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THE A-Z OF AIR POLLUTION



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Chintan Environmental Research and Action Group

ABOUT CHINTAN:

Chintan is a non-profit Circular Society Do-Tank that improves the lives, livelihoods and leadership of the people who contribute the least to environmental pollution and climate change while combating the excessive and inequitable consumption that causes it.

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INTRODUCTION

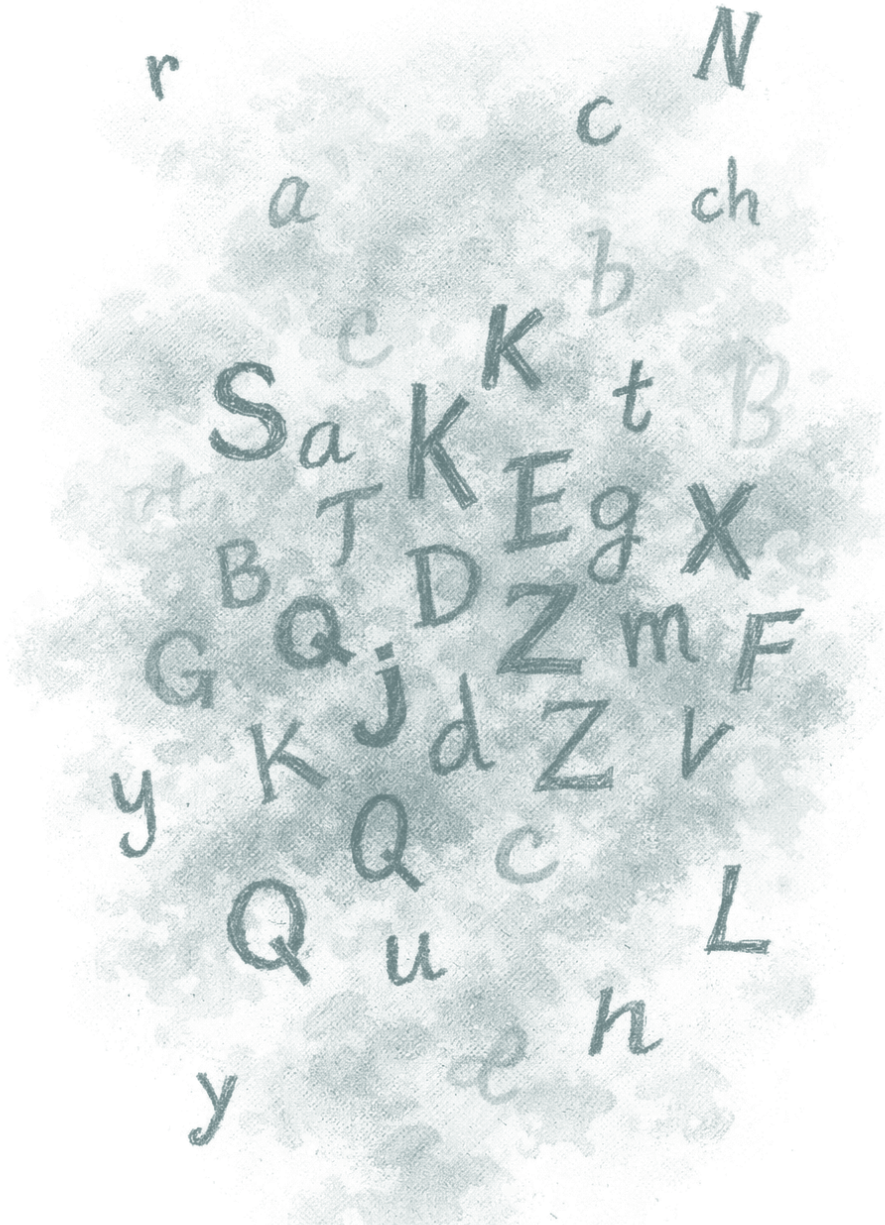
AIR POLLUTION is often discussed in the media, among peers, and in public debates through numbers, indices, and alarming headlines. Yet, for many people it remains confusing and distant.

A survey¹ undertaken by Chintan during peak pollution periods made it clear that most people have only a partial understanding of what air pollution actually is, where it comes from, and how it affects their bodies, livelihoods, and surroundings.² Many recognise “bad air days,” yet are unsure which pollutants are harmful, why sources extend beyond traffic, or why pollution can be dangerous even when the air looks clear. This gap between ambient air quality information and personal exposure makes it harder for people to connect pollution with health impacts and weakens public demand for sustained clean air action.

Air pollution is not just a technical or regulatory issue; it is shaped by policies and systems, as well as markets. Examples of these are how waste is handled and which fuels are widely used, to how cities are planned and how people move around. When these links, and their implications for individual exposure are not clearly understood, clean air policies can feel abstract and be removed from daily reality. Meaningful public participation, accountability, and behaviour change all begin with knowing the basics of what we are exposed to and why it matters.

In this context, Chintan, with support from Canada Fund for Local Initiative (CFLI), created this handbook, ‘The A-Z of Air Pollution’, a clear and practical primer that explains air pollution from A to Z. It makes complex ideas accessible, highlights everyday sources, and places exposure and health at the centre of the discussion - connecting air pollution to our collective quality of life, so everyone can understand the basics. We hope this fills in the gap for an evidence-based and India-centric knowledge product, that is easy to read without losing any of the science and quality that can enable everyone to understand the issue without being intimidated by technical terms they’ve never learnt in school.

Bharati Chaturvedi
Founder and Director, Chintan



HOW TO USE THIS HANDBOOK

This handbook is designed to be flexible and easy to navigate. Readers may choose to begin with any section or topic of interest and explore the content at their own pace. While the handbook can be read from beginning to end for a comprehensive understanding, it can also be used as a reference guide to revisit specific sections as needed.

Readers are encouraged to engage actively with the material, reflect on the information provided, and apply the insights in practice wherever relevant. The handbook is intended not only to inform but also to support learning and knowledge sharing. Users are therefore encouraged to share the knowledge and lessons from this handbook with colleagues, communities, and other stakeholders.

A

AIR POLLUTION



THE AIR (Prevention and Control of Pollution) Act, 1981, defines Air Pollution as the “presence of any solid, liquid, or gaseous substances in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.” But this is not all you should know:

- Some air pollutants are more dangerous than others. Based on the ease of exposure and their toxic effects, many regulatory agencies classify six major pollutants as ‘criteria pollutants’ viz., SO_x, NO_x, CO, O₃, Particulate Matter (PM), and Lead.

- Size matters. Air pollution is discussed in terms of PM, as the size of a particle of pollution can also determine the harm it causes. PM is a mixture of solid particles and liquid droplets suspended in the air. These particles vary in size and composition. How easily particulate matter (PM) enters the body depends on how small the particles are. Based on their size, PM is usually grouped into PM₁₀ and PM_{2.5} - the numbers show the particle size in micrometres (µm). PM_{2.5} is so small it crosses the blood barrier and enters the body directly, delivering its toxic punch rapidly and potently. To put this in perspective, a human hair is about 70 micrometres thick, making PM₁₀ roughly one-seventh the width of a hair, and PM_{2.5} about 30 times smaller than a strand of human hair.

- Air pollution is not limited to cities or winter months; it is a regional, year-round problem linked to everyday activities. Treating pollution as local or seasonal results in weak and fragmented responses. It is also important to know that air pollution travels. Emissions from a truck in one city can easily be carried within the airshed (a region within which air tends to circulate), and harm the health of people who also happen to be in the same airshed. Recognising that shared airsheds are a fact, helps build coordinated and effective solutions to fight air pollution.

CALL TO ACTION

- The government should work on reducing air pollution by addressing sources at their roots. This includes better public transportation, elimination of private diesel vehicles, diversification of e-vehicles and a more robust EV ecosystem, improving appropriate green cover, better industrial production which also includes fuels and processes, dust management, improved management of waste and reduction of waste reaching landfills, stopping open burning, reducing and eliminating waste-to-energy plants, improved construction and demolition practices - these are some pathways for cleaner air.

- Municipal waste systems are city-managed services which must improve infrastructure for collecting, transporting, processing, and disposing of waste that cannot be recycled or handled locally. This includes sanitary waste, non-recyclable multi-layered packaging, and even domestic hazardous waste. State municipal corporations should work to strengthen community-led and municipal systems, reduce waste burning and prevent pollution from entering the air.

- You can be a part of this too - segregation of waste at source helps prevent waste burning. When waste is mixed, it becomes difficult to recycle or compost and is often burned to reduce volume or to eliminate it, releasing harmful pollutants into the air. Proper segregation allows waste to be safely processed, which reduces open burning. Horticultural waste must also be composted, to prevent being burnt.

- Communities should promote decentralised waste systems by supporting local efforts led by residents, waste collectors, and community groups. These include door-to-door segregated waste collection, composting, and neighbourhood dry-waste centres, which enable waste to be managed close to where it is generated.



B

BIOMASS BURNING

HERE IS a source of air pollution that can be addressed in tangible ways in the short and medium term:

- Biomass burning includes the burning of wood, dung cakes, crop residue, and forest vegetation. In India, most biomass burning is driven by human activity, particularly for cooking, heating, and clearing agricultural fields. It is a major contributor to PM_{2.5} pollution, especially in rural and peri-urban areas. Biomass burning degrades air quality, damages lung and heart health, and contributes to climate change, creating a reinforcing cycle of harm. Unfortunately, biomass burning harms mostly women who cook using biomass and their infants who are often near them. Research shows that biomass use accounts for nearly half of India's PM_{2.5} emissions, excluding dust sources.

- But biomass burning by humans is not the only concern. As global temperatures rise, fire frequency is expected to increase, creating a feedback loop where climate change worsens air pollution through phenomena such as forest fires and vice versa.

CALL TO ACTION

- Governments should ensure sustained access to clean fuels to reduce dependence on biomass for cooking and heating. By expanding and reinforcing the Pradhan Mantri Ujjwala Yojana (PMUY), affordable and reliable access to LPG particularly for low-income households, will ensure a reduction in household and neighbourhood-level burning.
- Government focus should also extend to strengthening waste handling practices and supporting decentralized waste management systems to reduce domestic and agricultural waste burning. When combined with effective cleaner fuel alternatives, this can significantly reduce ground-level air pollution.



CARBON

CARBON-RELATED air pollutants include carbon dioxide, carbon monoxide, and black carbon. These play a central role in air pollution and climate change in multiple ways. Learn more about the Bad Cs:

- Carbon dioxide (CO₂) is a key greenhouse gas, generated by human activities such as burning of fossil fuels, deforestation, coal-powered electricity production and industrial processes.
- Carbon monoxide (CO) is a toxic gas produced by incomplete combustion in vehicles, industries, and households, and is a major urban air pollutant. Carbon monoxide exposure can reduce oxygen delivery in the body, causing headaches, dizziness, and at high levels, death.
- Another critical form is black carbon, a component of fine particulate matter. Black carbon absorbs sunlight and heats the atmosphere, making it the second-largest contributor to global warming after CO₂. It also accelerates melting of snow and ice when deposited on surfaces. A significant source of black carbon is biomass and waste burning. Black carbon contributes both to climate change and to severe health impacts through PM2.5 exposure.

Managing carbon emissions therefore addresses both air quality and climate goals, highlighting the need for cleaner fuels, better combustion practices, and reduced reliance on fossil fuels.

CALL TO ACTION

- Community members should encourage each-other to understand the kinds of carbon that might contaminate the air in their city. Read about them and their sources. Without information, you cannot make change.
- Recognise that low-income households may rely on burning waste or biomass, due to limited access to affordable alternatives even when subsidized. Governments must provide targeted support and dedicated funding to enable a just transition to clean energy.
- At the same time, the middle classes must reduce or entirely avoid burning activities such as during festivals like Lohri and Diwali. Celebrations like barbeques and bonfires also need similar action across middle and higher-income groups. Addressing both necessity-driven and discretionary burning is essential to reducing ground-level air pollution.
- Mindful consumption of resources is a key step to reduce carbon emissions; production, transport, storage and disposal of products and packaging - all emit carbon across its various stages.

D DATA

AIR POLLUTION data helps us understand how polluted the air is, how pollution levels change over time, and the sources of pollution. Reliable data makes pollution measurable, and harder to ignore. It allows policymakers, scientists, and communities to identify trends, assess risks, and evaluate whether interventions are working.



This information is collected through multiple systems:

- **Ground-level monitoring stations** measure pollutants such as PM_{2.5}, PM₁₀, NO₂, SO₂, ozone, and carbon monoxide, providing accurate reference data. These stations are different from Continuous Monitoring Systems (CMS), which are generally installed at specific emission sources. CMS primarily measure pollutants at the point of emission in order to track compliance with environmental standards and regulations. Their purpose is to monitor the quantity and concentration of pollutants being released from a source rather than the overall air quality in the surrounding environment.

In contrast, ground-level monitoring stations measure ambient air quality, reflecting the combined impact of emissions from multiple sources such as vehicles, industries, construction, and waste burning. Therefore, while CMS help regulate emissions from specific sources, ground-level monitoring stations provide a broader picture of the air people are actually breathing.

- **Continuous monitoring stations** generate real-time information that also feeds into the Air Quality Index and public advisories.

- **Low-cost sensors** help expand coverage and identify neighbourhood-level pollution patterns. You may have seen them in some offices, homes or even hospitals, so the local air quality can help decision making.

- **Industrial emission monitors** track pollution released from specific sources, while satellites observe large-scale pollution movement and regional transport from space. We use satellite data to understand the patterns of crop stubble burning.

Strong data systems enable targeted action, early warnings during severe pollution episodes, and informed planning. This enables the public to protect its health. They also support transparency and public awareness by making pollution information accessible.

CALL TO ACTION

- Community members should teach each other to understand data.
 - Use reliable air quality data to identify pollution hotspots and act early to prevent pollution. Local authorities and communities should regularly use publicly available platforms such as the CPCB Air Quality Index (AQI)³ portal, the SAMEER app, City-level dashboards under the National Clean Air Programme (NCAP)⁴, and available data from continuous monitoring stations. The apps can easily be downloaded from app stores or google play stores, while data from other platforms can easily be seen on their portals.
 - These tools provide real-time and historical data on key pollutants like PM_{2.5} and PM₁₀ that help pinpoint areas with poor air quality and guide interventions.
 - Platforms like the CPCB's SAMEER app provide hourly updated AQI information for more than 150 cities, using data from hundreds of monitoring stations across India (from both continuous and manual networks).
 - The CPCB network itself includes several hundred continuous and manual monitoring stations, with real-time data contributing to daily AQI bulletins. It covers 500+ stations and manual records under the National Air Monitoring Programme (NAMP). This means a large volume of data, not just snapshots, is available and can be used for trend analysis, hotspot identification, and planning pollution control actions. If you enjoy working with data, consider a project with these sets to solve a problem.
- Authorities, researchers, and citizens can often download historical AQI and pollutant concentration datasets directly from these portals or through CPCB reporting interfaces, allowing for mapping of seasonal patterns, comparison of locations, and evaluation of policy effectiveness.

E

MISSIONS



EMISSIONS REFER to pollutants released into the air from human activities and natural processes. In urban areas, these emissions arise from transport, industries, thermal power plants, construction activities, road dust, waste burning, and the use of solid fuels for cooking or heating.

- To effectively manage air pollution, cities and states prepare Emission Inventories. These are basically systematic assessments that quantify pollution from different sectors over a defined period.

- Emission inventories help to identify major sources, estimate their relative contribution and also guide policy decisions - especially to identify priority areas on where to cut emissions. They are typically developed using activity data combined with emission factors that estimate how much pollution is produced per unit of activity.

- In India, emission monitoring and regulation involve multiple institutions. The Central Pollution Control Board (CPCB) functions as the apex body under the Ministry of Environment, Forest and Climate Change (MoEFCC). It sets national standards for emissions, coordinates monitoring efforts, develops guidelines for pollution control, and supports the implementation of air quality management programmes such as the National Clean Air Programme (NCAP). CPCB also operates and oversees Continuous Ambient Air Quality Monitoring Stations (CAAQMS) and publishes real-time data through platforms like the SAMEER app and the national AQI portal.

- At the state level, State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) are responsible for enforcing emission standards, granting environmental clearances, monitoring industries, and taking action against violations. They conduct inspections, mandate pollution control technologies, and oversee compliance with emission norms for industries, waste facilities, and construction sites.

- While emission inventories often show transport, industry, and dust as major contributors, they also highlight smaller but highly localised sources such as waste burning and landfill fires. These sources may represent a modest percentage in overall inventories, but can create intense neighbourhood-level pollution hotspots because they occur close to residential areas and may release highly toxic pollutants, including dioxins and heavy metals. To know more about the air quality standards, refer to the table on page 27, under Q - Air Quality Monitoring.

CALL TO ACTION

- Reduce local emissions by taking action as a community. Learn about the complaints app or phone number in your city and lodge complaints to prevent emissions, such as those from burning, construction and industries.

F

FOSSIL FUELS



FOSSIL FUELS are combustible geological deposits of organic matter, formed from decayed plants and animals that have been subjected to intense heat and pressure in the Earth's crust over millions of years. Fossil fuels such as coal, oil, and gas are widely used in transport, power generation, and industry.

- Fossil fuel combustion is a major source of PM2.5 pollution and premature deaths. They are also a major driver of global warming as they release significant amounts of greenhouse gases. Continued dependence on fossil fuels worsens air pollution and deepens inequality, as vulnerable communities are often exposed to higher pollution levels.

- Acknowledging the challenge of climate change, India is expanding its renewable energy capacity in line with its international commitments. This will reduce emissions from fossil fuels.

- The country added record levels of renewable capacity, increasing the share of non-fossil sources. However, since India must fight both poverty and climate change, it is compelled to use fossil fuels alongside renewables in this march towards ensuring no citizen suffers from energy poverty. Additionally, as we move away from fossil fuels, it is vital to ensure a just transition for workers whose livelihoods depend on fossil fuel-related industries.

CALL TO ACTION

- At the community level, action on air pollution should align with the national roadmap set out by the Government in the official documents, like the Draft National Electricity Policy (2026)⁵ and related environmental policies, which emphasise reducing dependence on fossil fuels across end-use sectors.

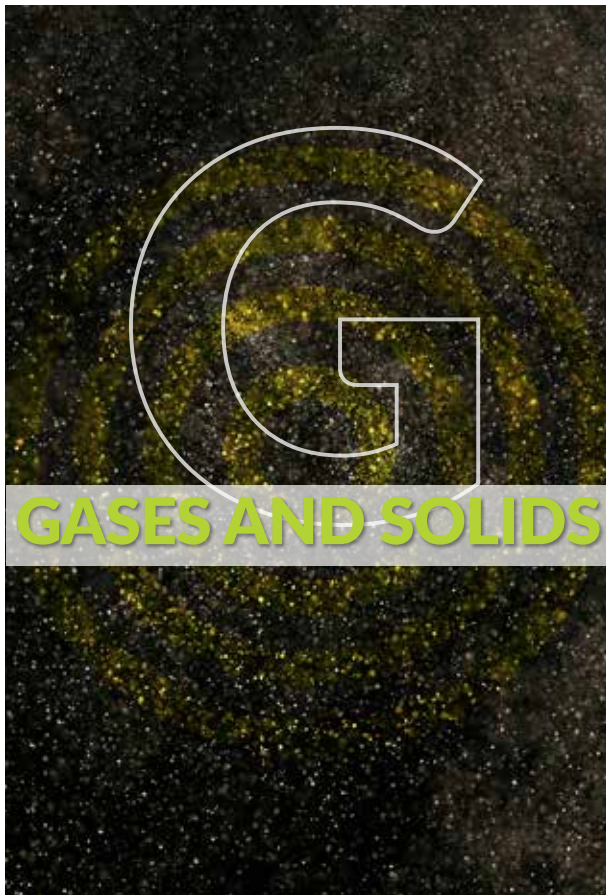
The draft policy highlights electrification and expansion of non-fossil generation as key pathways to reduce pollution and emissions intensity.

- Communities can contribute by prioritising the use of clean electricity and other non-fossil energy sources for everyday needs thereby lowering reliance on coal, diesel, LPG, and kerosene.

- The state solar policy often contains many incentives for such action. Read the one most relevant for you. Here are the links of a few: Delhi Solar Energy Policy⁶, Tamil Nadu Solar Policy⁷, Uttar Pradesh Solar Policy⁸.

- In parallel, source segregated organic waste can be used for biogas production, providing a clean alternative to fossil fuels for cooking and energy use. Since organic waste in landfills releases flammable gases, utilising it to produce biogas also reduces the emissions and fire risks from dumps and landfills.

Together, these actions reflect the policy direction outlined in the Draft National Electricity Policy and related frameworks - translating national goals on fossil-fuel reduction into practical steps that communities can take to improve air quality and protect public health.



- Air pollution can exist as gases or tiny solid particles. They are not always visible. Hence, air can be polluted even if the skies look blue and the air looks clean.

- One of the most important forms of air pollution is dust and particulate matter, which are tiny particles that float in the air. These particles come from sources such as construction activity, road dust, waste burning, vehicles, and industrial processes. Because they are extremely small and light, they can remain suspended in the air for long periods and travel across neighbourhoods and cities. Note that dust can also be very toxic.

- When we breathe polluted air, these particles can enter the nose, throat, and lungs, affecting breathing and worsening respiratory illnesses. Long-term exposure can contribute to asthma, heart disease, and other serious health problems.

- Particulate matter is often classified by size. PM10 refers to particles that are 10 micrometres or smaller, which can enter the nose and throat. PM2.5 refers to even finer particles (2.5 micrometres or smaller) that can travel deeper into the lungs and even enter the bloodstream. In case of air pollutants, size matters - the smaller the particle, the deeper it can penetrate into the body and the greater the potential health risk.

- Air pollution also includes gaseous pollutants such as nitrogen oxides (NO_x), sulphur oxides (SO_x), ammonia, and hydrogen sulphide. These gases react in the atmosphere to form smog, haze, and acid rain, and they are monitored as part of air quality indices (AQI) because of their impacts on both health and the environment.

CALL TO ACTION

- Community members should check the daily PM2.5 levels before stepping outdoors. Don't just read the AQI. You can monitor real-time data through reliable platforms. For more detailed information on the apps to check AQI, please refer to K - Knowledge on page 20.

- If the AQI levels rise above 100, it indicates that air quality is beginning to deteriorate from satisfactory to moderate. At moderate level AQI, vulnerable groups, especially children, the elderly, pregnant women and people with respiratory and heart conditions, should take precautions. At this point, it is advisable to wear a well-fitted N95 mask when outdoors to reduce inhalation of fine particulate matter.
- Regularly checking air quality allows us to plan outdoor activities more safely. On days when pollution levels are high, it may be better to avoid strenuous outdoor activities. During physical activities such as sports, running, or heavy exercise, deeper breathing goes up, as does the amount of polluted air entering the lungs. If possible, plan such activities during times of the day when pollution levels are lower.

- Staying informed about daily air quality allows individuals and families to limit exposure during peak pollution hours, take early preventive measures, and protect their health before pollution levels become severe. Make it part of your everyday life to check the AQI and PM 2.5 just as your grandparents once checked the chances of rain.



AIR POLLUTION is linked to over 20 serious and long-term diseases that affect nearly every system of the body at the very least. Doctors now say that it does not only harm the lungs. Fine particles (PM2.5) and toxic gases penetrate deep into the lungs; some enter the bloodstream and travel to vital organs.

- Health impacts linked to air pollution include:

- i. Respiratory diseases:** Asthma, chronic bronchitis, reduced lung function, chronic obstructive pulmonary disease (COPD), and lung cancer;

- ii. Cardiovascular diseases:** Heart attacks, stroke, irregular heartbeat, high blood pressure, and atherosclerosis;

- iii. Neurological and cognitive impacts:** Impaired brain development in children, reduced learning and memory, headaches, anxiety, depression, and increased risk of dementia;

- iv. Adverse pregnancy and child health outcomes:** Low birth weight, premature birth, stillbirth, impaired lung and brain development;

- v. Metabolic and endocrine disorders:** Increased risk of diabetes and hormonal disruptions;

- vi. Immune system impacts:** Weakened immunity, increased susceptibility to infections;

- vii. Cancers beyond the lungs:** Bladder cancer and other pollution-linked malignancies.

- Children, older adults, and communities living near sites of air pollution, such as industrial areas or landfills, are particularly exposed to toxic pollutants such as dioxins, heavy metals, and volatile organic compounds. These exposures increase the likelihood of lifelong illness, disability, and premature death, reinforcing that air pollution is a whole-body health crisis, not merely a respiratory issue.

CALL TO ACTION

- Communities should protect health by reducing air pollution through cleaner practices and safer systems in all sectors.

- Clean air is a shared responsibility, and the health sector has a key role in promoting it. Health professionals including doctors, nurses, and practitioners of Ayurveda, Homeopathy, Unani, and other systems should constantly study new science about air pollution, its health impacts, and means to prevent it.

By understanding the risks, they can advise patients, advocate for cleaner environments, and actively push for policies and practices that reduce exposure, especially for vulnerable populations like children, the elderly, and outdoor workers.

INDOOR AIR POLLUTION



INDOOR AIR pollution is often overlooked, yet it can be as harmful as outdoor pollution. It is not true that staying home during peak pollution guarantees you clean air indoors. Indoor air is polluted both due to activities inside and also when outdoor air comes in, via doors and windows - as is a natural phenomenon.

- While many urban households now use cleaner fuels like LPG, some peri-urban and rural homes still rely on wood, dung cakes, or kerosene especially during winters, leading to high exposure to indoor air pollution.

- Everyday sources such as incense sticks, mosquito coils, tandoors, chemical cleaners, and even outdoor pollution entering through windows add to the risk. Because people spend most of their time indoors, even moderate pollution can have significant health impacts.

- Real-world measurements in Delhi recorded in January 2026 highlight just how severe indoor exposure can be. Three reporters from Hindustan Times logged PM_{2.5} levels at a private school, a major hospital (AIIMS), and a residential home at the same time between 14th to 20th January 2026. Hindustan Times' monitoring data showed that at the school and hospital, indoor PM_{2.5} levels routinely hovered between 200–300 $\mu\text{g}/\text{m}^3$, spiking as high as 432 $\mu\text{g}/\text{m}^3$ in classrooms and 431 $\mu\text{g}/\text{m}^3$ in hospital OPDs. Outdoor readings were even higher, reaching 502 $\mu\text{g}/\text{m}^3$, which is over eight times India's national safety limit⁹.

- By contrast, a room in a home with a high-efficiency air purifier stayed between 18 and 40 $\mu\text{g}/\text{m}^3$, well below India's 60 $\mu\text{g}/\text{m}^3$ standard and the WHO guideline of 15 $\mu\text{g}/\text{m}^3$.

- These findings show that outdoor air penetrates indoors with little reduction, meaning that even spaces meant to protect children, patients, or the elderly, often breathe nearly the same toxic air as outside. Experts note that while air purifiers and properly maintained HVAC systems can help, they are temporary solutions. True protection requires reducing outdoor pollution itself.

- Improving indoor air quality also requires promoting clean cooking fuels, proper ventilation, and awareness of everyday pollution sources. By reducing indoor emissions, households not only protect themselves, but also contribute to cleaner outdoor air, creating health benefits for the wider community.

CALL TO ACTION

- Community members should prevent indoor air pollution by using cleaner everyday practices.
 - Reduce smoke from cooking in poorly ventilated kitchens by installing exhaust fans, hoods and windows.
 - Use cleaner fuels like LPG.
 - Avoid burning agarbattis or incense sticks
 - Consider mosquito nets instead of using mosquito coils which can compromise indoor air quality.

J JUSTICE

AIR POLLUTION is not only a technical or environmental issue, it is a question of fairness. Pollution does not affect everyone equally. Everyday sources such as burning agarbattis indoors or cooking in poorly ventilated kitchens add to exposure to polluted air, but for many people, exposure does not end at home.

- In cities, the urban poor like street vendors, waste workers, safai karamcharis, delivery and gig workers, construction workers and traffic police spend long hours outdoors because their livelihoods depend on it.

- They cannot choose to “stay inside” or avoid polluted streets; if they do not work, many do not earn. As a result, they breathe polluted air throughout the day and face higher health risks, despite contributing the least to the problem.

- It is therefore a question of justice that everyone is able to breathe clean air. It is a right for all, not a privilege reserved for those who can afford protection or working indoors in purified air. Ensuring clean air is not only about reducing pollution; it is also about standing up for the rights, health, and dignity of the people who keep our cities running every day.



CALL TO ACTION

- Community members should come together and share stories and experiences, and support campaigns that call for safer and healthier working conditions.
- Community members should also show respect and dignity in everyday interactions, whether with safai karamcharis, street vendors, or delivery workers, and challenge practices that undermine their dignity or safety.
- Support initiatives that advocate for worker protection, health safeguards, and equitable policies. This can help ensure that the fight for clean air includes those who are most exposed.



REDUCING AIR pollution requires awareness at every level. Effective solutions start with everyday choices at home and in communities. Without understanding how pollution is generated, even the strongest systems cannot protect health.

- Many indoor and outdoor activities release harmful smoke and fine particles, without people realizing the risks.
- Knowledge empowers communities to focus on preventing pollution at its source rather than relying solely on technical fixes, which reduces exposure and improves health for all.
- For monitoring and data, these are some of the best websites to follow and share:
 - **Central Pollution Control Board (CPCB)**¹⁰: The official Government of India portal for national air quality data that provides real-time Air Quality Index (AQI) from monitoring stations across cities;
 - **IQAir**¹¹: A global air quality platform with real-time AQI maps and forecasts - useful for tracking pollution trends and comparing cities;
 - **PRANA Portal**¹²: A government portal under the National Clean Air Programme (NCAP), that provides city-wise air quality data, action plans, and progress updates;
 - **Climate Trends**¹³: A research and communication platform that shares analysis, reports, and insights on air pollution and climate issues
- Keeping track of air quality in real time helps communities, researchers, and policymakers take informed action.

CALL TO ACTION

- Governments should encourage people to educate themselves so they can take high-impact action. Additionally, awareness around waste segregation and the health impacts of waste burning and landfill fires should be strengthened.
- Lasting change begins when individuals actively seek knowledge and understand the consequences of their everyday choices. For more information on better choices, refer to A - Air Pollution on Pg 8, E - Emissions on Pg 14, I - Indoor Air Pollution on Pg 18, N - NO_x on Pg 23, R - Regulation and Responsibility on Pg 28, V - Vehicle on Pg 35, W - Waste on Pg 36



THE LUNGS are usually the first organs we associate as being harmed by air pollution. They are constantly exposed to the air we breathe. Fine particles (PM2.5) and other pollutants penetrate deep into the lungs, causing inflammation, scarring and diseases such as asthma, chronic obstructive pulmonary disease (COPD), repeated bronchitis, and infections like pneumonia.

- Children's lungs are still developing and they breathe more air per kilogram of body weight than adults, making them especially vulnerable. In 2019, more than 90% of children worldwide breathed air with AQI above safe limits - many suffering respiratory infections and asthma linked to pollution.

- The elderly are also at higher risk because aging lungs and immune defenses are less able to cope with chronic exposure.

- Most importantly, workers at all ages are chronically exposed to air pollution and can be harmed throughout their lives.

- While lungs are the most obvious organs visibly affected, air pollution also harms nearly every organ system. Over time, exposure also increases risks of heart disease and stroke, because these tiny particles can enter the bloodstream.

- Air pollution remains a massive global health burden. The 2017 Lancet Commission on pollution and health found that pollution was responsible for an estimated 9 million deaths (16% of all deaths globally) in 2015. The lungs are the first organs affected by air pollution because they are constantly exposed to polluted air. Fine particles cause long-term lung damage and chronic disease. Prevention is the only effective protection.

CALL TO ACTION

- Community members should learn how air pollution affects your health and the health of those around you, especially children, the elderly, and people who work outdoors.

- Take steps to reduce pollution in everyday life and support cleaner, safer choices in your community.

- Speak up and demand clean air as a basic right because prevention is the only real protection.

- Talk to a doctor if you experience symptoms such as persistent cough, breathing difficulty, eye irritation, or worsening asthma, and seek advice on how to protect your health during polluted days.



M MASKS

MASKS CAN help reduce exposure to air pollution and are a useful temporary measure, but they are only a partial solution. Their effectiveness depends on the type of mask - high-protection masks like N-95 or N-99 filter fine particles more effectively but can be expensive, uncomfortable, and difficult to wear for long periods.

- While masks can reduce immediate exposure, they cannot provide complete protection, and relying solely on them is not enough. A recent study suggests that wearing masks during peak pollution alerts may reduce mortality risk by up to 13%. However, true and lasting protection comes from reducing pollution at its source and adopting responsible daily practices, both individually and collectively. Masks are a helpful tool, but addressing the root causes of pollution remains essential.

CALL TO ACTION

- Whenever you leave your house during periods of poor air quality, in high-exposure settings or for any outdoor activity, wear a well fitted N-95 or K-95 mask or any mask which has been scientifically proven to protect from air pollution.
- However, people with respiratory, cardiac, or other medical conditions should consult a doctor before using a mask, especially tight-fitting masks such as N95 or equivalent, as these may make breathing uncomfortable for some individuals.



N

NOx

NITROGEN OXIDES (NOx) mainly nitric oxide (NO) and nitrogen dioxide (NO₂) are reactive gases formed when fossil fuels are burned, such as in vehicle engines and power plants.

- NO₂ irritates the airways, worsens asthma and bronchitis, and reduces lung function.
- The major human sources are vehicle exhausts (cars, trucks and buses), power plants and industrial combustion, and other high-temperature fuel burning in factories and engines. Indoor sources include fuel-burning appliances like gas stoves and heaters.
- Natural sources such as lightning and soil microbes also generate some NOx, but anthropogenic emissions dominate urban air pollution.
- Reducing NOx and other pollutants would prevent thousands of deaths and chronic illnesses, especially among children, the elderly and people with existing respiratory conditions.

CALL TO ACTION

- Community members should try to reduce combustion-related pollution by preventing open burning and cutting traffic emissions by avoiding unnecessary vehicle use and thinking twice before buying a second vehicle.



OZONE

OZONE IS a gas made up of three oxygen atoms. While stratospheric ozone (high up in the atmosphere) shields life by blocking harmful ultraviolet radiation, ground-level ozone near the Earth's surface is harmful to human health and the environment. It is not emitted directly, but forms when nitrogen oxides (NOx) and volatile organic compounds (VOCs) react in sunlight, with levels often peaking on hot, sunny days.

- Breathing ozone can irritate the airways, cause chest pain and coughing, worsen asthma, reduce lung function over time, and increase susceptibility to respiratory infections.
- Short-term exposure to high ozone levels has also been linked to an increased risk of cardiac arrest.
- In Delhi and the National Capital Region (NCR), ground-level ozone pollution has been reaching dangerously high levels during summer months in recent years. A 2025 analysis by CSE, found that ground-level ozone breached India's eight-hour average safe limit ($100 \mu\text{g}/\text{m}^3$) on nearly all days between March and May, with an average daily exceedance of more than 14 hours.¹⁴
- In many parts of the region, on several days ozone became the lead pollutant, displacing particulate matter in the Air Quality Index (AQI) as the main health concern.
- The health effects of ground-level ozone include:
 - i. Irritation of the airways, causing coughing, chest pain and shortness of breath.
 - ii. Inflammation and damage to lung tissues, which can worsen asthma and other chronic respiratory conditions.
 - iii. Reduced lung function over time and increased susceptibility to infections.
 - iv. Some studies and expert commentary (including in reporting on Delhi) also link short-term, intense ozone exposure to cardiovascular stress, which can increase the risk of cardiac events in vulnerable individuals.
- Ozone also damages vegetation. It harms leaf tissues and reduces photosynthesis, lowering the growth and productivity of crops, forests, and natural ecosystems.

CALL TO ACTION

- Ground-level ozone is a growing summer health emergency that can no longer be ignored. Governments should treat ozone as a major summer pollutant, with stronger monitoring and public health alerts.
- Community members should talk to the doctor when you read about increased ozone levels. Understand what is specifically needed for you.

P POLICY

INDIA'S CLEAN air governance has evolved from a legal and regulatory framework to a programmatic, multi-sectoral approach for city-level action. The Air (Prevention and Control of Pollution) Act, 1981, provides the statutory basis for controlling air pollution. The Act empowers the Central and State Pollution Control Boards to set emission standards, monitor air quality, regulate industrial sources, and enforce compliance.

While the Act establishes the legal authority to curb pollution, its implementation has largely remained sector-specific and enforcement-driven, with limited integration across urban planning, transport, energy, and waste management.

Recognizing that air pollution is a complex, multi-source problem requiring coordinated planning beyond regulatory controls, the Government of India launched the National Clean Air Programme (NCAP) in 2019. It aims to address rising air pollution across Indian cities.

It targets a 40 percent reduction in particulate matter concentrations in non-attainment cities and currently covers over 130 cities.



NCAP promotes city-specific clean air action plans focusing on transport, industry, power plants, waste management, road dust, and public awareness. Funding is linked to performance, encouraging accountability.

The programme strengthens monitoring networks, data quality, institutional capacity, and research. A key feature of NCAP is its integrated, multi-sectoral approach. It recognises that air pollution cannot be solved through isolated actions. For example, waste burning control depends on solid waste management, while vehicle emissions require transport planning and behavioural change. Effective policy implementation depends on coordination between citizens, communities, municipalities, states, and the central government. When these actors work together, pollution reduction becomes sustainable and resilient.

CALL TO ACTION

- Adopt a regional coordination approach, as air pollution is a transboundary challenge that cannot be effectively addressed without collective action and cooperation across regions.
- Governments should focus on urgently strengthening implementation of clean air policy by mandating time-bound, inter-departmental coordination at the city level, backed by adequate financing, enforceable accountability mechanisms, and transparent public reporting under the National Clean Air Programme.
- Community members should learn how the policy applies to their sector, or ward and talk about it with other members.



AIR QUALITY MONITORING

AIR QUALITY monitoring is the backbone of pollution control, risk communication, and public health protection. It goes beyond measuring pollutant concentrations at a few fixed locations, and instead relies on a range of complementary data systems that together help understand pollution levels, sources, trends, and exposure.

- Air quality data is translated into tools such as the Air Quality Index (AQI), which informs the public about health risks and guides advisories, planning, and emergency responses.

- In India, air quality information is generated through multiple monitoring and assessment approaches. Manual air quality monitoring stations and Continuous Ambient Air Quality Monitoring Stations (CAAQMS), remain the core regulatory systems, along with others:

- i. Manual stations** collect samples once or twice a day for laboratory analysis. These provide high-quality reference data but cannot capture short-term pollution spikes or real-time variation.

- ii. Continuous Ambient Air Quality Monitoring Stations (CAAQMS)** measure pollutants automatically on an hourly basis, making them essential for AQI calculation, public alerts, forecasting, and rapid response, though their high costs limit widespread deployment.

- iii. Satellite-based remote sensing** has emerged as an important tool for understanding regional and large-scale pollution patterns. Satellite data help identify pollution hotspots, track seasonal and long-range transport of pollutants, and fill gaps in areas with little or no ground monitoring.

- iv. Low-cost sensors (LCS)** are increasingly being used to supplement regulatory monitoring. A dense network of calibrated LCS can provide valuable insights into neighbourhood-level variation, local sources, and short-term exposure patterns, especially in under-monitored areas.

National and regional institutions, including the Commission for Air Quality Management (CAQM), have begun developing guidance and frameworks for their appropriate use alongside regulatory monitors.¹⁵

- v. Online Continuous Emission Monitoring Systems (OCEMS)** are increasingly tracking pollution from industrial sources, measuring emissions directly at the stack level. The recent expansion of OCEMS requirements by the Ministry of Environment, Forest and Climate Change has strengthened regulatory oversight and improved transparency for industrial pollution control - linking emissions data more closely with ambient air quality management.¹⁶

- Understanding air pollution also requires knowing where it comes from, not just how much is in the air. This is addressed through emissions inventories, which estimate the pollution released from different sectors such as transport, industry, power plants, waste burning, construction, and households, and how much each sector contributes.

- It is essential to estimate the impacts created by the pollution sources on ground. Source apportionment studies help identify the relative contribution of each source to actual ambient pollution levels, providing critical evidence for targeted and effective action.

- Both emissions inventories and source apportionment are now recognised as essential planning tools in clean air programmes.

However, gaps remain. Monitoring coverage across India is still uneven, with many regions such as the North-East, hill states, peri-urban areas, and ecologically sensitive regions remaining poorly monitored. This unevenness hides real exposure, which burdens and weakens evidence-based policymaking.

For air quality monitoring to meaningfully support clean air action, it must be expanded, integrated, and rationalised across data sources, geographies, and pollution contexts. Strengthening monitoring is not merely a technical exercise; it is a prerequisite for equitable governance, effective regulation, informed public participation, and protection of public health.

CALL TO ACTION

- Governments should focus on strengthening India's air quality governance by urgently expanding and rationalizing regulatory air quality monitoring networks across cities, wards, and underserved regions, and aligning them with community exposure and waste-related pollution sources.

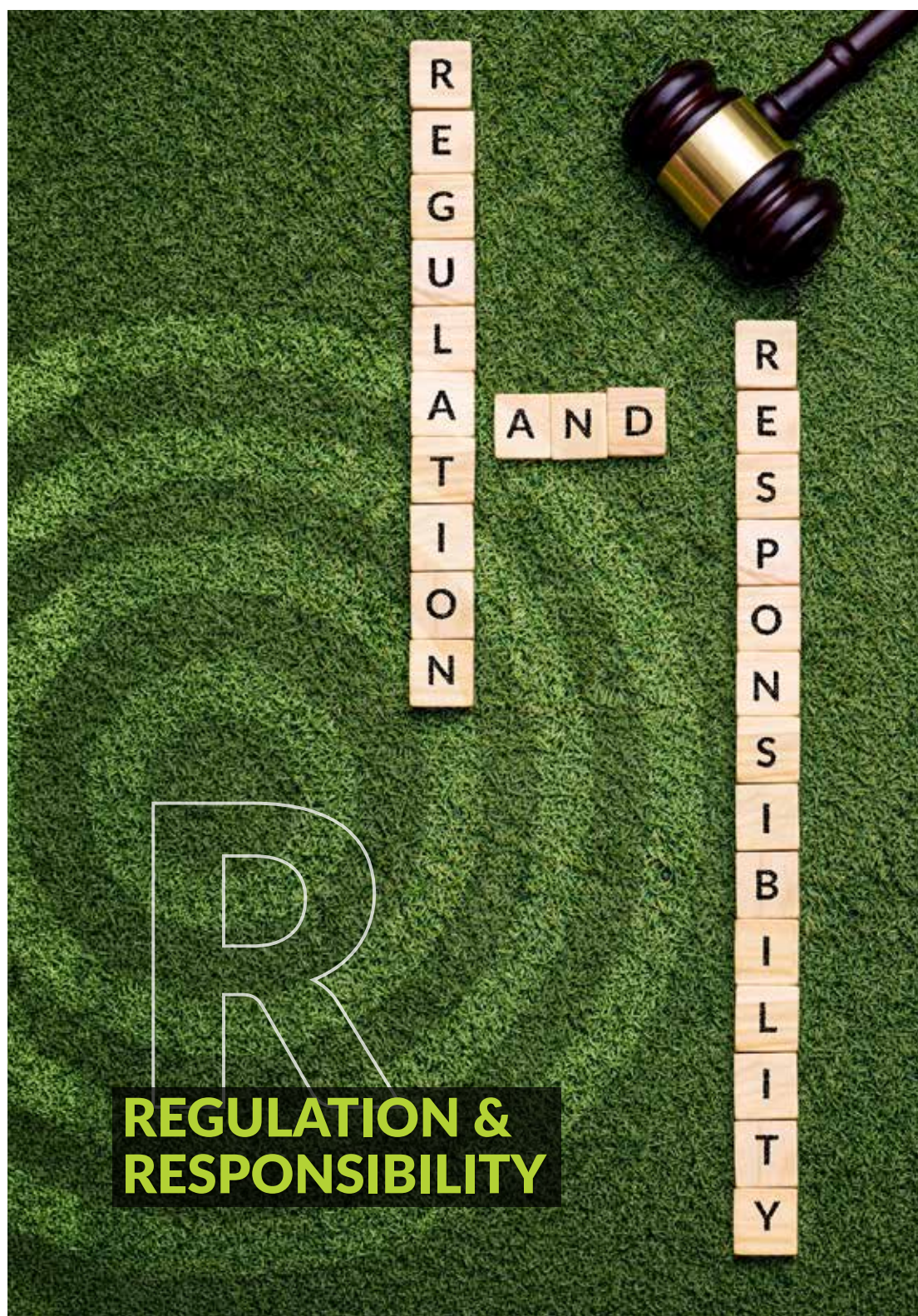
- Governments must ensure adequate, well-distributed placement of manual and continuous monitoring stations near communities so networks are dense enough to capture local pollution spikes from waste burning, construction, traffic, and other everyday sources that directly affect health.

- Alongside regulatory stations, low-cost sensor networks should be expanded to improve neighbourhood-level coverage and identify pollution hotspots more quickly. Several states have begun experimenting with such systems.

- Monitoring data should be publicly accessible, benchmarked against health-based standards including WHO guidelines, and used not only for advisories but to trigger systemic, preventive action across departments, enabling early hotspot identification, timely enforcement, and reduced exposure before pollution escalates into a crisis.

AIR QUALITY STANDARDS: WHO AND INDIA (ANNUAL AVERAGES)

Pollutant	India NAAQS (2009) (Industrial, Residential, Rural and Other Area) ¹⁷	WHO Guidelines (2021) ¹⁸
PM _{2.5} – Annual Avg	40 µg/m ³	5 µg/m ³
PM ₁₀ – Annual Avg	60 µg/m ³	15 µg/m ³
NO ₂ – Annual Avg	40 µg/m ³	10 µg/m ³
SO ₂ – 24 Hours	50 µg/m ³	40 µg/m ³
Ozone (O ₃)	100 µg/m ³ (8-hr)	60 µg/m ³ (peak season)
CO ₂ mg/m	2 µg/m ³ (8-hr)	4 µg/m ³ (24-hr)



- Air pollution control depends not only on cleaner technologies or public awareness, but on strong regulation, clearly defined responsibilities, and consistent enforcement.

- Air quality is shaped by decisions across multiple sectors like transport, urban development, energy, waste management, industry, and health, yet action is often fragmented, with no single agency fully accountable for outcomes. This lack of coordination weakens implementation even when policies and plans exist.

- Municipal bodies play a critical frontline role in controlling local emission sources. They are responsible for solid waste management, preventing open waste burning, maintaining roads to reduce dust, regulating construction activities, improving public transport infrastructure, and expanding urban green spaces. Their effectiveness depends on adequate staffing, technical capacity, and financial resources.

- State Pollution Control Boards such as the Delhi Pollution Control Committee (DPCC) are tasked with monitoring air quality, enforcing emission standards, and taking action against violators. They coordinate with the Central Pollution Control Board (CPCB) to implement national air quality standards and guidelines. Their role is crucial in ensuring compliance, maintaining monitoring networks, and making data publicly accessible.

- Other key agencies, including transport departments, traffic police, urban development authorities, power distribution companies, and industrial development corporations, also influence emission patterns. Regional mechanisms such as the Commission for Air Quality Management (CAQM) are designed to coordinate, research, identify and resolve problems surrounding the air quality index in the NCR, addressing pollution that transcends administrative boundaries.

- Effective regulation requires clear, enforceable air quality standards, reliable and transparent monitoring systems, and well-defined institutional roles at the city, state, and national levels. Responsibilities must be explicitly assigned, adequately resourced, and regularly reviewed to ensure compliance and course correction.

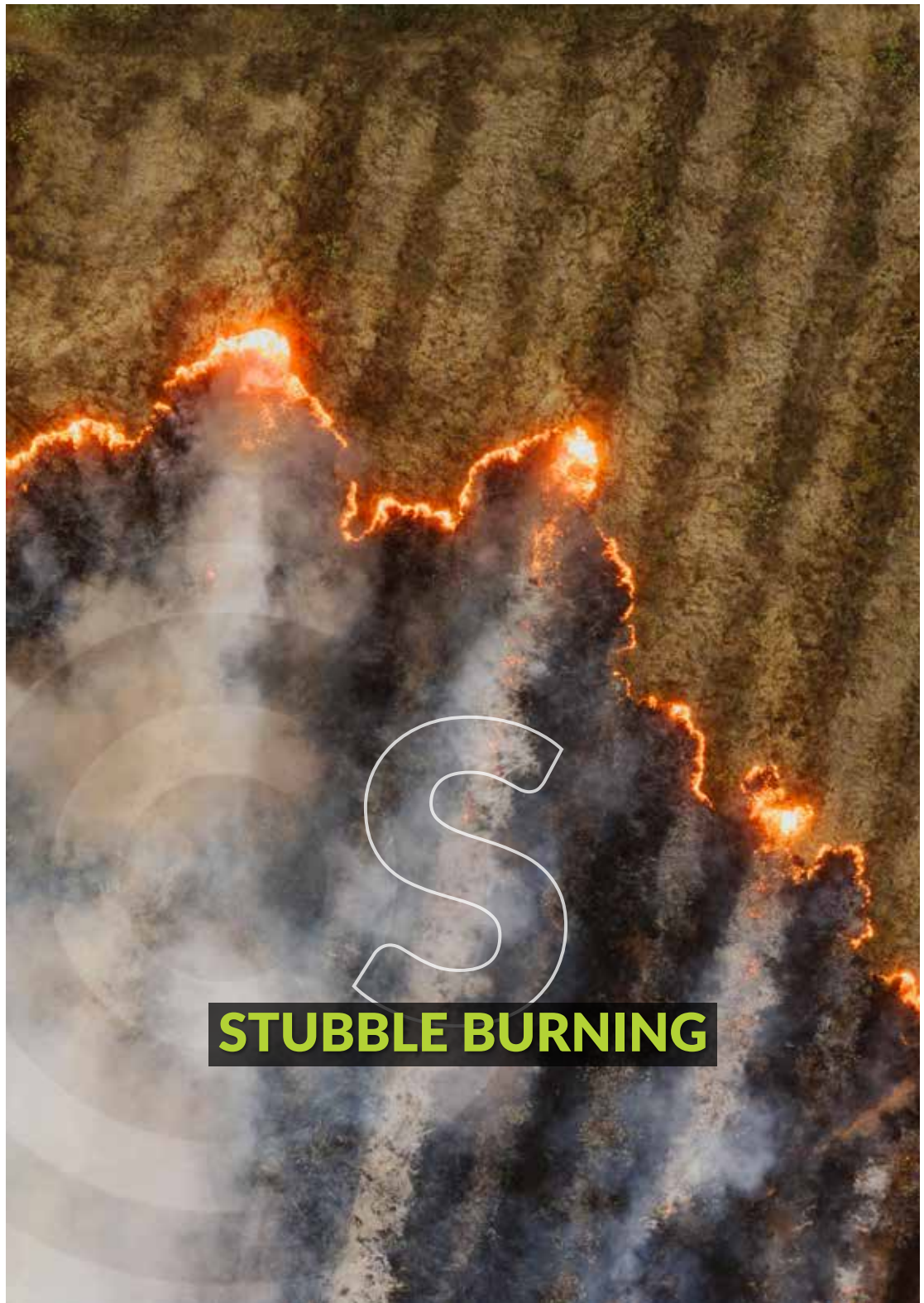
- Without accountability mechanisms and coordinated governance, clean air policies remain aspirational. Strong regulation combined with shared but clear responsibility is essential for sustained air quality improvements and protection of public health.

CALL TO ACTION

- Governments should strengthen air pollution governance by enforcing clear standards and ensuring accountability across sectors. Roles of municipalities, State Pollution Control Boards, and other agencies must be clearly defined, adequately resourced, and coordinated at the city, state, and national levels to ensure effective implementation.

- For citizens, communities, and institutions seeking information or redressal, State Pollution Control Boards should be accessible and responsive points of contact. In addition to publishing air quality data and regulatory updates, authorities must ensure quicker grievance redressal, time-bound responses, and visible action on complaints.

- The government should strengthen helplines, offline complaint centres, ward-level facilitation desks, and community outreach mechanisms to ensure air governance is more inclusive and responsive. Additionally, focus should be on transparent monitoring, prompt enforcement, and citizen-friendly grievance systems, which are critical to protecting public health and sustaining clean air gains.



S **TUBBLE BURNING** is an episodic but significant source of air pollution in northern India.

- In Punjab, the Punjab Preservation of Subsoil Water Act, 2009, delayed paddy transplantation to conserve groundwater, pushing harvesting into late October and sharply reducing the window before wheat sowing. Combined with mechanised harvesting, high labour costs, and labour shortages, farmers are left with little time or affordable options to manage large volumes of paddy straw, making burning the fastest and cheapest solution.

- During October and November, winter meteorology traps pollution close to the ground. Smoke from thousands of fires travels across the Indo-Gangetic Plain and accumulates over Delhi NCR. While stubble burning is not the dominant source of Delhi's annual air pollution, it drives a sharp seasonal spike, contributing roughly around 10% of PM2.5 on average during peak weeks and rising to around 20% or more on the worst days, triggering severe smog episodes. Although seasonal, its impact is intense due to the scale and timing of burning.

- It is important to distinguish this from shifting cultivation (jhum) practiced in parts of North-east India. Jhum is a traditional agricultural system involving controlled burning of vegetation to clear land for mixed cropping. Unlike mechanised residue burning in northwestern India, jhum is embedded in ecological cycles with fallow periods that allow forest regeneration. However, shortening of fallow cycles due to population pressure has reduced ecological recovery time, leading to forest degradation, biodiversity loss, and localised smoke emissions. While its contribution to national urban smog episodes is limited compared to northwestern stubble burning, it can affect regional air quality and carbon emissions.

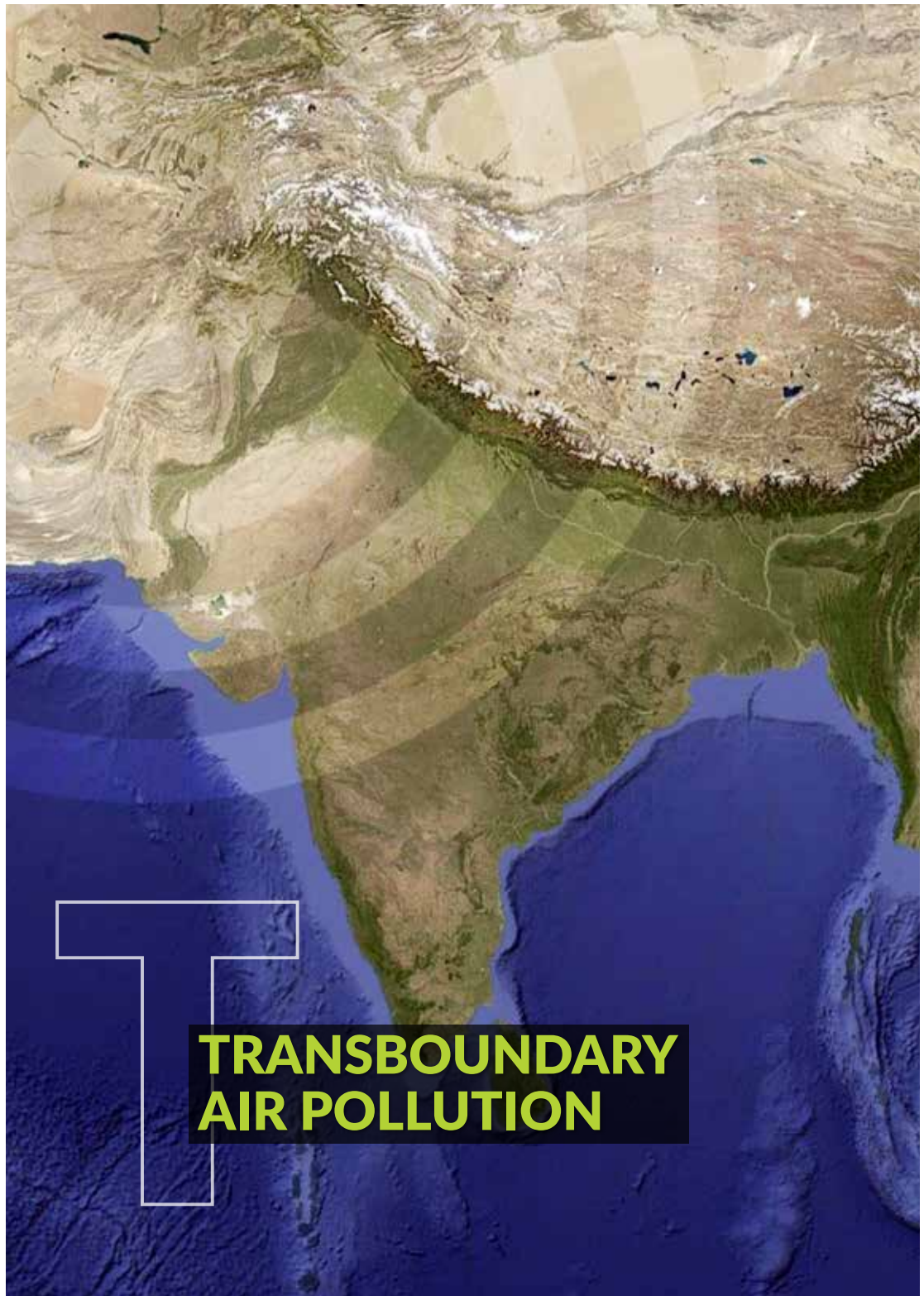
- Due to different wind direction, we do not experience the pollution from the much-reduced stubble burning in the summer harvest season.

- Solutions to crop residue burning in northern India require inter-state coordination, financial and technical support for alternative residue management, crop diversification, and addressing the economic constraints faced by farmers. Tackling the issue effectively demands coordinated policy reform and viable on-ground alternatives, rather than enforcement alone.

- Crops more suited to the ecology, with Minimum Support Prices, are an even better option in areas where water is the driver for stubble burning.

CALL TO ACTION

- The government should support alternatives to stubble burning like biogas, bio-CNG or bio-fuel production, along with technology such as Happy Seeder and coordinated regional action.
- Further, the government should also focus on expanding procurement under Minimum Support Price (MSP) for climate-resilient crops by actively purchasing these crops and integrating them into public distribution and nutrition schemes.



AIR POLLUTION does not follow borders. It is a borderless problem where winds, geography, and atmospheric conditions often override political boundaries. Pollution released in one location can travel hundreds or even thousands of kilometres, affecting people in other regions or countries.

- A key example is the Indo-Gangetic Plain (IGP), one of the most densely populated and polluted regions in the world.¹⁹ This vast airshed stretches across India, Pakistan, Nepal, and Bangladesh. Pollution generated in one part of the region, whether from vehicles, industries, or crop burning can easily travel across national borders.

- The movement of pollutants across northern India follows a seasonal atmospheric “conveyor belt” shaped by changing wind systems and pressure patterns.²⁰

- In spring and early summer, strong northwesterly winds associated with high-pressure systems over West Asia, often funnelling through the Persian Gulf between Saudi Arabia and Iran generate frequent sand and dust storms. Extremely dry conditions and gusty winds produce 5–10 major dust storms annually over the Thar Desert, many of which move into northwest India during the pre-monsoon season.²¹

- Mineral dust from the Middle East and northeastern Africa can also be lifted to higher altitudes and transported over the Arabian Sea into the Indian subcontinent. Wind systems such as the Shamal and Red Sea winds carry these particles at elevations of roughly 2–5 km above the surface, allowing them to travel long distances and alter aerosol composition far from their original source.²²

- Around the world, similar examples demonstrate how air pollution travels across regions and continents. Dust storms from Sub-Saharan Africa regularly cross the Arabian Sea and can affect air quality in cities such as Mumbai. Dust and sand from the Middle East also move across long distances and influence the composition of aerosols over the Indian subcontinent.²³

- In North America, smoke from large wildfires in Canada has travelled hundreds of kilometres to affect air quality in the United States, exposing millions of people to hazardous levels of particulate matter.²⁴

- Similarly, in Southeast Asia, haze from forest and peatland fires in Indonesia frequently spreads to neighbouring countries such as Malaysia and Singapore, creating regional public health emergencies.²⁵

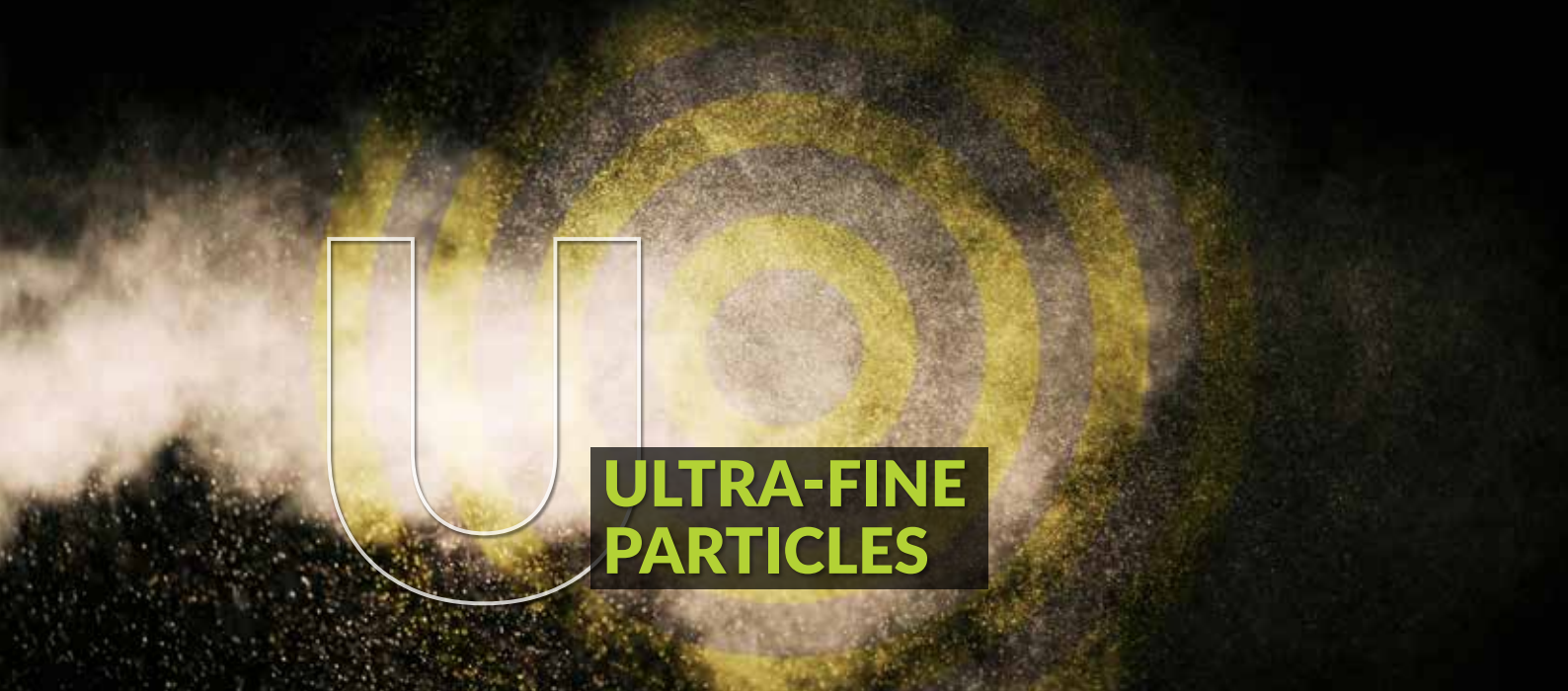
- Transboundary pollution can also arise from global waste trade and toxic dumping. For example, large volumes of electronic waste from wealthier countries are shipped to places like Agbogboshie, where informal recycling and burning release toxic fumes, heavy metals, and persistent pollutants into the air. In this way, pollution generated by consumption in one part of the world is effectively transferred to another region.²⁶

These examples show that air pollution is not only a local or national problem but a regional and global one. Managing it requires cooperation across states, countries, and continents. Governments must work together to monitor shared airsheds, regulate emissions, control waste flows, and respond to pollution events that cross borders.

Regional coordination and international cooperation through technology sharing and sustained dialogue between neighbouring countries are essential to effectively address transboundary air pollution and safeguard public health in an interconnected atmosphere. To manage an airshed effectively, policymakers must assess cumulative emissions, seasonal wind flows, shared sources, and meteorological trends across the entire region.

CALL TO ACTION

- Governments across borders should share solutions across all borders, promote coordinated action across regions as a shared priority, and build alliances to reduce air pollution
- At the individual level, community members should connect with people in other parts of the world to exchange knowledge and collaborate on efforts to reduce airshed pollution.



ULTRA-FINE PARTICLES

- Ultra-fine particles (UFPs) are extremely small air pollution particles, smaller than 0.1 micrometres (100 nanometres). They are even smaller than PM_{2.5} and are sometimes referred to as PM_{0.1}. Because of their tiny size, they behave differently from larger particles and can remain suspended in the air for long periods.

- UFPs are mainly formed during combustion and chemical reactions in the atmosphere. They can originate from sources such as vehicle exhaust, industrial processes, waste burning, diesel generators, and other high-temperature burning activities. In the atmosphere, they can also form through processes such as nucleation, condensation, and coagulation, where gases and smaller molecules combine to create new particles.

- What makes ultra-fine particles particularly concerning is their ability to penetrate deep into the human body. Due to their very small size and large surface area, these particles can pass through the lungs, reach the pulmonary alveoli, and in some cases enter the bloodstream and travel to other organs.

- Research suggests that exposure to UFPs may contribute to a range of health effects, including respiratory diseases, cardiovascular problems, inflammation, neurological effects, and even cancer. Their toxicity is linked to their ability to generate reactive oxygen species (ROS), which can damage cells, DNA, and tissues in the body.²⁷

- Despite these risks, ultra-fine particles are rarely measured in standard air quality monitoring systems, which typically focus on PM₁₀ and PM_{2.5}. This means that an important part of air pollution may remain largely unmonitored and underestimated, even though people may still be exposed to it.

- Recognising ultra-fine particles as an emerging air pollution concern is important for improving monitoring systems, guiding research, and developing policies that better protect public health.

CALL TO ACTION

- The government should strengthen monitoring and research on ultra-fine particles and reduce emissions from combustion sources such as vehicles, generators, industries, and waste burning.
- Further, the government should also encourage research and public reporting on ultra-fine particles so policymakers and communities better understand their health impacts.
- While PM_{2.5} should remain a key focus for public health, funding should also be made available to support research on ultrafine particles to strengthen preparedness.

V

VEHICLES



A RECENT REPORT presented by the Commission for Air Quality Management (CAQM) stated that the transport sector ranks as the largest primary contributor to winter air pollution in Delhi-NCR, accounting for about 23% of the PM_{2.5} load during the worst months, ahead of biomass and dust sources.

- The report notes that tailpipe emissions from on-road and off-road vehicles are a major source of urban air pollution, and that older vehicles emit significantly more pollutants than newer ones certified under Bharat Stage VI (BS-VI) standards.

- In testimony to the Supreme Court, CAQM also identified vehicular emissions as the leading cause of Delhi-NCR's deteriorating air quality overall, proposing long-term measures such as phasing out high-emitting vehicles, strengthening vehicle emission checks, and boosting public and zero-emission transport options.

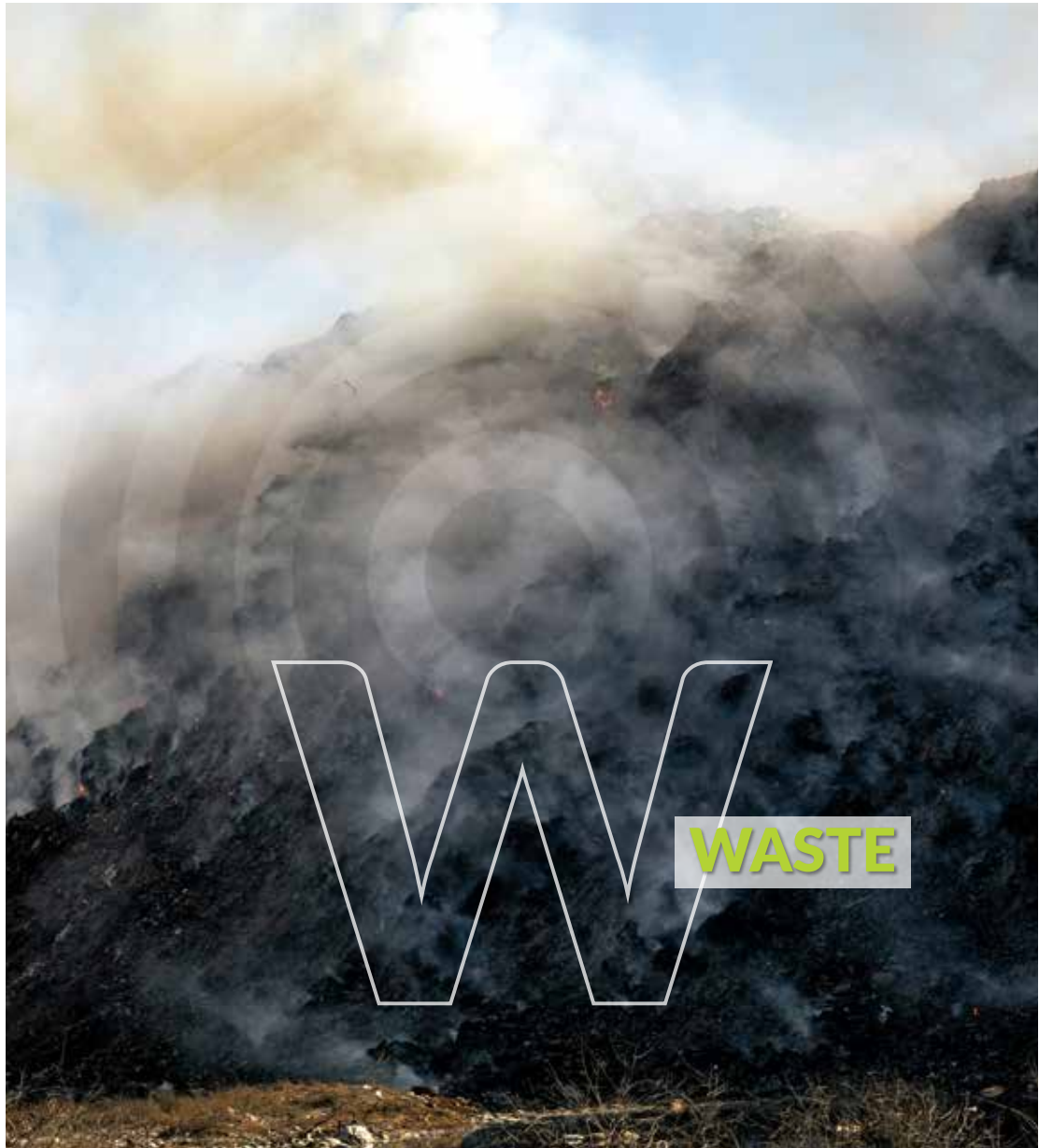
- Additionally, two-wheelers also play an important role in transport-related emissions. They make up a large share of vehicles on Delhi's roads. They collectively contribute significantly to urban pollution, particularly hydrocarbons and fine particulate pollution. Older two-wheelers, especially those with two-stroke engines, can emit much higher levels of pollutants compared to newer models.

- The type of fuel used also matters. Vehicles running on diesel tend to emit higher levels of particulate matter and nitrogen oxides, which contribute to smog and secondary particle formation. Cleaner alternatives such as electric vehicles (EVs) can significantly reduce tailpipe emissions in cities because they produce no exhaust emissions during operation. Expanding public transport, shifting to electric mobility, and encouraging cleaner fuels can therefore play an important role in improving urban air quality.

- While vehicles are not the only source, secondary particulates, dust, industry and seasonal biomass emissions also contribute as per the latest CAQM study. However, it elevates transport as a core, year-round urban source of fine particulate pollution in Delhi-NCR.

CALL TO ACTION

- The community should ask for better and more reliable public transport in the city. Strong public transport systems reduce the number of private vehicles on the road and help reduce air pollution.
 - Support campaigns that promote public transport, such as the Double the Bus²⁸ campaign India, which calls for expanding bus fleets to make buses more accessible and efficient for everyday travel.
 - Support youth-led initiatives which aim at encouraging schools to support bus travel instead of private car drop-offs, helping reduce congestion and pollution around school areas.
 - Choose public transport whenever possible; taking buses, metro, or shared transport instead of private vehicles can significantly reduce emissions.
- Governments should encourage schools, offices, and communities to adopt transport practices that prioritise buses, walking, cycling, and shared mobility.



- Waste contributes to air pollution through open burning, landfill fires, and decomposition. Burning mixed waste releases toxic gases, fine particulate matter, heavy metals, and persistent organic pollutants that remain in the air long after the fire stops. These emissions affect not only those who burn waste but also neighbouring communities and children who breathe the polluted air.

- Open waste burning is often seen as the quickest way to dispose of waste, especially where waste collection is irregular, waste is not segregated, or dumpsites are poorly managed. As a result, burning of household waste, garden waste, and landfill fires continues to contribute significantly to urban air pollution. Waste burning releases large amounts of particulate matter, carbon monoxide, nitrogen oxides, sulphur dioxide, and other harmful pollutants into the atmosphere.

- Another important but less visible problem is methane emissions from wet waste. Food scraps and other organic waste decompose in landfills and dumps, releasing methane, a highly flammable and powerful greenhouse gas. It causes landfill fires, contributing to air pollution. Managing wet waste through segregation, composting, and decentralised treatment can significantly reduce methane emissions as well as the need for burning.

- Poor handling of electronic waste (e-waste) is another growing concern. Informal dismantling and burning of electronic components to recover metals can release toxic fumes, heavy metals, and hazardous chemicals, affecting both workers and surrounding communities.

- Waste pickers play a critical role in preventing waste from being burned or dumped. By collecting, sorting, and recycling materials such as plastic, paper, and metal, they help reduce the amount of waste that ends up in landfills or fires. Supporting waste pickers through recognition, safe working conditions, and integration into formal waste systems is essential for both environmental protection and social justice.

- Waste-to-Energy (WtE) is often promoted as a solution for managing large volumes of municipal solid waste by incinerating mixed waste to generate electricity. While it can reduce the volume of waste sent to landfills, poorly planned or operated WtE facilities can become significant sources of air pollution, emitting particulate matter, nitrogen oxides, heavy metals, and toxic compounds such as dioxins and furans.

In India, the high moisture and low calorific value of municipal waste often requires additional fuel to sustain combustion, increasing both emissions and costs. Over-reliance on WtE technologies can also discourage waste segregation, composting, and recycling if mixed waste is prioritised as fuel. Any role for WtE must therefore be strictly limited, regulated, and monitored, and should not substitute for waste reduction, segregation, composting, and decentralised waste management systems, which offer greater benefits for air quality and public health.

CALL TO ACTION

● The government should:

- Focus on fixing waste collection and management systems to prevent open burning, landfill fires, and unmanaged dumping.
- Encourage communities and bulk waste generators to adopt effective waste management systems as mandated by the Solid Waste Management Rules (SWM), 2026.
- Encourage people to segregate waste at source and compost wet waste to reduce methane emissions and the amount of waste that ends up in dumps or incinerators. The SWM Rules mandate source segregation of waste into distinct streams - wet, dry, hazardous and sanitary waste.
- Recognise and support waste pickers, whose work in collection, sorting, and recycling prevents large volumes of waste from being burned or landfilled. The SWM Rules also require the formal integration of waste pickers into municipal waste management systems.

● Communities should:

- Be cautious of technologies that appear to “clean up” waste quickly but may actually increase air pollution, such as poorly regulated burning or incineration of mixed waste in Waste to Energy plants to get rid of legacy waste piles.
- Ask for prioritising decentralised waste management solutions, including composting, recycling, and material recovery facilities, which protect both public health and air quality.



X

X-FACTOR

- Beyond well-known sources such as vehicles and industries, hidden and poorly-documented contributors continue to drive air pollution. These include everyday activities and small-scale sources that often escape monitoring and regulation, such as emissions from dry-cleaning units, diesel generators, solvent use, plastics, mosquito repellent coils, and even perfumes.

- In addition, long-range transport of pollution, including dust storms originating in West Asia, periodically elevates particulate matter levels across large parts of India, especially in northern and western regions. Because these sources are dispersed, episodic, or transboundary, they are rarely captured in routine inventories or city action plans.

- Ignoring these X-factors allows pollution to remain stubbornly high even when major sources are addressed, particularly at the neighbourhood level. Recognizing and accounting for these hidden and external contributors is essential for effective, comprehensive, and resilient air pollution control.

CALL TO ACTION

- Community members should be encouraged to reduce reliance on dry cleaning, consider the necessity before getting furniture polished and be mindful about regularly using solvents like harsh and toxic cleaning products, synthetic air fresheners, etc. They should also try using mosquito nets before resorting to mosquito coils.
- The government should focus on introducing targeted regulations for emerging and under-regulated sources.

Y

YEAR-ROUND

- Air pollution is a year-round issue and not confined to winter smog episodes. It is because the activities that generate it do not stop when visible smog disappears. In urban areas, vehicles, industries, construction activity, road dust, diesel generators and household fuels release pollutants every day, maintaining a constant baseline of pollution throughout the year.

- These sources emit not only particulate matter directly, but also gases such as nitrogen oxides and volatile organic compounds that react in the atmosphere to form secondary PM_{2.5}, adding to pollution across seasons.

- Seasonal factors change how pollution is experienced, not whether it exists. In the winter, low wind speeds and temperature inversions trap pollutants near the ground, making pollution more visible and severe. In summer, stronger winds and higher mixing heights disperse pollutants more effectively, but emissions continue and contribute to ozone formation and chronic exposure.

- As a result, people are exposed to harmful air in all months, sometimes acutely during smog episodes, and at other times silently through long-term exposure. This makes air pollution a persistent public health and environmental challenge rather than a seasonal problem.



CALL TO ACTION

- Action must shift from emergency responses to sustained, all-season measures that cut emissions at source. The Government should be aware that clean air requires continuous enforcement, accountability across agencies, and long-term investment in cleaner transport and cities.
- Citizens must be mindful of reducing their own emissions and ask governments for clean air action throughout the year, and not just during high pollution months.



- Zero reflects the vision of preventing air pollution at its source, rather than managing it only after the damage is done. It represents zero tolerance for avoidable emissions through cleaner fuels, zero-emission mobility, strong enforcement, and coordinated action across sectors and states.

- We know that absolute zero pollution is an ideal and may never be fully achieved. However, the idea of zero helps set clear goals and direction for policy and public action. It shifts the focus from reacting to pollution crises to preventing pollution wherever possible.

- This approach treats clean air as a public good, protected through long-term planning, accountability, and sustained action, not just short-term emergency measures during severe pollution episodes. Air should not be treated as a private dump yard for emissions from vehicles, industry, waste burning, or construction.

- At the same time, measurement and monitoring remain essential. Without tracking air quality and pollution sources, it is impossible to understand whether policies and actions are actually reducing emissions.

- While we may not reach zero pollution, we can still work toward practical “zero” goals, such as zero open burning of waste, zero tolerance for illegal industrial emissions, and zero uncontrolled dust from construction and roads. Alongside prevention, cities must also adopt mitigation measures that reduce pollution levels and limit exposure when emissions cannot be immediately eliminated.

CALL TO ACTION

The government should:

- Shift from crisis management to prevention and mitigation, addressing pollution at its source wherever possible. Governments must prioritise long-term planning over short-term emergency responses.
- Expand renewable energy systems and strengthen public transport networks, while accelerating the transition to electric mobility.
- Adopt and enforce mitigation measures across sectors, including effective waste management, strict dust control at construction sites, and cleaner industrial processes.
- Strengthen air quality monitoring systems and ensure transparency in data. Public agencies must provide accessible, real-time information so that communities and policymakers can track progress and hold institutions accountable.

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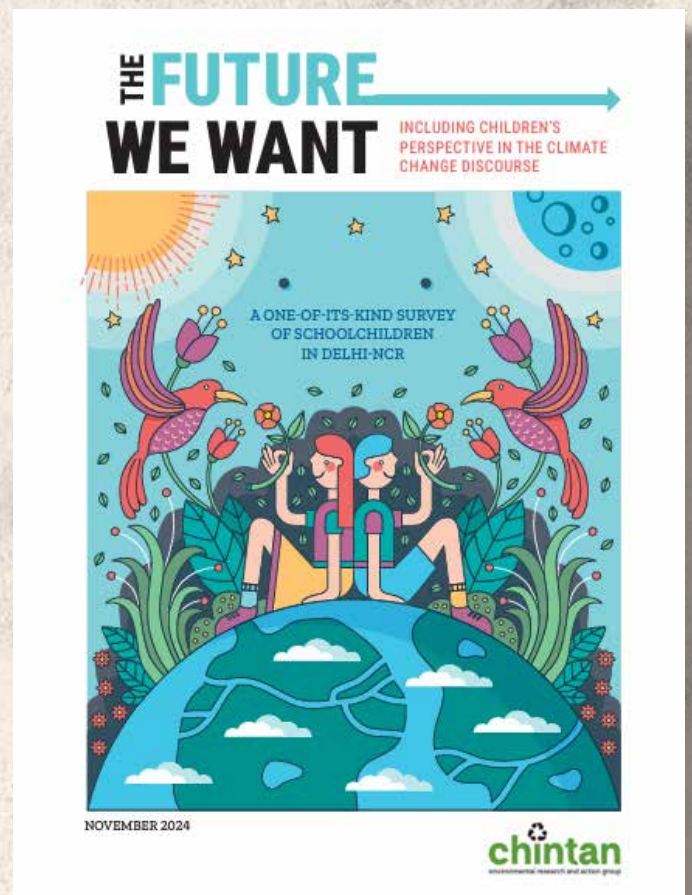
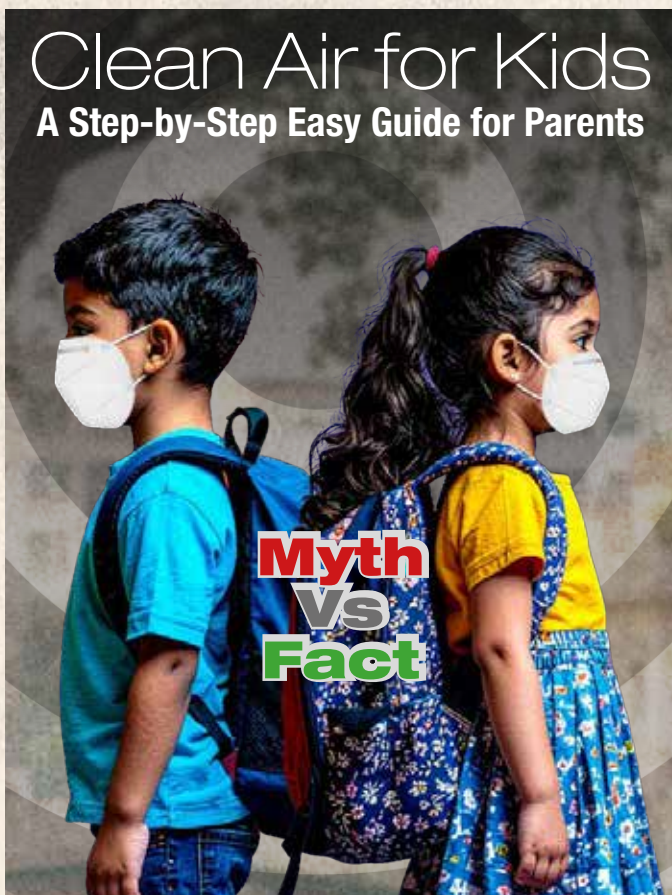
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