Delhi - Air Quality Crisis

1. What is the problem?

1.1. Why is this in the news?

On November 1st, Delhi declared a public health emergency after air quality plunged. The overall air quality index (AQI) was around 530, category 'severe plus'.[1] The levels of particulate matter (PM) 10 and 2.5 were above 500 and 300 microgramme per cubic metre respectively, five times more than their prescribed standard.

1.2 Why did this happen?

Air pollution in India is not a problem restricted to Delhi winters. 76% of Indians live in areas that do not meet national standards. The Indo-Gangetic Plain (IGP), in particular, has an air pollution crisis throughout the year, with especially severe levels during the winters. There are many pollutants, but fine particulate matter suspended in the air - *referred to as $PM_{2.5}$ because particles are 2.5 micron in diameter or less* – help us measure the seriousness of the problem.

The recurring smog in Delhi and other parts of IGP in late October-mid November is a combination of two factors. One, pollution from the sources that operate throughout the year – *such as industry, power plant, vehicle emissions, and construction dust* -- is unable to disperse away as winter sets in.

Two, stubble burning during these few weeks and to a lesser extent Diwali contribute to pushing the air quality from poor levels to severe. Even during this period, pollution levels can vary substantially from one day to the next. Whether a particular day has severe levels or not depends on *surface wind conditions, meteorological conditions and the extent of agricultural fires*.

We cannot control meteorological conditions, but we certainly can tackle the emissions. To make substantive progress, tackling any one source will not do. We need to make progress on each major source, throughout the year and across India. These include household burning of solid fuels for cooking and other purposes, industries and power plants, waste burning, construction and road dust, and transport emissions.

1.3 Why is it bad?

The health impacts of poor air quality are staggeringly high and of growing concern as we discover the full range and degree of its effects with new research. Air pollution is **estimated to reduce the average life expectancy of a child born in India by at least 1.5 years** and is estimated to have contributed to one in eight deaths in India. Cardio-respiratory diseases and lung cancer in adults, and acute lower respiratory infections in children, are the more commonly known impacts of air pollution. In addition, new research indicates a much wider range of health impacts, such as on birth weight, child growth, obesity and bladder cancer. There is growing evidence on the adverse impacts of pollution on cognitive abilities in children.

1.4 How has the government responded?

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[1] An AQI between 0-50 is considered 'good', 51-100 'satisfactory', 101-200 'moderate', 201-300 'poor', 301-400 'very poor', and 401-500 'severe'. Above 500 is 'severe-plus' or 'emergency' category.

The Environment Pollution Prevention and Control Authority (EPCA) gave directions to for the following measures till 5th November under the Graded Response Action Plan:

- **Ban all construction activities** in the national capital and adjoining regions of Faridabad, Gurgaon, Ghaziabad, Noida, and Greater Noida
- **Close hot mix plants and stone crushers** in all National Capital Region (NCR) districts
- **Close all coal and other fuel-based industries** that have not shifted to natural gas or agro-residue (with exception to power plants) in multiple surrounding areas.
- **Ban industries which have not shifted to piped natural gas (PNG)** in Delhi.
- **Ban cracker burning** for the entire winter period.
- **Advised residents to minimise personal exposure** as far as possible, especially for children, the aged and vulnerable. Schools in the city were shut till November 5.
- **Increase vigilance and enforcement in hotspots** of multiple surrounding areas.
- **Initiate car rationing** 'odd-even' scheme by the Delhi government until November 15.

2. What can be done?

Air quality policy in India has historically been reactive and over-reliant on administrative solutions. Monitoring and enforcement capacity for existing rules and standards has proven to be weak. The judiciary has largely driven decision-making in the absence of an active executive, with mixed results. The National Clean Air Programme, launched in January 2019, in its current form is largely a continuation of the status quo approach of long lists of unprioritised action points with dispersed accountability.

2.1. Build efficient government mechanisms

An efficient governance mechanism is central to the success of any anti-pollution effort. Air Pollution in Delhi is managed by an autonomous government body, the Environmental Pollution Control Authority (EPCA). The authority has published a plan that calls for responses commensurate with the severity of air pollution.

Unfortunately, at least 16 different agencies are currently involved in the implementation of the plan. Some are under the control of the Union government, some under the Delhi government, and some are under the administrative control of neighbouring states. These agencies are ruled by fierce political rivals, and there is no clear effort to promote coordination among them. Consequently, policy measures are not effectively enforced.

2.2. Address Delhi's air pollution as a regional problem

A study conducted by the International Institute for Applied Systems Analysis (IIASA) and the National Environmental Engineering Research Institute (NEERI) in Nagpur, India, showed that about **60% of the PM2.5 burden in Delhi is due to the neighbouring states**. No policy is likely to work unless it takes regional considerations into account.

2.3. Seek out adequate source appropriation

Delhi needs to search for the sources of emissions. During the past decade, there have been 15 source apportionment studies. While sources of emissions remain same in all the studies, the contribution from

different sources to Delhi's pollution varies greatly. Due to Delhi's complex meteorology and the changing nature of the sources of emissions, it is difficult to make accurate estimates

> **Note: Popular discourse often blames stubble burning alone.** Absent stubble burning, pollution levels in the Delhi region would still be many times higher than the national standards. Other important sources like power plants, industries, transport (esp. trucks), construction and road dust, and waste burning play a critical role.

2.4. Address gaps in capital and human infrastructure

Delhi has only half the buses it needs for public transport (the lowest level in the past eight years). This means that private automobile use continues to grow. The Delhi Pollution Control Committee (DPCC), which is mandated to enforce compliance with air pollution rules in the city suffers from a serious scientific and technical manpower shortage (operating at about three-quarters strength since 1990).

3. What is the ICC doing?

There is a need for consistent public messaging around the issue, and a broad shared agenda for research and action. The India Climate Collaborative (ICC), a philanthropic collaborative incubated by the Tata Trusts, the Centre for Policy Research (CPR) has been commissioned to put together a strategy paper that will reflect on aspects for consistent public messaging and our shared agenda. Important elements of the shared agenda include *building consensus on which measures to prioritise*, *developing a roadmap for regulatory reforms*, *learning from international experiences*, and *advancing communication strategies*.

In addition, **we are exploring targeted grants** for quality monitoring and modelling, source apportionment data, and health data in Maharashtra as significant gaps still exist not only in Delhi, but in metro regions all over the country. Data gaps cannot remain a reason for inaction.

 We will also need to build coalitions for implementation, sector by sector, with groups specialising in methods and sector-specific issues. Some key organisations engaged in important components of this work are listed below:

- **Strengthening air quality monitoring**: IIT Delhi, IIT Kanpur, low cost sensor service providers like Urban Sciences, PurpleAir and Kaiterra
- **Understanding source contributions, modeling and forecasting:** Urban Emissions, Indian Institute of Tropical Meteorology (SAFAR), IIT Kanpur, TERI, IIT Bombay, WRI
- **Investigating impact of air pollution on health:** Public Health Foundation of India, Sri Ramachandra University
- **Communicating health impacts:** Lung Care Foundation
- **Research and technical assistance on source by source mitigation:** CSE (transport, power plants), CSTEP (city action plans in Bihar, power plants), Chintan (municipal and construction waste), CEEW (stubble burning, power plants), EPIC India (industries), WRI (transport)
- **Regulatory reforms:** CPR, Vidhi Legal, LIFE
- **Coordination of advocacy efforts and media outreach:** Asar Social Impact, Global Strategies and Communications Council, Center for Environment and Energy Development, Clean Air Fund (CAF)

> **If you are interested in learning more about ongoing efforts to combat air pollution in our cities, please reach out to the ICC team (*snath@tatatrusts.org*) for information and opportunities to act.**

This knowledge product was prepared in consultation with the Centre for Policy Research

Useful resources for further reading

1. Balakrishnan et al., 2019., 'The Impact of Air Pollution on Deaths, Disease Burden, and Life Expectancy across the States of India: The Global Burden of Disease Study 2017'
2. Health Effects Institute, 2019,. 'State of Global Air 2019'
3. CPR, 2019. 'Clearing Our Air Of Pollution: A Road Map for the Next Five Years'.

Glossary:

AQI	Air Quality Index
CAF	Clean Air Fund
CEEW	Council on Energy, Environment and Water
CPCB	Central Pollution Control Board
CPR	Centre for Policy Research
CSE	Centre for Science and Environment
CSTEP	Center for Study of Science, Technology and Policy
DPCC	Delhi Pollution Control Committee
EPCA	Environment Pollution Prevention and Control Authority
GRAP	Graded Response Action Plan
ICC	India Climate Collaborative
IIASA	International Institute for Applied Systems Analysis
IITM	Indian Institute of Tropical Meteorology
LIFE	Legal Initiative for Forests and Environment
NCR	National Capital Region
NEERI	National Environmental Engineering Research Institute
PM	Particulate Matter
PNG	Piped Natural Gas
SAFAR	System of Air Quality and Weather Forecasting And Research
TERI	The Energy and Resources Institute
WRI	World Resources Institute

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