Finding Solutions to Air Pollution in India: The Role of Policy, Finance, and Communities

Aparna Roy, Tanushree Chandra and Aditi Ratho
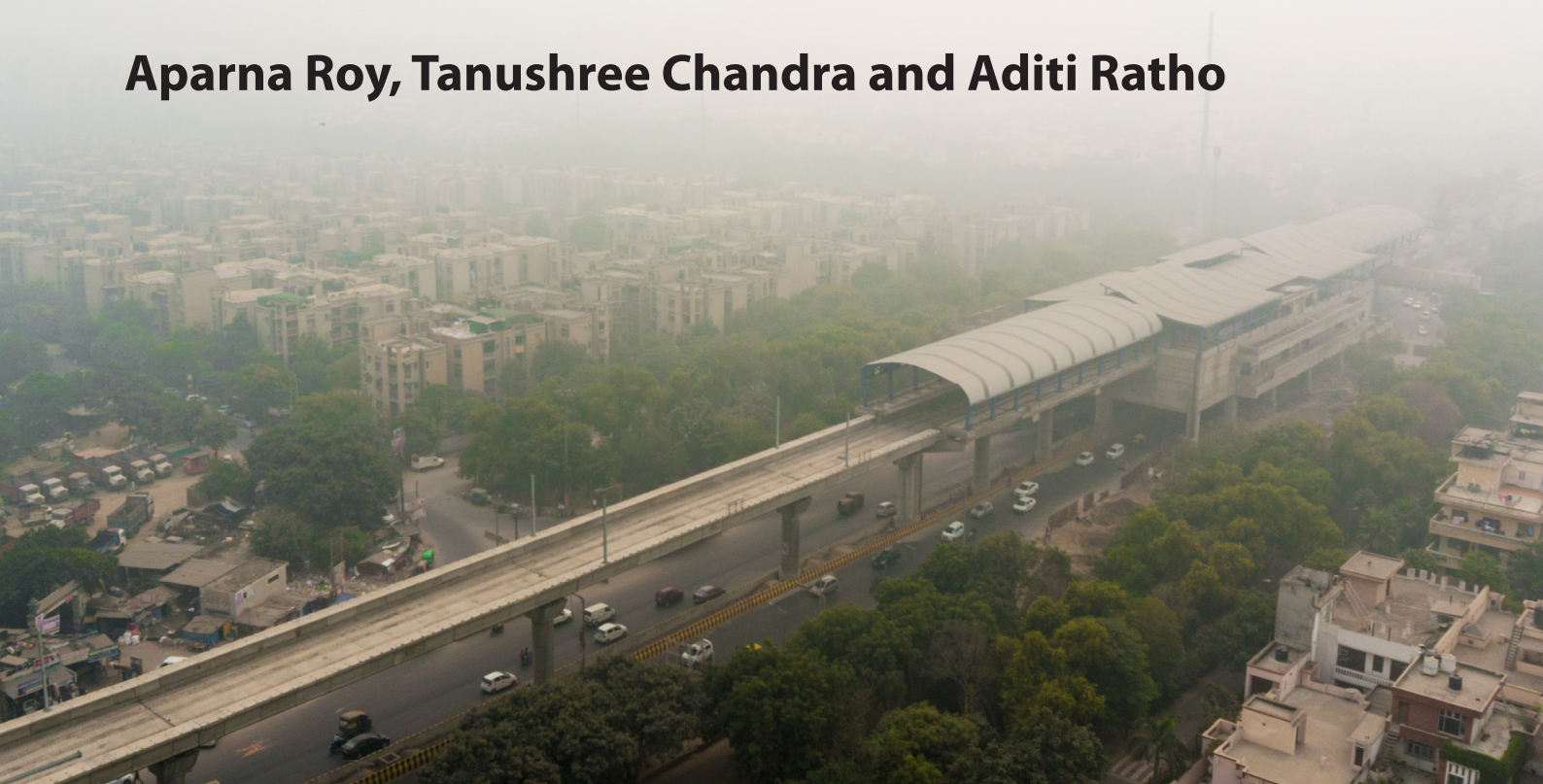
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INTRODUCTION

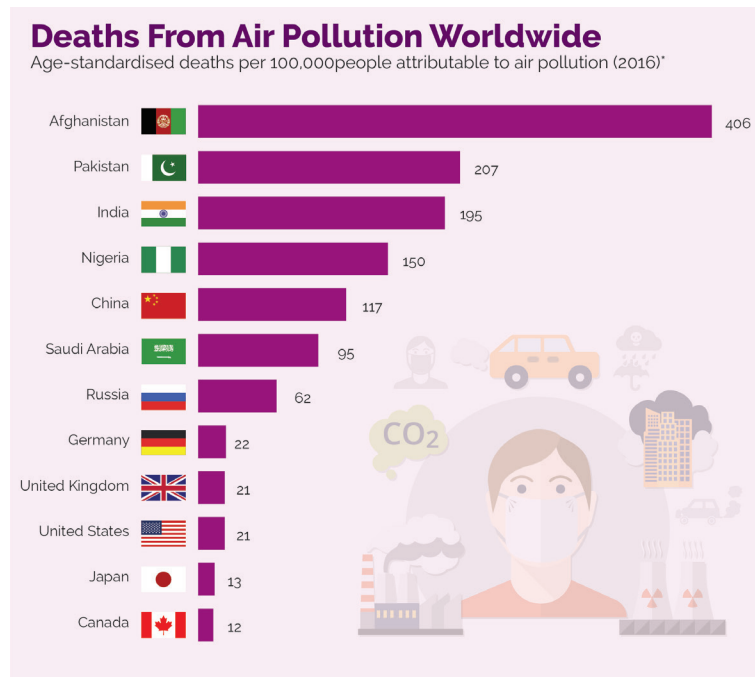Ambient air pollution poses grave, multi-faceted risks to India's prospects for achieving its development goals: it leads to a rapid increase in public health expenditure, diminished labour productivity, and reduced agricultural yields. Estimates peg the economic cost of air pollution to the Indian economy at more than US$150 billion a year.

Air quality in India has deteriorated significantly over the past two decades; today, air pollution is the second largest risk factor contributing to the country's disease burden. In 2017, around 97 percent of the country's population were exposed to particulate matter (PM2.5)[1] in excess of the value specified by the World Health Organization (WHO) air quality guidelines, thereby making them vulnerable to serious health risks.[a] Air pollution affects individual health of citizens, increases mortality and morbidity rates, and contributes to climate change. The levels of morbidity and mortality have led to losses in welfare that in turn cost India's economy some 5.9 percent of GDP.[2] A 2018 report by the Health Effects Institute projects a rise in annual deaths in India due to air pollution from 1.1 million in 2015 to 1.7 million in 2030[3] (See Figure 1).

Figure 1: Deaths due to air pollution

Deaths From Air Pollution Worldwide
Age-standardised deaths per 100,000 people attributable to air pollution (2016)*

Country	Deaths
Afghanistan	406
Pakistan	207
India	195
Nigeria	150
China	117
Saudi Arabia	95
Russia	62
Germany	22
United Kingdom	21
United States	21
Japan	13
Canada	12

Source: Health Effects Institute, State of Global Health 2018.

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a   Long-term exposure to particulate pollution can result in significant health problems including increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing; decreased lung function; aggravated asthma; and development of chronic respiratory disease in children.

The COVID-19 pandemic has highlighted the urgency to address India's chronic problem of air pollution. An April 2020 report by the Harvard T.H. Chan School of Public Health has established the correlation between long-term exposure to air pollution and COVID-19 mortality: "people living in high-pollution cities are more likely to have compromised respiratory, cardiac and other systems – and are therefore more vulnerable to COVID-19's impacts."[4] According to the 2019 World Air Quality Report, India is home to 21 of the 30 most polluted cities in the world, where air quality can be as much as ten times over the safe limits of air pollution recommended by WHO (See Figure 2). Majority of these cities today are COVID-19 hotspots: 12 Indian states with a greater share of urban population (in 2011 and project values for 2036) constitute 75.1 percent of all confirmed cases.[5]

Figure 2: The 10 most polluted cities in the world

Rank	City	2019 AVG
1	Ghaziabad, India	110.2
2	Hotan, China	110.1
3	Gujranwala, Pakistan	105.3
4	Faisalabad, Pakistan	104.6
5	Delhi, India	98.6
6	Nodia, India	97.7
7	Gurugram, India	93.1
8	Raiwind, Pakistan	92.2
9	Greater Noida, India	91.3
10	Bandhwari, India	90.5

Source: 2019 World Air Quality Report, IQAir

Analysts fear that India's state response to COVID-19 has failed to address the multi-dimensional impact of air pollution in the country. As policymakers attempt to chart a post-pandemic economic recovery framework for the country, mitigating multi-sectoral risks contributing to ambient air pollution should be a priority. The government's post-COVID-19 economic support packages must prioritise and integrate financial incentives and technology solutions for addressing air pollution to ensure a green and resilient recovery. Going forward, communities such as women, youth, and the indigenous communities will play a particularly significant role in mitigating the unequal impacts of air pollution.

In August 2020, the Observer Research Foundation (ORF) and the Child Investment Fund Foundation (CIFF) convened a High-Level Working Group to gather policymakers from the Union and state governments, multilateral organisations, media, energy entrepreneurs, sector experts, scholars, and members of civil society organisations, to discuss cross-cutting solutions and strategies for facilitating the improvement of air quality in India. The flagship convening of the Expert Group aimed to develop a post-COVID-19 roadmap for implementing policy interventions, financial incentives, and technology solutions for combating air pollution. This special report builds on the ideas shared during the Working Group meeting.

POLICY ACTION TO FIGHT AIR POLLUTION

There are various policies and programmes that have been implemented in India to address the issue of air pollution. Like any other policy measure, the success and efficacy of these programmes has been contingent upon collaboration and coordination across various stakeholders.

One of the most recent policies launched to tackle air pollution is the National Clean Air Programme (NCAP) launched in early 2019. The NCAP calls on 122 cities[b] across India to develop city-level Clean Air Plans to implement mitigation strategies for ambient PM concentrations. The NCAP is envisioned as a comprehensive strategy to provide the State and Union governments with a blueprint to combat air pollution. It sets a target of reducing key air pollutants PM10 and PM2.5 by 20-30 percent by 2024, with 2017 as the

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b   The NCAP identifies 122 cities from 23 states, referred to as non-attainment cities, as they did not meet the national ambient air quality standards (NAAQS) for the period of 2011-15 under the National Air Quality Monitoring Program (NAMP).

base year. This five-year action plan intends to create a pan-India air quality monitoring network and generate citizen awareness.

Over a year since the NCAP's inception, however, it has failed to legally enforce its targets and has remained effectively toothless. Absent a legal mandate, the NCAP will not be able to implement the action plan. The NCAP itself notes that the primary reason for non-compliance is lack of appropriate monitoring and inspection elements, and has suggested that trainings be given to its personnel[6] and regular inspection drives be conducted.

There are data-related implementation hurdles as well, including poor data capture due to substandard monitoring stations, lack of appropriate methodology to leverage real-time data for reporting trends, and a dearth of data cleaning methods to fill gaps (missing/ inaccurate data) in the monitoring system.[7] Moreover, there is still relatively sparse knowledge on the urban-rural disparity in terms of air quality. This means that only a small section of the country's population is closely being monitored for air pollution, with one monitoring station for every 6.8 million people.[8]

Indeed, while the issue of air pollution has garnered significant political traction, India has not been able to make any significant progress in terms of achieving the targets set under NCAP. The onset of the coronavirus pandemic further slackened the momentum. The goals of reducing emissions from thermal power plants, transportation, and other industries, and switching to cleaner energy processes have been stalled with the economic fallout of the countrywide lockdown.[c]

Although environment and health analysts have long called attention to the worsening air quality in the country, policy measures for pollution abatement have yet to be given adequate financial teeth. Taking cognisance of this gap, the government increased allocation for pollution control by almost 10 times in Budget 2019-20, from US$ 678,000 (INR 4.95 crore) to US$ 62.2 million (INR 445 crore). In Budget 2020-21, this sum was further increased to US$ 63.01 million (INR 460 crore). The total amount covers financial assistance to pollution control boards/committees as well as the NCAP. An initial US$ 41.1. million (INR 300 crore) was allocated to the city-specific

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c   On 24 March 2020, the Government of India ordered a nationwide lockdown for 21 days, as a preventive measure against the COVID-19 pandemic. The lockdown was extended three times until 31 May 2020. The process of lifting restrictions commenced June 1 onwards over multiple phases (four phases of "unlock") throughout the country.

plans that aim to reduce air pollution in their jurisdictions by 20-30 percent by 2024. However, only nine out of the 42 cities that have made their own plans, have earmarked a budgetary allocation for this initiative.

Figure 3: Drawbacks of NCAP
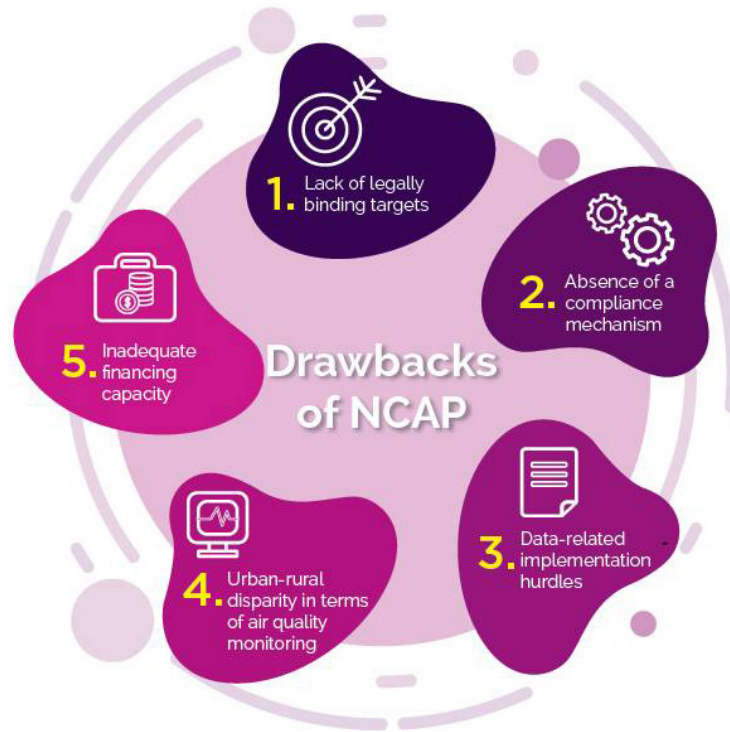
Appropriate budget allocation can be made for low-cost, real-time air quality monitoring stations across the Indian states, for which a feasibility study is being conducted by the Maharashtra Pollution Control Board and IIT Kanpur.[9] This could help address the problem of disparity among the states— at present, for example, Delhi has 38 stations while Uttar Pradesh (UP) and Maharashtra have 25 and 22 each, and Tamil Nadu has only five. The action plan also requires a more comprehensive and effective monitoring capacity that is not only expansive in size but also involves sound methodology for the reporting of data in order to analyse trends and take useful policy action. To make the NCAP more functional and focused, useful tools such as the NCAP Tracker developed by Carbon Copy—a news portal that tracks developments in the climate and energy sector—could serve well in understanding how different cities are performing with regard to their emission control initiatives. It would also help to compare the push and pull factors in different cities to analyse what drives their priorities and the allocation of different budgets.
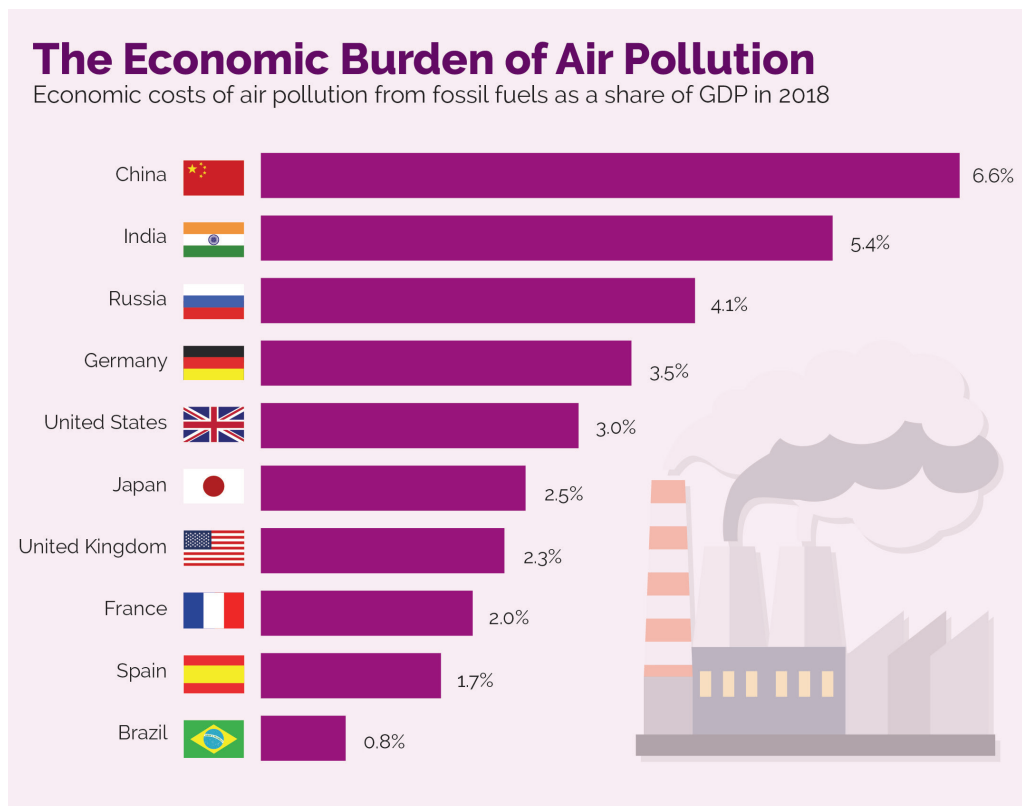
Despite the above-mentioned hurdles and challenges, the way forward can be accomplished with the right combination of political will, appropriate

implementation, and a strong compliance mechanism. Apart from government initiatives, there is also a need for the private sector to contribute towards green business and climate financing.

FINANCING SOLUTIONS TO IMPROVE AIR QUALITY

Air pollution inflicts a massive toll on the Indian economy (See Figure 4). Its scale, complexity and urgency necessitate a strong, coherent and coordinated fiscal response by the government. However, recent relief and stimulus spending in response to the COVID-19 pandemic has crippled the Indian economy and led to a massive spike[10] in public debt. With limited room available for fiscal manoeuvre, the government faces the massive challenge of financing measures to improve air quality.

Figure 4: Economic cost of air pollution

The Economic Burden of Air Pollution
Economic costs of air pollution from fossil fuels as a share of GDP in 2018

Country	Value
China	6.6%
India	5.4%
Russia	4.1%
Germany	3.5%
United States	3.0%
Japan	2.5%
United Kingdom	2.3%
France	2.0%
Spain	1.7%
Brazil	0.8%

Source: Greenpeace, Center for Research on Energy and Clean Air

The imperative is to create a financial architecture that can mobilise private finance for clean-air solutions in India. Green sectors such as clean energy and e-mobility are likely to be the driving force for developing and implementing tangible solutions to improve air quality. An investment fund with a dedicated green focus could play an instrumental role in catalysing

growth of such green industries and simultaneously addressing the twin problems of air pollution and climate change. A Green SuperFund[11] would combine a returns-driven strategy with the sustainability imperative and accelerate investment in green industries. The Triple Bottomline framework, with an emphasis on profit, people and the planet, will be at the heart of the SuperFund's performance management strategy.[12] It would raise capital from institutional investors such as multilateral organisations, sovereign wealth funds, and development financial institutes. Since 2014, more than 40 environmental startups have been set up in India with the singular goal of combatting the air pollution crisis.[13] The SuperFund would play a pivotal role in harnessing the economic and environmental potential of these startups and financing other high-impact ventures.

There are several other channels through which the private sector can contribute to cleaner air and demonstrate that economic development and air pollution abatement are not mutually exclusive. The roadmap for catalysing action in the private sector to promote clean air consists of four critical subsets.

Figure 5: Catalysing action in the private sector to curtail air pollution

The first subset relates to the private sector's role in designing and financing bold, cutting-edge innovations and unique technology solutions to address the air pollution conundrum. Business and industry can significantly

accelerate momentum towards achieving India's air quality standards[d] by providing the necessary investment, technical expertise and large-scale coordination. IKEA, a Swedish multinational group specialising in furniture and home accessories, is a case in point. IKEA launched a collection in 2019 that used rice straws (crop residue) as raw material. Farmers in Northwest India burn approximately 39 million tonnes[14] of rice straw residue on their farms every year in order to clear the field for the next harvest—these activities contribute up to 45 percent[15] of the toxic smog that envelops Delhi during the stubble burning season. IKEA's innovative solution showcases the potential of repurposing a waste product into an economically viable resource that reduces air pollution. Another example of an innovative product for tackling air pollution is the air quality sensor called 'Zephyr', developed by mobility management company Siemens Mobility and the air quality experts at EarthSense.[16] The sensor can produce real-time measurements for various pollutants, allowing local authorities to make meaningful and timely interventions based on reliable pollution data and prevailing air quality levels.

Another important channel through which the private sector can improve air quality is via investments made through the Corporate Social Responsibility (CSR)[17] route. The CSR guidelines, which came into effect on 1 April 2014, state that companies with a net worth of US$ 68.5 million (INR 500 crore) or revenue of US$ 137 million (INR 1,000) crore or net profit of US$ 700,000 (INR 5 crore) should spend two percent of their average profit in the last three years on social development-related activities such as education, healthcare, poverty alleviation and environmental sustainability. CSR funds can be effectively utilised by businesses to address the interrelated challenges of air pollution and climate change. A notable CSR initiative to improve air quality is the "Creating Oxygen Hubs"[18] drive, launched by Cummins India Limited in Pune, Maharashtra. Cummins partnered with various NGOs, civic authorities, the Maharashtra forest department and defence department, and local volunteers to plant more than 35,000 trees in the city in multiple phases.

Further, businesses can make a significant impact in improving air quality by aligning their own practices and supply chains with the clean air agenda. By setting standards and establishing programmes that monitor

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d   India's National Ambient Air quality Standards (NAAQs) are: PM10 – 60 micrograms/cubic metre (annual), PM2.5 – 40 micrograms/cubic metre (annual)

air quality, businesses can reduce the environmental footprint of their operations as well as those of their suppliers. Such measures are beneficial for both the environment and their bottomlines. A 2018 survey by Futerra, an international sustainability strategy and creative agency, shows that 88 percent of the respondents were keen to purchase brands that were ethical and environmentally sustainable.[19] Adopting sustainable business practices therefore becomes a tool for creating a competitive edge.

The private sector also has an important role to play in collaborating with the public sector and other relevant stakeholders to build awareness. Businesses can also calculate the air pollution footprint of their products and disclose the same in company sustainability reports. This will help them project transparency in their communication with their consumers about the air pollution caused by their operations, and in explaining the strategies they have adopted to mitigate pollution.

Addressing the air pollution problem will not just improve public health but also accelerate climate action and draw India closer to its developmental goals. A combination of adequate finance and technological innovation can help India move the needle on the issue of air quality. The costs of action against air pollution may be high, but the costs of inaction are even higher.[20]

Close collaboration between the public and private sector is essential in overcoming the challenges posed by air pollution. Equally important is adopting a nuanced approach that takes into consideration community-based solutions, so that the impact of poor air quality on vulnerable communities is accounted for.

ENGAGING THE VULNERABLE COMMUNITIES

As mentioned earlier, there is a minuscule proportion of the Indian population that is monitored for health outcomes of air pollution; this number is also largely skewed towards the urban population. It is imperative to understand and work towards mitigating the extent to which marginalised and vulnerable communities are affected by air pollution. These groups include women, children, indigenous populations, and the elderly. The extent of outdoor pollution can act as a detriment to children's growth and development specifically through outdoor activity. Of the total number of deaths caused by the combined effects of household and ambient air pollution worldwide in 2016, nine percent were children.[21] The exposure to high levels of pollutants affects lung capacity and predisposes children to respiratory problems later

in life.[22] Exposure to air pollution contributes to more than half of all deaths from Acute Lower Respiratory Tract Infection (ALRI) in children under 5 years in Low and Middle Income Countries, making it one of the leading killers of children worldwide.[23] The five leading causes of death in children under 5 years globally are prematurity, acute respiratory infection, intrapartum-related complications (including birth asphyxia), other group 1 conditions and congenital anomalies as seen in Figure 6.

Figure 6: Causes of deaths among children under 5 years, 2016
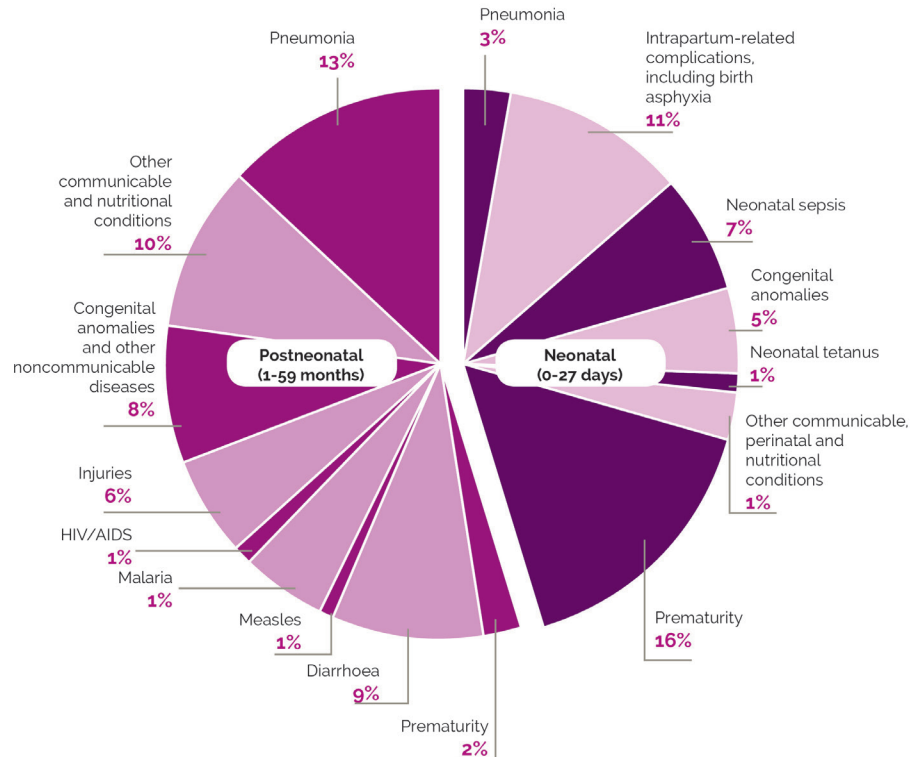
Source: World Health Organization[24]

The number of premature deaths due to outdoor air pollution is predicted to increase from 3 million people in 2010 to 6 to 9 million people globally in 2060.[25] The incidence of bronchitis in children is projected to increase from 12 million to 36 million cases per year for children aged six to 12.[26] A study shows that approximately 2.2 million schoolchildren in Delhi are growing up with irreversible lung damage.[27]

Women are also extremely vulnerable to the ill-effects of air pollution. Due to prevalent gender imbalance, low labour force participation rate of women, and lack of access to public space, women spend more time indoors—and, consequently, are more susceptible to indoor air pollution. In rural households of India, indoor air-pollution is associated with the ineffective combustion of biomass (firewood, coal, and dung cakes) due to faulty processing and drying. Around 83 percent of rural households and almost 20 percent of urban

households use solid biomass fuels for cooking.[28] This affects women and girls every day because compact and enclosed spaces allow pollutants to build up more than in open spaces. This extended exposure causes major health complications such as lung, heart, pulmonary disease as well as strokes. The opportunity cost of collecting firewood, seen as the responsibility of women and girls, also results in loss of education and employment for girls and young women. Household air pollution causes more deaths than outdoor pollution, with researchers emphasising that 40 percent of the disease burden can be attributed to household air pollution. In 2012, indoor air pollution was linked to 4.3 million deaths globally, compared with 3.7 million deaths related to outdoor air pollution.[29] Six of every ten of these deaths were of women and children.[30]

The smoke generated from traditional stoves in rural areas that use this biomass as fuel is not just used for cooking, but also for warding off insects and drying collected wood and palm leaves used for thatched houses. Due to these multiple avenues of exposure, studies evaluating Chronic Energy Deficiency (CED) show that 60 percent of women in tribal hamlets in Kerala were found to be suffering from various degrees of CED, which in turn has a significant impact on child survival.[31]

The indigenous population of India is another susceptible community. There are still significant industrial and mining activities happening around the ostensibly legally protected tribal areas such as in North East India. This excessive industrial activity for revenue generation, has resulted in deforestation and increasing levels of pollution that are exacerbating the worsening standards of living of the indigenous populations of those areas. The dust from the mining trucks further contributes to air pollution and health hazards in the region.[32] The impacts of air pollution for indigenous populations go beyond health impacts. A healthy natural ecosystem is embedded into the population's culture and well-being, and increasing air pollution that contaminate water and the natural habitat has forced many to shift away from their traditional lifestyles.

A total of 64 mining projects have led to diversion and destruction of some 10,451.39 hectares of forest land in the Keonjhar district of Odisha since 1980.[33] The fact that this is the highest loss of green cover in any district coincides with that of Keonjhar being known for its tribal population that relies on traditional practices of using the forest for their livelihoods. In the northeast region, there have been burgeoning plans to auction off forest areas for mining, together with the dilution of the Environment Impact Assessment.

Plans for the Etalin Dam in Arunachal Pradesh may submerge over 300,000 trees and affect the indigenous Mishimi population, of which 13,000 reside in the state's Dibang valley district. Another project given clearance in the region, the Dibang Multipurpose Project, would affect and displace nearly 2,000 IduMishimi people. Over 169 dams are being planned in Arunachal Pradesh, a state which is home to 26 major tribes and 100 sub-tribes.[34]

While indigenous lifestyles must be protected, which would provide the added benefit of protecting forest cover, technological developments in the form of using liquefied petroleum gas (LPG) as a cleaner cooking fuel should be introduced. A balance between clean technology and preserving natural lifestyle should be achieved, and the national scheme aimed at replacing solid fuels with LPG should be utilised.

There are various community-based solutions that can be incorporated to mitigate the growing negative impacts of air pollution on vulnerable communities. The academic community can be tapped to find innovative solutions – for example, researchers from Banaras Hindu University (BHU) have determined which trees are hardy enough to put up with the assault of particulate matter gaseous pollutants (nitrous oxide, sulphur dioxide, ozone) in the city's urban pockets.[35] This knowledge can be used by urban planners in managing urban forests.

It is also crucial to have the representation of women and tribal communities in decision-making bodies to ensure that their specific problems are brought to light and noted while making development and industrial plans. Appropriate representation of tribal and indigenous communities in environment policy and decision-making would prevent proposals for large-scale mining and other development projects from obtaining clearance without the appropriate impact assessment.

Women in rural areas need role models who can engage in entrepreneurial projects of selling clean cooking fuel, and who can then build capacities within the rural communities to use and switch to cleaner cooking methods. The community-based approach of women participating in capacity-building initiatives to represent the value of cleaner cooking fuel to households can attract households towards this lifestyle and create awareness of the significant improvement in health these changes would bring. The immediate measures that should be utilised to mitigate the impacts of air pollution include appropriate financial investment from the government, awareness generation of the health impacts of indoor pollution and receding forest covers, and the participation of vulnerable communities in decision-making.

WAY FORWARD

As India begins to direct resources towards addressing the post-pandemic economic crisis, policymakers should display political and economic commitment towards addressing the multi-dimensional impact of air pollution. The COVID-19 pandemic has only emphasised the need to proactively invest in public healthcare and resilient development.

The air pollution crisis will require innovative, collaborative solutions from public, private, and civil society stakeholders. Institutions, governments, philanthropies, and members of the academe have been fighting the battle for clean air for decades; it is time to tap into the power of a multi-stakeholder framework to hurdle this challenge.

The ORF and CIFF programme is an effort to mainstream conversations on the issue of air pollution, and influence public discourse on improving the air quality in the country in post-Covid era. By curating a diverse set of knowledge products and platforms, this multi-stakeholder programme aims to help policymakers devise a post-pandemic roadmap for implementing policy interventions, financial incentives, and technology solutions for combating air pollution in India. ORF

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20 August 2020
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ENDNOTES

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