Health harms
- **Vulnerable populations** to air pollution and unequal impacts
- Link to weather events and **climate change**
- Economic **impacts**

ENFORCEMENT

- **Polluter fees** finance oversight
- Fines/penalties that provide **real disincentives**
- Continuous emissions and fenceline **monitoring**
- **Safe work** spaces
- **Wildfire** prevention

INFORMATION AND TRANSPARENCY

- **Continuous monitoring** and reporting
- Toxic emissions **registry**
- Cumulative **impact assessments**
- Air quality **maps and indices**
- **Accessible** public information and **education**



POLICIES FOR HEALTH

- Focus first on **most impacted areas** (hotspots and sacrifice zones)
- **Mitigate priority sources** requiring best available technology
- Limit and offset **new sources**
- Green spaces & efficient public transportation
- **Renewable energy** grids
- Reoriented **subsidies**

STRONG LEGAL FRAMEWORKS

- Air quality **standards and emission limits**
  - **Protecting** vulnerable populations (children, asthmatics, elderly)
  - **WHO guidelines** as a minimum
  - Complying with **human rights and international law obligations**
  - Based on **best available science**
- ESHRIAs[5] and comprehensive planning, considering **climate change**

[5]Environmental, Social and Human Rights Impact Assessments. (A/80/187).

To achieve a clean air, States must:

1. Ensure that air quality frameworks incorporate a human rights-based approach, recognizing the severe risks and harms of air pollution to human health.
2. Enact and progressively strengthen air quality norms, setting safe, health-based limits on pollution and aiming to meet WHO's global air quality guidelines.
3. Mandate monitoring programs that provide regular, accurate and verifiable data for both air quality and emissions, covering all affected regions and contaminants of concern ($PM_{2.5}$, PM_{10}, nitrogen dioxide, sulfur dioxide and ozone, as well as potential source-specific toxic pollutants).
4. Rapidly identify air pollution hotspots and prioritize interventions to protect the most vulnerable populations.
5. Implement air pollution action plans that guarantee health protection, including emergency interventions, warning systems, and community outreach to reduce health harms and increase understanding of risks and corrective actions.
6. Establish emission limits for specific contaminants, activities and facilities to ensure that air quality standards can be met, also considering cumulative impacts.
7. Require regular reporting of average and maximum peak concentrations of air pollutants, along with toxic releases, reviewing the data in light of both long-term and acute health risks.
8. Make all air quality and emissions data publicly available free of charge, ensuring data is up to date, comprehensive, reliable, and user-friendly.
9. Incorporate Environmental, Social and Human Rights Impact Assessments into licensing processes for major polluting activities.
10. Enact a presumption against permitting additional contaminating activity in already overburdened communities that do not meet air quality standards.
11. Control main drivers of air pollution through effective enforcement, charging the costs of oversight to polluters, and imposing fines that create real economic disincentives for violations.

PHOTO: Daniel Torobekov / Pexels

To achieve a clean air, city and subnational governments should:

1. Limit new fossil fuel use and production, mandate strict control of air pollution and shift to clean air alternatives.
2. Strengthen fuel quality standards and vehicle exhaust controls.
3. Develop efficient, sustainable and affordable "zero emissions" public transportation systems and improve traffic patterns to address contamination hotspots.
4. Strictly regulate the use of polluting products including chemicals, paints, and fireworks.
5. Require strategic impact assessments and Environmental, Social and Human Rights Impact Assessments including health assessments for urban planning and project approval.
6. Strengthen building codes and zoning to promote green and efficient buildings.
7. Expand green spaces and tree coverage to improve natural air filtering.
8. Adopt and enforce strong measures to prevent forest fires and waste and agricultural burning, while subsidizing cleaner fuels for heating and cooking.
9. Improve waste collection and management, including establishing programs for recycling and composting and requiring methane-capture at landfills.
10. Build awareness of the consequences of air pollution to increase acceptance of and adherence to measures intended to protect health and the environment, such as warnings to avoid outdoor activities or to limit vehicle use.

PHOTO: Tom Nix / Getty Images

To achieve a clean air, businesses must:

1. Comply with emissions limits and all permit conditions, proactively contributing to air quality improvement.
2. Share reliable and comprehensive monitoring and emissions data.
3. Protect workers from polluted air and working conditions.
4. Abstain from undue influence or misinformation campaigns concerning air quality and its relation to human health.

VI. SUCCESSFUL INITIATIVES ON THE PATH TO CLEAN AIR

Investments to reduce air pollution generate tangible and rapid improvements.

Ulaanbaatar, Mongolia, shifted from use of raw coal to cleaner fuels, seeing a 51% reduction in winter PM levels over a three-year period.

More than 70% of households receiving clean-cooking subsidies in **India** reported health improvements.

In **Nigeria,** cooking on ethanol stoves was associated with improved infant health.

As of 2025, **Kathmandu** has replaced 700 diesel units with electric three-wheelers that serve mostly marginalized populations.



PHOTO: Samafoto / Getty Images

Cross-sector coordination and incorporating health risks improves environmental policy making.

Colombia and Uzbekistan use the AIRQ+ WHO Air Quality software to quantify the health burden and impact of air pollution, complementing state monitoring in informing policy decisions.

Estonia conducts Health Impact Assessments as part of environmental permitting, combining pollution data and health statistics to understand impacts and improve planning.

Japan conducted epidemiological studies to provide solid evidence for regulations.



PHOTO: Enzo Renz / Pexels

Strengthened regulations, policies and enforcement yield concrete results.



PHOTO: Mathias Rhode / Getty Images

Kazakhstan has reduced associated-gas flaring volumes by over 75 % since 2012.

Due to clean air policies in **China**, $PM_{2.5}$-related diseases fell 30% between 2013 and 2017. By 2024, national $PM_{2.5}$ average fell 36% compared to 2015.

The creation of the **London** Ultra Low Emission Zone policy led to more rapid lung growth in children there compared to an area without such protections.

After a major pollution-related epidemic of respiratory diseases in **Japan**, the "polluter-pays principle" held responsible parties accountable for remediation, restoration and victim compensation costs.

In **California, United States,** Senate Bill 1137 establishes new safety measures to protect human health and the environment. This law creates Health Protection Zones (HPZ), in which new oil and gas wells are prohibited within 975 meters (3,200 feet) of homes, schools, hospitals, and other sensitive locations. Existing oil and gas facilities in the HPZs must also comply with strict new regulations to control pollution, dust, noise and develop leak detection programs.

Low-cost monitoring and government transparency can help identify problem areas.


PHOTO: Michael Utech / Getty Images

The air quality monitoring network in **Nairobi** includes two reference stations and 87 active low-cost sensors posted in strategic locations, including informal settlements, industrial areas and vehicular transit zones.

In Pasig, the **Philippines**, a municipal-university partnership launched a community-based low-cost air quality monitoring network since there was no government-operated reference station in the city.

Citizen engagement has been a catalyst for improvement around the world. Civil society groups in **Poland** helped make air quality data accessible, which led to Krakow issuing a ban on solid fuels for household heating.

Scientific evidence confirms that air pollution is not an inevitable consequence of development, but a fully preventable and solvable human rights crisis.


PHOTO: Courtesy of Azul Ayala

We have the international legal framework, economic feasibility, and technology both to transition to clean energy sources and to establish monitoring programs, to reverse damage and eliminate risk.

With decisive political actions that prioritize public health, millions of people could live breathing clean air and, therefore, enjoy an essential element of the human right to a healthy environment as well as other fundamental human rights.

Taking action is an obligation that States and companies can and must fulfill through strict regulations, elimination of fossil fuel subsidies, use of the best available science, and creation of short- and long-term action plans, with local and transboundary approaches. The solution is possible, breathing clean air is part of a human right, not a privilege.

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Thank you for your cooperation!

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