



Regular Article

## Delhi's Air Pollution as an Environmental Disaster: An Evaluation of Policies and Initiatives for Sustainable Development

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**Abstract:** The persistent air pollution problem in Delhi presents a major risk to people's health, urban infrastructure, and the overall quality of life. This study critically evaluates the government's policies and initiatives to manage and mitigate air pollution disasters in the city. Delhi and its surrounding areas suffer from severe air pollution, mainly caused by hazardous pollutants produced by transportation, traffic congestion, polluting industries, construction activities and burning of crop residues. Delhi had 209 days with good to moderate air quality (AQI 200 and below) and 157 days with poor to severe air quality (AQI 201-400 and above) in 2024. In contrast, 2023 saw 159 days fall into the poor to severe category, which was slightly higher than in 2024 (MoEFCC, 2024, December 31). Many programs have been started by the government to reduce air pollution, such as National Air Quality Index (AQI) under the Swachh Bharat Abhiyan. This study aims to examine the causes of air pollution and its associated health problems and to review government initiatives to control air pollution and its effects. To achieve objectives, secondary information has been collected from Central Pollution Control Board (CPCB), Delhi Pollution Control Committee (DPCC), and Press Information Bureau (PIB), which have been used to analyse the Air Quality Index (AQI) data. Despite several government initiatives, air pollution in Delhi remains a serious problem for our wellbeing of living environment. The government has implemented many mitigation plans. The objectives of greening cities, along with the adoption of other sustainable practices, can substantially contribute to controlling air pollution. This study underlines the need for citizens and policymakers to take action to prevent air pollution and associated health problems and creates a healthy environment.

**Keywords:** air pollution, hazardous pollutant, air quality index, disaster, government policies, sustainable practices

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## 1. INTRODUCTION

Air pollution is considered as an anthropogenic disaster, primarily due to human activities. Although natural sources exist, their scale and impact are minor compared to human-caused pollution. According to IQ Air's World Air Quality Report, India ranked 5th most polluted country in 2024. Delhi ranked as the second most polluted city in India in January 2025, recorded a monthly average PM<sub>2.5</sub> concentration of 165 µg/m<sup>3</sup> above national safety standards and experienced 23 days in the 'Very Poor' category and three days in the 'Severe' category (CREA, 2025). In 2024, Delhi experienced its highest pollution levels in November. Notably, November 18th recorded the highest Air Quality Index (AQI) in the past four years (Real-Time Air Quality Index, 2024, November 18). There are various natural and anthropogenic reasons for air pollution in Delhi. The most prominent causes of dangerous levels of air pollution in Delhi include the city's topography, crop burning in neighbouring states, vehicular emissions, industrial pollution, urbanisation, and large-scale construction activities. The effectiveness of a nation's initiatives to improve air quality depends on its citizens' awareness of local and national air pollution issues and related policies, as well as on the progress of government-implemented mitigation efforts. This research examines air pollution crises, their consequences, and governmental disaster management efforts. Despite several initiatives to tackle air pollution, progress remains inadequate. Several plans and efforts have been made so far to control air pollution in Delhi. For example, government strategies have evolved from emergency responses to organised policies, including the Graded Response Action Plan (GRAP) and initiatives promoting electric vehicles and clean industries. These efforts, along with real-time air quality monitoring, show a growing awareness of immediate and long-term solutions (MoEFCC, 2023, December 7). In this context, the National Air Quality Index (NAQI), introduced in 2014 as part of the Swachh Bharat Abhiyan, is another important initiative (MoEFCC, 2014, October 17).

## 2. LITERATURE REVIEW

Delhi's air pollution has been widely characterised as a slow-growing environmental disaster, with extensive research highlighting its causes, impacts, and policy challenges. A thematic review of the literature reveals several key areas, such as measurement and assessment of air quality, health impacts, policy responses and gaps, and proposed solutions for sustainable development.

### 2.1 The Sources or Causes of Delhi's Air Pollution

The sources of Delhi's air pollution consist predominantly of vehicular emissions, industrial activities, crop residue burning in neighbouring states, and unfavourable winter meteorological conditions, which exacerbate pollutant concentrations. Several studies highlight a rising magnitude of pollution over recent decades, with particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>),

nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>) being major harmful pollutants that exceed national and international air quality standards (Dutta et al., 2021; Ghude et al., 2024).

## **2.2 Measurement and Assessment of Air Quality**

The quantification of air pollution in Delhi relies heavily on the Air Quality Index (AQI), which integrates multiple pollutants to provide an overall status of air conditions. Nigam et al. (2015) conducted a comparative study using six methods to estimate AQI based on PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and NO<sub>2</sub>, emphasising seasonal and daily variations in air quality. Similarly, Bhuyan et al. (2025) highlighted the alarming rise in AQI levels in 2024, underscoring the persistence of the pollution crisis and the challenges in enforcing mitigation measures, such as the Graded Response Action Plan (GRAP) and electric-vehicle incentives. Gulia et al. (2021) further contributed by analysing 17 years of data on policy interventions, emphasising the need for systematic monitoring and evaluation mechanisms to effectively track, measure and assess air quality improvements. Ghude et al. (2024) similarly highlight the importance of high-resolution monitoring and prediction systems, such as AIRWISE (Air Quality Warning and Integrated Decision Support System for Emissions), which has empowered policymakers by integrating real-time data, enabling more informed decisions on emission control measures.

## **2.3 Health Impacts of Air Pollution**

The hazardous air in Delhi brings severe, long-term health risks to residents. Rizwan et al. (2013) detailed the magnitude of health problems linked to pollution, noting that PM<sub>10</sub> levels far exceed safe limits and contribute to increased morbidity and mortality. Similarly, Dutta & Jinsart (2022) reported that a surge in pollution correlates with significant respiratory and cardiovascular morbidity and mortality among Delhi's population. Guttikunda et al. (2023) expanded on this by associating air pollution with respiratory illnesses like COPD, asthma, bronchitis, cardiovascular diseases, and even mental health issues and developmental problems. Their study advocates for continuous monitoring of pollution levels alongside hospital data to inform public health strategies.

## **2.4 Policy Responses and Identified Gaps**

Several studies critically evaluate Delhi's policy landscape addressing air pollution. Gargava (2016) argued for integrated strategies combining stricter regulations, enhanced public transportation, green technology, and community participation to combat worsening air quality. Ganguly et al. (2020) examined the National Clean Air Programme (NCAP), focusing on transport and road dust control, but noted shortcomings in inter-departmental coordination and funding. Chatterji (2020) identified critical policy gaps and proposed a framework for setting more targeted air quality goals. Bhargava (2023) compared air pollution control policies in Delhi and Mumbai, highlighting the importance of clear demarcation of control areas and cross-city learning for effective policy implementation.

## **2.5 Proposed Solutions and Sustainable Development Initiatives**

Addressing the complexity of environmental pollution requires multifaceted approaches. Khanam et al. (2023) provided a global perspective on pollution causes and remediation techniques, including phytoremediation and bioremediation, emphasizing technological innovation and policy responses. Kumar (2024) focused on the Delhi/NCR region, proposing solutions such as air purification technologies, vertical gardens, sustainable transportation, urban planning, and renewable energy adoption. The study calls for multisectoral collaboration to ensure the feasibility and environmental friendliness of these interventions, offering valuable guidance for policymakers and urban planners.

Overall, the literature underscores the persistent severity of Delhi's air pollution, its profound health impacts, and the necessity for cohesive, well-enforced policies combined with innovative, sustainable solutions. Continuous monitoring, targeted policy frameworks, and collaborative efforts across sectors emerge as critical components for mitigating this environmental disaster and advancing sustainable development.

## **2.6 Gap in Literature**

There have been studies highlighting the exponential growth in air pollution across Delhi, its impact and policy interventions. Despite the research discussing government mechanisms in dealing with the rising pollution, there remains a gap in the study critically evaluating initiatives and policies. This research aims to fulfil this gap, thus contributing to the arena of studies discussing why, despite the government's efforts, pollution remains a challenge.

## **3. OBJECTIVES**

To critically evaluate the government disaster policies and initiatives aimed at managing and mitigating air pollution.

## **4. RESEARCH METHODOLOGY**

This study uses a secondary data-driven, spatially integrated framework to examine Delhi's air pollution as an environmental emergency with special attention to the effectiveness of related sustainability-related policies and initiatives. This study adopted an all-inclusive approach to examine the local and national government-related policies and related initiatives that sought to limit pollution levels in Delhi, which included policy analysis and data analysis. This study employs two principal methodological approaches to address air pollution in Delhi. The first methodological approach is an aerial or structural method of delivering air pollution analysis and visualization by mapping the spatial dispatcher of elevated Air Quality Index (AQI) levels and identifying areas with high congestion, referred to as hotspots. This

methodological approach used Geographic Information System (GIS) technology to understand the spatio-temporal distributions of AQI levels, including difference months and week, in Delhi. The second technique was an integrated data analysis technique that afforded a wider understanding of a phenomenon or problem from combining different sources of or types of data. For instance, to analyse trends in air quality and levels of particles in the air like particulate matter PM<sub>2.5</sub> and PM<sub>10</sub>, the research used data from the Central Pollution Control Board (CPCB) and DPCC.

#### **4.1 Research Design: Materials and Methods**

The study adopts a descriptive-analytical design, utilising a spatial and integrated analysis approach with qualitative and quantitative frameworks. The focus is on understanding spatial patterns of air pollution, assessing temporal trends, and evaluating policy interventions holistically.

##### **4.1.1 Data Sources**

Secondary data has been used, collected from national and international sources such as:

1. Central Pollution Control Board (CPCB) and Delhi Pollution Control Committee (DPCC) reports and databases.
2. Ministry of Environment, Forest and Climate Change (MoEFCC).
3. In addition, various data and information related to AQI were obtained from newspaper articles, research papers, and the Press Information Bureau (PIB) of Delhi.
4. Economic Survey of Delhi
5. Delhi's ranks globally in air pollution have been collected from IQAir and the World Health Organisation (WHO).
6. Information of Air Quality collected from National Clean Air Programme (NCAP) and Delhi's action plans for air pollution (Air Pollution Mitigation Plan 2025), National Air Quality Index (AQI), Graded Response Action Plan (GRAP) and the Commission for Air Quality Management (CAQM).

##### **4.1.2 Analytical Tools and Techniques**

- **Spatial Analysis:** GIS software (ArcGIS) have been used for spatial mapping of point information of air pollution data of Delhi.
- **Trend Analysis:** Comparative data analysis of the air quality index of previous years to detect peak months of air pollution.
- **Content Analysis:** Systematic review of policy documents have been done to evaluate action plans.
- **Integrated Evaluation:** Policy outcomes and implications have been studied to judge alignment with sustainable development goals.

### 4.1.3 Evaluation of Policies and Initiatives

Air quality monitoring data from the past few years (2018 to 2024) has been collected to assess the effectiveness of government policies to control air pollution, their implementation on the ground, and their results, and effectiveness in the targeted areas for which these policies and efforts were designed. For example:

1. Pollutant concentration levels: Measuring changes in key air quality indicators (e.g., PM<sub>2.5</sub> and PM<sub>10</sub>) and policy implementation during the period 2016 to 2024.
2. Compliance and implementation: Assessing policies, their specifications, and the extent to which they are implemented and followed by relevant stakeholders.
3. Sustainability Impact: Evaluating how policies promote long-term environmental sustainability, including impacts on public health and ecosystem resilience.
4. Challenges: Several challenges related to policy implementation and formulation have been studied, such as considering economic feasibility and cost-effectiveness.

This methodology utilises secondary data and emphasises the integration of spatial analysis with a content-based review of policies, enabling a multi-layered evaluation of Delhi's air pollution disaster management through a sustainability lens.

## 5. STUDY AREA

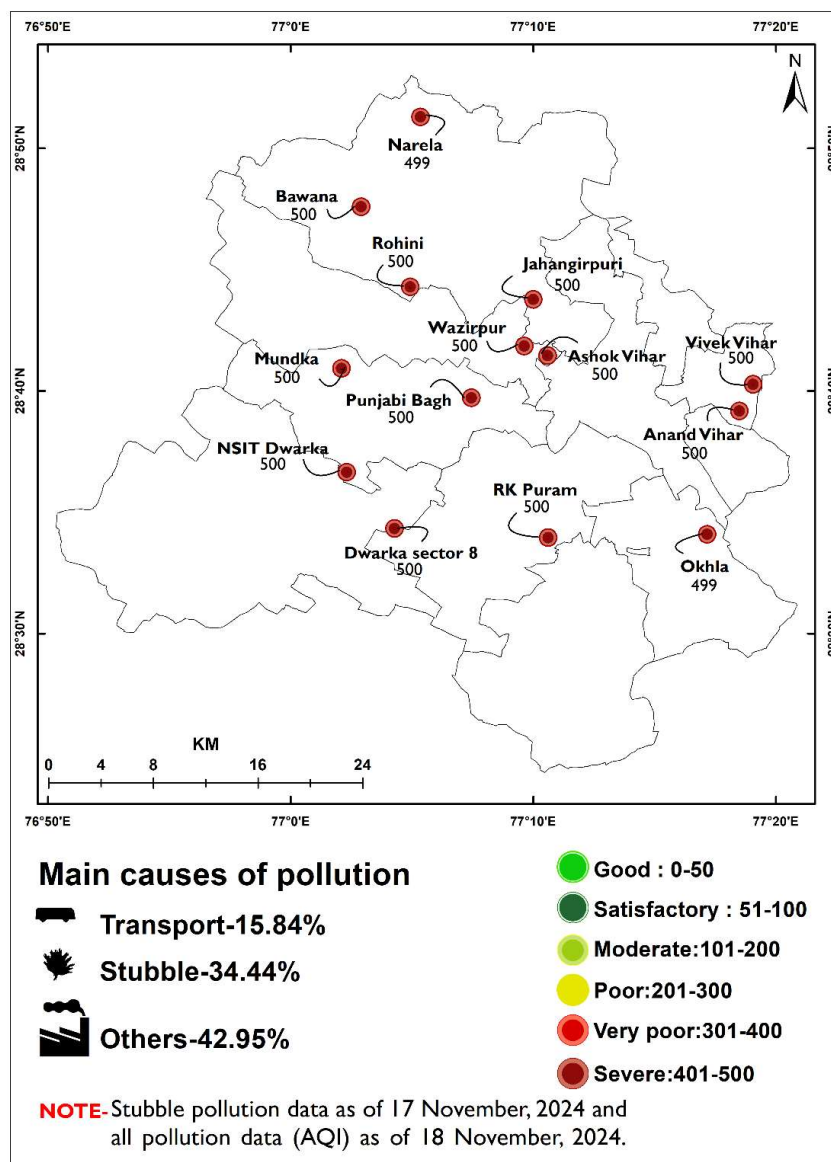
The NCT of Delhi encompasses 1,483 km<sup>2</sup> of this, 1,114 km<sup>2</sup> is urban, and 369 km<sup>2</sup> is rural (Economic Survey 2023-2024). Rapid growth and fragile urbanisation of Delhi have worsened the air quality. Air quality monitoring in Delhi is conducted through stations managed by the Delhi Pollution Control Committee (DPCC), Decision Support System (DSS), Central Pollution Control Board (CPCB), System of Air Quality and Weather Forecasting and Research (SAFAR), and India Meteorological Department (IMD). As one of India's most polluted cities, Delhi implements strategies to manage pollution hotspots. The Department of Environment of the Government of NCT of Delhi identified 13 critical pollution hotspots in 2018. These locations were determined based on PM<sub>10</sub> concentrations exceeding 300 µg/m<sup>3</sup> and PM<sub>2.5</sub> concentrations surpassing 100 µg/m<sup>3</sup>, as measured by the Continuous Ambient Air Quality Monitoring Stations (CAAQMS) (Sahbaz et al., 2025), as shown in Figure 1.

## 6. RESULTS AND DISCUSSION

### 6.1 Overview of Air Pollution in Delhi and Measures to Curb It

Delhi is experiencing air pollution levels that are now widely acknowledged as an environmental disaster, with frequent occurrences of hazardous air quality having significant effects on public health, the environment, and the economy. The city's strategy has evolved to incorporate a combination of technology-driven enforcement, regulatory actions, regional

collaboration, and alignment with the Sustainable Development Goals. This study sought to explain air pollution levels, their causes, impacts, and government policies to control them. In other words, this study provides a detailed overview of the need to evaluate government initiatives to control air pollution.



**Figure 1.** AQI across Delhi: Hotspots on 18 November, 2024

Source: National Air Quality Index (2024)

[https://airquality.cpcb.gov.in/AQI\\_India/\(Navbharat Times, New Delhi, Tuesday, 19 November 2024\)](https://airquality.cpcb.gov.in/AQI_India/(Navbharat Times, New Delhi, Tuesday, 19 November 2024))

### 6.1.1 Air Quality Situations Prevailing in Delhi

The subsequent data provides a comprehensive analysis of the air quality situations prevailing in Delhi. The National Air Quality Index (AQI) is vital for assessing air quality and its health effects. Table 1 elucidates that in Delhi, air quality was poor to severe, with 206 days in 2018, 202 days in 2022, and 159 days in 2023 having the worst conditions. However, due to stakeholder efforts and preventive strategies, 2024 showed slight improvement over 2018, 2019, and 2021 to 2023, as shown in Table 1. Despite progress, air quality remains a major concern

'Very poor' air (301-400 AQI) can cause respiratory illnesses, worsening for those with lung and heart conditions. In 2024, Delhi had 209 days with AQI below 200, indicating 'Good to Moderate' air quality, the highest count since the Covid-19 lockdown in 2020 (MoEFCC, 2024, December 31), as shown in Table 1.

**Table 1.** Comparative AQI Category Status for Delhi

| AQI Category-Number of Days |      |      |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|------|------|
| Years                       | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
| Good to Moderate (<200)     | 159  | 182  | 227  | 197  | 163  | 206  | 209  |
| Poor to Severe (201-400+)   | 206  | 183  | 139  | 168  | 202  | 159  | 157  |

Source: PIB Delhi, MoEFCC (2024, December 31)

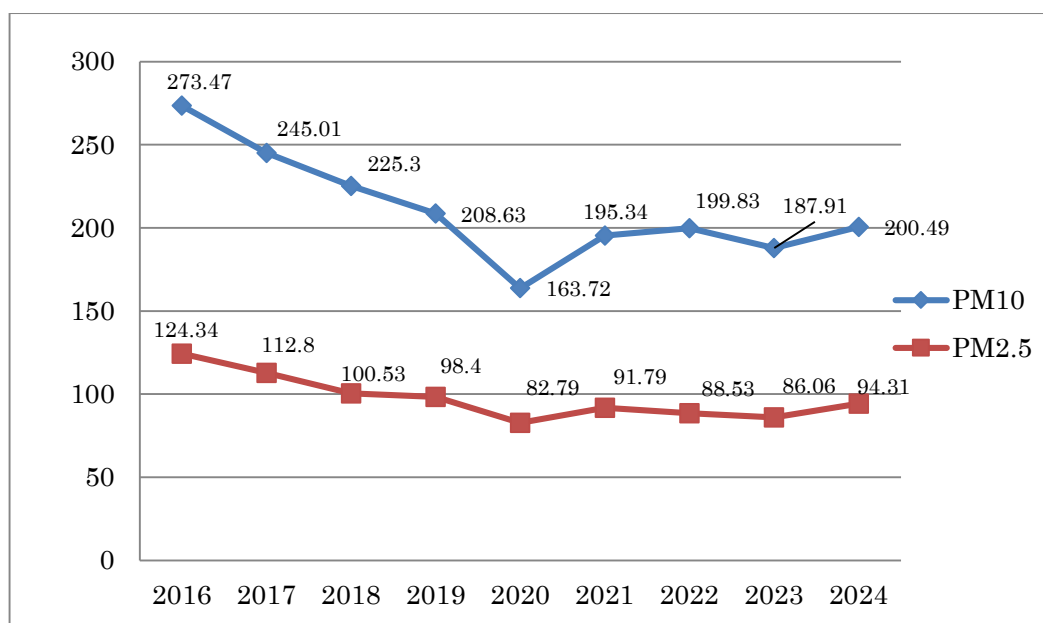
Delhi saw improved air quality compared to previous years in late December, marking a key achievement for 2024's annual Air Quality Index (AQI). However, challenges persisted as January and November saw increased pollution with an average AQIs of 355 and 374, respectively (See Table 2).

**Table 2.** Average Air Quality of Delhi

| Month/ Year | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|-------------|------|------|------|------|------|------|------|
| January     | 328  | 328  | 286  | 324  | 279  | 311  | 355  |
| February    | 243  | 242  | 241  | 288  | 225  | 237  | 218  |
| March       | 203  | 184  | 128  | 223  | 217  | 170  | 176  |
| April       | 222  | 211  | 110  | 202  | 255  | 179  | 182  |
| May         | 217  | 221  | 144  | 144  | 212  | 171  | 223  |
| June        | 202  | 189  | 123  | 147  | 190  | 130  | 179  |
| July        | 104  | 134  | 84   | 110  | 87   | 84   | 96   |
| August      | 111  | 86   | 64   | 107  | 93   | 116  | 72   |
| September   | 112  | 98   | 116  | 78   | 104  | 108  | 105  |
| October     | 269  | 234  | 266  | 173  | 210  | 219  | 234  |
| November    | 335  | 312  | 328  | 377  | 320  | 373  | 374  |
| December    | 360  | 337  | 332  | 336  | 319  | 348  | 294  |

Source: PIB Delhi, MoEFCC (2024, December 31)

Figure 2 illustrates the average levels of PM10 and PM2.5 ( $\mu\text{g}/\text{m}^3$ ) as of November 18, 2024. It shows that in recent years, 2023 recorded the lowest daily average PM10 level ever and the second-best PM2.5 level in Delhi, except for 2020 when COVID reduced human activities. However, PM10 and PM2.5 levels increased in 2024 compared to 2023. This increase means that air quality is getting worse, mainly due to more pollution from vehicles, construction, industry, and stubble and biomass burning. It also points to major challenges for the environment, public health, and policies.



**Figure 2.** Comparative Status of PM10 and PM2.5  
(microgram per cubic meter)- Till Nov. 18 (2016-2024)  
Source: Central Pollution Control Board (2024)  
<https://cpcb.nic.in/uploads/AQM/AQ-NCR-19112024.pdf>

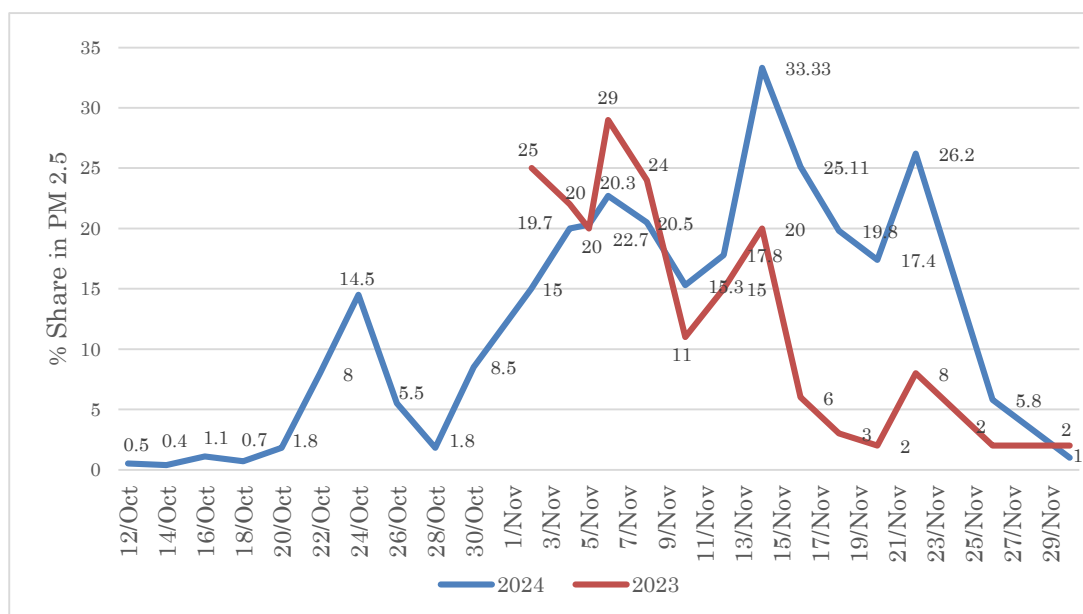
Table 2 reveals that Delhi achieved its best average Air Quality Index (AQI) for February and December 2024, since 2018. August 2024 recorded the best average AQI since 2018, except for 2020 during COVID-19. March and April 2024 documented the second-best daily average AQI, excluding 2020. In January 2024, low wind conditions resulted in an elevated average Air Quality Index (AQI) of 355, marking the highest level for January since 2018. Conversely, November experienced a notably very poor AQI of 374. During November, several locations in Delhi recorded an AQI of 500, classified as severe, as illustrated in Map 1. Besides this, extended dry periods from April to June, along with high-speed winds transporting dust from neighbouring regions, resulted in poor AQI, with May 2024 recording the worst average AQI from 2018 to 2024 (MoEFCC, 2024, December 31).

## 6.2 Causes and Effects of Air Quality Degradation in Delhi

Pollution in the air of Delhi and its surrounding areas stems from multiple anthropogenic activities in densely populated areas, including vehicular emissions, industrial discharges, construction dust, biomass burning, waste incineration, overpopulation and other sources. During post-monsoon and winter months, lower temperatures, inversion conditions, worsening smog and stagnant winds trap pollutants, leading to elevated pollution levels. Emissions from stubble burning and firecrackers further intensify this issue (MoEFCC, 2024, November 25). The toxic air severely impacts health, particularly affecting children, elderly, and those with pre-existing conditions. Air pollution increases risks of respiratory diseases, stroke, heart disease, lung cancer, and asthma, with prolonged PM2.5 exposure linked to fatal diseases (WHO, 2019).

The leading causes of air pollution and their impact on health are outlined below.

1. Climatic conditions, including wind speed, temperature, and seasonal variations, along with natural dust storms, significantly contribute to air pollution. In Delhi, winter pollution is exacerbated by inversion, a phenomenon where cold, dense air traps pollutants near the surface. This cold winter layer hinders the upward movement of air, creating an atmospheric lid that causes pollutants to diffuse back, thereby intensifying pollution (Max Lab, 2023).
2. Delhi's topography also plays a significant role in air pollution. Delhi is located northwest of the central plains and southwest of the Himalayas, trapping pollutants in the air after the monsoon season and causing air pollution (Choudhary, 2019).
3. Stubble burning is also a significant cause of air pollution in Delhi. Farmers of Punjab, Haryana burn paddy and wheat residues from September to November for Kharif crops and April to May for Rabi crops, affecting Delhi's air quality. Wind dispersal of pollutants worsens pollution levels. After the monsoon season, Stubble burning affects Delhi's air quality the most in October and November. During this time, weather conditions such as slow wind and low mixing heights make it difficult for pollutants to spread. Most burning happens in early and mid-November. Figure 3 shows that from around 2 to 22 November in 2023 and 2024, the percentage share of stubble burning in PM 2.5 recorded high levels. It also highlights that, comparatively, around 14-15 November, the levels were higher in 2024 than in 2023.
4. Vehicular emissions represent a major contributor to air pollution. Vehicular sources exceed stubble burning in degrading air quality. High population density worsens traffic congestion, increasing emissions of hazardous gases, with diesel vehicles being the primary contributors. Increased public transport has raised PM 2.5 levels.
5. Industrial activities significantly contribute to air pollution in Delhi. Small-scale industries form polluting clusters that exceed emission limits. Industries near Delhi in Ghaziabad, Noida, and Faridabad emit sulphur dioxide (SO<sub>2</sub>) and particulate matter (PM) due to fossil fuel combustion and inadequate pollution control measures.
6. Construction work and urban expansion in Delhi increase dust and pollution levels. Large construction sites and roadways generate substantial particulate matter, degrading air quality and impacting inhabitants. Brick kilns in Jhajjar, Faridabad, and Ghaziabad further worsen air pollution, threatening environmental and public health (Choudhary, 2019).
7. In low-income regions, the use of wood, coal, and other biomass for cooking and heating significantly worsens local air pollution. These activities release small particles (PM 2.5 and PM 10) and harmful gases. These contribute to smog (What's Delhi smoking: Major pollutants behind toxic NCR smog, 2024, November 18).
8. Road dust and the burning of solid waste, both at landfill sites and in open areas, release pollutants.



**Figure 3.** Percentage Share of Stubble Burning to PM2.5 in Delhi

Source: Central Pollution Control Board (2024)

[https://cpcb.nic.in/uploads/AQM/AQ-NCR pdf \(Oct. to Nov. 2024 & Nov.2023\)](https://cpcb.nic.in/uploads/AQM/AQ-NCR_pdf_(Oct._to_Nov._2024_&_Nov.2023))

### 6.3 Effects of Air Pollution

1. **Environmental threat:** Threatening flora and fauna while contributing to acid rain and climate change.
2. **Economic Conditions:** Rising healthcare expenses, decreased worker productivity, and loss of tourism.
3. **Impact on Health:** The pollutants emitted during air pollution are associated with respiratory ailments, including asthma, bronchitis, and chronic pulmonary conditions. Children, the elderly, and those with pre-existing conditions are particularly susceptible to air pollution's effects. Severe air quality affects people's lungs and hearts, causing breathing trouble (MoEFCC, 2014, October 17).

### 6.4 Governments' Programme and Policies to Combat Air Pollution

Governments need to implement various programs and policies to combat Delhi's air pollution caused by high levels of particulate matter and other pollutants. The goal is to mitigate the harmful effects on humans and to protect the environment from long-term damage. Effective, synchronised policies are required to address the multifaceted nature of the problem. The government has implemented programs, policies, and initiatives to reduce air pollution levels. Key agencies, including the Pollution Control Authority (EPCA), the Central Pollution Control Board (CPCB), the Delhi Pollution Control Committee (DPCC), and the Decision Support System (DSS), have been instrumental in managing the environment in Delhi. Initiatives such as the Swachh Bharat Abhiyan and Smart Cities programs promote a clean and eco-friendly environment, contributing to a sustainable future.

Delhi government, in collaboration with the central government and various agencies, has adopted a comprehensive strategy to address air pollution. These initiatives and policies target pollution sources, including vehicular emissions, industrial pollutants, construction dust, waste burning, and stubble burning. For instance, the National Air Quality Monitoring Programme (NAMP) operates 804 monitoring stations across 344 cities to observe air quality trends. Within this framework, the Commission for Air Quality Management (CAQM) have identified critical areas and hotspots to mitigate pollution from air in various regions in Delhi and National Capital Region (NCR), focusing on diverse pollution sources. Besides this, National Air Quality Index (NAQI) also played an important role in classifying air quality into six levels based on various pollutants (CPCB). The Graded Response Action Plan (GRAP) is also a key strategy used in Delhi-NCR to control air pollution. It is triggered mainly when the Air Quality Index (AQI) reaches poor to severe levels. As the air quality worsens, GRAP enforces tougher measures (Commission for Air Quality Management, 2023).

#### **6.4.1 Government Initiatives to Control Air Pollution in Delhi**

Government Initiatives and Policies are key to monitoring and controlling Delhi's air pollution to shield community health and the environment. Table 3 presents the government's innovative initiatives, such as measures to address vehicular pollution, the introduction of clean/alternative fuels like CNG and LPG, the promotion of public transport networks (metro, buses, and battery-powered rickshaws), and carpooling. This includes streamlining the process of issuing pollution control certificates, lane discipline, and vehicle maintenance (MoEFCC, 2023, December 7). The Government has taken many steps to control air pollution (see Table 3). However, the current AQI remains dangerous to health. The government launched the 'Green Diwali and Healthy Diwali' campaign to improve air quality during the festival of Diwali (MoEFCC). Apart from this, several other efforts to fight air pollution include the use of anti-smog guns, road-cleaning machines, and water sprinklers to remove dust from the air. Roadside greenery can also reduce pollution to some extent (Economic Survey of Delhi, 2021-22). The Green Delhi app helps people to report problems online to the right department and track the progress. The app enables citizens to report environmental violations in Delhi by uploading photos or videos of pollution-related activities for government action (Air Pollution Mitigation Plan 2025).

Stakeholders play a key role in managing and monitoring air pollution in Delhi through collaborative efforts of the people. For example, government agencies formulate and implement laws and policies related to air quality management. They install air quality monitoring equipment at various stations, provide necessary resources, and conduct public awareness campaigns. To control air pollution, various industries need to adopt cleaner technologies and comply with government regulations. Locals can help by using public transport instead of private vehicles, using car-pooling options, checking pollution of their vehicles effectively, participating in awareness campaigns, and taking part in green initiatives. Integration of academic institutions with industrial activities should be promoted. Environmental NGOs and academic institutions act as mediators by raising responsiveness, leading research, and holding stakeholders accountable. Social media also plays a vital role in disseminating information, spreading education, and highlighting the effectiveness or

limitations of policies, thereby influencing people's perceptions and stakeholders' arrangements.

Here's an overview of the main initiatives.

**Table 3.** Initiatives taken for the improvement of air quality

|                                                                 |                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Graded Response Action Plan (GRAP)</b>                       | The Delhi government enforces GRAP, a series of measures aimed at managing sudden spikes in air pollution levels. specifies actions for different Air Quality Index (AQI) levels (PIB, Delhi, 7 Dec, 2023).                                                                                                                                                  |
| <b>Stubble Burning in Delhi-NCR</b>                             | scheme to provide subsidies for the acquisition of crop residue management machinery and the establishment of custom hiring centres (CHCs) in the National Capital Territory of Delhi and the states of Punjab, Haryana, and Uttar Pradesh. This initiative aims to facilitate the in-situ management of paddy straw (PIB, Delhi, 7 Dec, 2023).              |
| <b>Proactive Bans</b>                                           | The Delhi government has instituted a comprehensive prohibition on the use of all types of firecrackers throughout the year. Furthermore, the operation of older vehicles, specifically diesel vehicles exceeding 10 years of age and petrol vehicles exceeding 15 years of age, is banned on the roads of Delhi (Hindustan Times, 4 June 2025).             |
| <b>Construction &amp; Demolition (C&amp;D) Waste Management</b> | To ensure adherence to dust control standards. Strict measures include paved roads at construction sites, onsite recycling of waste, and prominently displaying dust mitigation measures (PIB, Delhi, 7 Dec, 2023).                                                                                                                                          |
| <b>Industrial Pollution</b>                                     | Industries in Delhi-NCR are installing Online Continuous Emission Monitoring Systems (OCEMS). They are also using cleaner fuels like PNG. Brick kilns in the area must switch to zig-zag technology. <b>Ban on use of petroleum coke and furnace oil</b> as fuel in NCR (PIB, Delhi, 7 Dec, 2023).                                                           |
| <b>Vehicular Pollution</b>                                      | BS-VI Standards: Only vehicles meeting BS-VI standards can be registered in Delhi (PIB, Delhi, 7 Dec, 2023).                                                                                                                                                                                                                                                 |
| <b>Electric Vehicle (EV) Promotion</b>                          | There are plans to introduce 2,000 electric buses by 2027 and expand the metro system for broader accessibility.                                                                                                                                                                                                                                             |
| <b>Cleaner Fuels</b>                                            | The transport sector is encouraged to adopt electric vehicles (EVs), Compressed Natural Gas (CNG), and BS VI diesel fuel.                                                                                                                                                                                                                                    |
| <b>Measures for Road Dust</b>                                   | Mechanical road sweeping and water sprinkling are used to manage road dust, with truck-mounted sprinklers operating regularly to minimise dust. Constructing paved and green pathways along roads to curb dust production.                                                                                                                                   |
| <b>Anti-smog Guns</b>                                           | High-rise commercial buildings (malls, hotels, office complexes). Mist Sprayers: Mist sprayers are being installed on electric poles at pollution hotspots to manage vehicular emissions and dust pollution.                                                                                                                                                 |
| <b>Green Infrastructure Development</b>                         | Tree Planting Initiatives: Campaigns such as 'Ek Ped Maa Ke Naam' focus on planting millions of trees. Creating Green Areas: Transforming unused land into green spaces (Hindustan Times, 4 June 2025).                                                                                                                                                      |
| <b>Waste Management</b>                                         | Landfill Cleanup: Projects are underway to bioremediate old waste at landfills, with set deadlines (Okhla by March 2027, Bhalswa by December 2027, Ghazipur by September 2028) (Hindustan Times, 4 June 2025).                                                                                                                                               |
| <b>Interventions &amp; Monitoring</b>                           | Air Quality Surveillance: The DPCC manages 26 real-time air quality monitoring stations and plans to add six more. Real-time Pollution Source Analysis: Conducting studies to identify and measure pollution sources in real-time (Hindustan Times, 4 June 2025).                                                                                            |
| <b>Use of modern technology</b>                                 | Using GPS, CCTV and drones to monitor pollution hotspots for immediate identification and action against pollution sources (Hindustan Times, 4 June 2025).                                                                                                                                                                                                   |
| <b>Public Engagement and Media Outreach</b>                     | Public Complaint Handling: for public complaints about open waste burning and dust control violations, use of social media <b>accounts has been created for public outreach, and complaint redressal</b> is closely monitoring the complaints on the SAMEER App and other social media platforms like Facebook and twitter/X, etc (PIB, Delhi, 7 Dec, 2023). |

Source: MOEFCC, PIB Delhi, 7 December 2023 and Hindustan Times, 4 June 2025.

## 6.4.2 Delhi Government's Initiative, Air Pollution Mitigation Plan 2025

Sustainable development represents not only a global necessity but also a local urgency for cities such as Delhi. Addressing air pollution through sustainable practices ensures a healthier environment, a more robust economy, and an improved future for coming generations. Delhi government's plan to make the capital greener and cleaner revolves around implementing various strategies through the Air Pollution Mitigation Plan 2025. The goal is to make Delhi a "pollution-free" city. To achieve this, the 25-point Air Pollution Plan 2025 targets seven key sources (Hindustan Times, 2025, June 4). Here's a brief overview:

### 1. Dust pollution from roads/open areas

- Innovative measures: Cloud-seeding pilot
- Water Sprinkling & Use of Anti-Smog Gun
- Road Repairs with greening.

### 2. Vehicular pollution

- End-of-Life Vehicles (Petrol vehicles over 15 years and Diesel vehicles over 10 years are not permitted in Delhi.)
- Goods Vehicles: BS-VI, CNG and EVs
- EV Push: e-autos at Metro Stations, development of charging stations.
- Public Transport: E-Buses, revamp of bus stops and depots.
- Traffic Management etc.

### 3. Industrial pollution

- Continuous emission monitors, fuel compliance
- INFRA: better roads, new policy
- Creating an e-waste eco park

### 4. Waste reduction

- Biomining Legacy Waste: ensuring zero landfill fires
- Management: 85% segregation at source and 100% segregation of bulk waste generators.
- WtE plants, multiple biogas plants.

### 5. C&D waste

- AI and Digital use to check
- Recycling
- Cleaner construction: Mandatory use of recycled products in all govt. projects

### 6. Greening

- Initiatives: transition to EVs, plantation 6.1 mn trees and 900,000 saplings
- Framework: Tree-cutting SOP, implementation and amending of laws
- Public Participation: Events on World Environment Day and Van Mahotsav, Effective media use.

### 7. Monitoring

- Development of new stations to monitor air quality
- Re-Inventorisation: pollution sources at all major and minor hot spots.

### 6.4.3 Interlinking with Sustainable Development Goals (SDGs)

Integrating the SDGs into Delhi's air pollution governance aligns the city's efforts with global sustainability goals and best practices (See Table 4). This approach promotes a comprehensive and multi-sectoral strategy that incorporates transport, waste, energy, and climate policies to achieve optimal impact. It also encourages new ideas and involves different groups by using technology, partnerships, and citizen platforms like the Green Delhi App (Air Pollution Mitigation Plan 2025).

**Table 4.** Delhi's efforts toward cleaner air align directly with several SDGs

| Relevant SDG  | Goal Theme                             | Linkage with Delhi's Air Quality Policies                                                                                    |
|---------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>SDG 3</b>  | Good Health and Well-being             | Reducing PM2.5 and PM10 to improves respiratory and cardiovascular health.                                                   |
| <b>SDG 7</b>  | Affordable and Clean Energy            | Promoting EVs and public transport to reduce dependence on fossil fuels.                                                     |
| <b>SDG 11</b> | Sustainable Cities and Communities     | Develop Green corridors, non-motorised transport, and anti-smog infrastructure to make urban areas safer and more resilient. |
| <b>SDG 12</b> | Responsible consumption and production | Cleanliness missions, waste management through segregation of wet waste, improved waste processing and industrial waste      |
| <b>SDG 13</b> | Climate Action                         | Air quality policies to reduce greenhouse gas emissions and restore Delhi's climate resilience.                              |
| <b>SDG 15</b> | Life on Land                           | Tree plantation drives and environmental rejuvenation for ecological balance.                                                |

Source: Niti Ayog, SDG Index (2023-2024) (2025)

Prepared from SDG report (2023-24) PDF, Niti Aayog & Air Pollution Mitigation Plan 2025

## 7. CRITICAL EVALUATION

Delhi's Air Pollution Mitigation Plan 2025 and other policies are precisely more effective; however, they face significant challenges, including enforcing regulations, collaborating with neighbouring regions, and encouraging behavioural changes among residents. For sustainable growth, Delhi requires cooperation with nearby states like Punjab, Haryana, and Uttar Pradesh, which involves managing crop waste and guaranteeing immediate accountability from city agencies. Delhi's air pollution policies faced problems due to their incomplete implementation. Short-term measures, such as the odd-even vehicle rule and temporary construction bans, failed to address the core pollution issues. A major obstacle is the lack of coordination between neighbouring states and the central government. Additionally, inadequate enforcement of regulations, coupled with insufficient monitoring and data collection, hampers the development of evidence-based policies. The focus on seasonal actions, rather than year-round strategies, has been criticised for neglecting Delhi's persistent air quality challenges.

## 7.1 Challenges and Opportunities

Despite strong policy interventions, Delhi faces air quality challenges due to:

1. Climatic factors (e.g., winter inversion, stubble burning in neighbouring states).
2. Traffic congestion, ongoing construction, and waste management issues.
3. Need for public engagement, innovation, and regular review of policy effectiveness.
4. Economic constraints: High cost of upgrading infrastructure, transport facilities and technology.
5. Integrating SDG principles offers the opportunity to address the primary causes of pollution and to follow sustainable urban transformations.

## 7.2 Outcome and Implications of Initiatives

Several initiatives have been launched to tackle air pollution, including swapping diesel engines in buses for CNG, promoting electric vehicles, and retiring old vehicles. The odd-even scheme and the Delhi Metro have also helped reduce air pollution. The National Green Tribunal has banned firecrackers in areas with poor air quality. Graded Response Action Plan (GRAP) is activated during high pollution periods. GRAP enforces measures like halting construction activities and restricting vehicle movement based on pollution levels. The Greening of City initiative has increased Delhi's green space to 342 km<sup>2</sup>, covering 23.06% of the total area in 2021 (Government of Delhi, 2025, December 17). Under a plantation drive, “Ek Ped Maa Ke Naam” during ‘Van Mahotsav 2024’, saplings were planted to help reduce pollution. Under the Green Action Plan (GAP), during 2023-24 (till December 2023), the Department of Forest and Wildlife, Govt. of NCT of Delhi, with other greening agencies, has planted 82.13 lakh saplings. The Forest Department's Plantation from 2023-2024 (up to Dec 23) reported 15.93 lakhs (Government of Delhi, 2025, December 18).

## 7.3 Limitations and Gaps in the Policy Framework in Their Implementation

The government is implementing many schemes to reduce air pollution, and even after implementing so many policies, air pollution is increasing rapidly. There are still shortcomings in our programs and policies that need attention. Several factors are responsible for this, such as despite well-designed programs, implementation challenges may lead to a lack of execution due to inadequate resources and inefficiencies in enforcement mechanisms. Sometimes, a lack of coordination and cooperation among stakeholders, government agencies, and the public can hinder the effectiveness of programs. Some pollution control technologies may be expensive or may not be possible to implement on a large scale. That is why it is important to develop economical and effective solutions to control the problem. Successful implementation of programs at regional and national levels requires coordinated efforts to control air pollution.

## 8. CONCLUSION

The ongoing air pollution crisis in Delhi reflects a complicated web of structural, regulatory, and socio-political issues that cannot be addressed at the margins or with selective policy instruments. Although there has been no shortage of governmental initiatives that aim to reduce emissions and enhance the sustainability of urban environments, these initiatives cannot compete with the fragmented governance, poor adherence to standards, and competing development priorities that characterize Delhi's environmental governance regime. A closer examination indicates that air pollution governance in Delhi has been largely reactive in nature, driven by responding to the demand for states of public indignation during specific periods of concentrated pollution, rather than a long-term approach to environmental governance. Regulatory frameworks, while existing without a viable mechanism to authoritatively manage air pollution because of jurisdictional overlaps and poor coordination across municipal, state and central authorities, are doubly challenged by the limited deliberative process of the relevant decision-making bodies. In addition, the patterns connected to urban morphology, characterized by a lack of planning, informal commercialisation of residential areas, and a lack of transport infrastructure, have aggravated environmental destruction by further entrenching arrangements of dependence on vehicular mobility, land-use conflicts, and commodification of public space. When framed within a political ecology approach to understanding spatial dynamics, the evidence suggests the air pollution crisis in Delhi is more than simply an environmental crisis; it is a manifestation of inequities and failures of governance.

While weather conditions and the characteristics of the season are often presented as worsening conditions, they should not detract from discussing how the crisis is grounded in anthropogenic and systemic phenomena and instead call for a more contextualised, nuanced approach to thinking about urban sustainability; one that incorporates environmental justice, participatory governance, and inter-sectoral coordination into urban sustainability frameworks.

In this case, sustainable development must be reconceived not as a series of technocratic solutions, but as a transformative framework that questions the deep systems of urban mismanagement and invests in inclusive, data-oriented, and ecologically resilient urban futures. Addressing the air pollution crisis in Delhi, therefore, requires a paradigmatic shift - one that moves beyond regulatory compliance and to structural reform, institutional accountability, and active citizen engagement as essential elements of environmental governance.

The findings of this study are consistent with previous research, emphasising the critical role of a comprehensive policy framework in reducing Delhi's air pollution. Like previous studies, this study focused on the need for problem-specific policy frameworks, such as efforts to reduce pollution levels, especially in hotspot areas. This further emphasises the need for practical, affordable, and environmentally friendly long-term solutions to air pollution control in Delhi. Recently Delhi government announced that it would provide air purifiers to government schools for students. The government should take effective steps to reduce pollution levels.

## 8.1 Suggestions

To maintain good health and prevent diseases, it is important to follow healthy habits. Detoxifying the body by staying hydrated helps to flush out toxins. Avoid doing strenuous exercises in parks. Instead, consume fresh fruits, foods rich in omega fatty acids, nuts, and proteins that are anti-inflammatory and rich in antioxidants to boost immunity. Plant eco-friendly plants at home. Indoor plants such as aloe vera and English ivy are natural air purifiers that can keep your environment clean and fresh (Outlook Web Desk, 2023). Besides all the above, public awareness and involvement are crucial in improving air quality. To reduce air pollution, maintain vehicles properly, follow traffic rules and switch off the engine at traffic signals. During severe AQI, minimise travelling and use public transport, such as buses, metro trains, bikes, walking, carpool, other eco-friendly products, etc. We can also use print media and digital media to spread knowledge among people on various environmental issues through advertisements.

## REFERENCES

- Bhargava, A. (2023). A comparative study of air pollution control policies in Delhi and Mumbai. *Indian Journal of Law and Legal Research*, 5(2), 1-22. <https://www.ijlrr.com/post/a-comparative-study-of-air-pollution-control-policies-in-delhi-and-mumbai>
- Bhuyan, A., Bordoloi, T., Debnath, R., Ikbali, A.M.A., Debnath, B., & W. S. (2025). Assessing AQI of air pollution crisis 2024 in Delhi: its health risks and nationwide impact. *Discover Atmosphere*, 3(13), 1-26. <https://doi.org/10.1007/s44292-025-00041-x>
- Centre for Research on Energy and Clean Air (CREA). (2025). Monthly ambient air quality snapshot for India, January 2025. PDF, 1-12. <https://energyandcleanair.org/wp/wp-content/uploads/2025/02/Monthly-ambient-air-quality-snapshot-for-India-January-2025.pptx.pdf>
- Central Pollution Control Board. (2024, November 18). *Air Pollution Data*. Central Pollution Control Board. Homepage. Retrieved from 2025, June 12. <http://cpcb.nic.in>
- Chatterji, A. (2020). Air Pollution in Delhi: Filling the Policy Gaps, *ORF Occasional Paper* No. 291, 1-48. [https://www.orfonline.org/wpcontent/uploads/2020/12/ORF\\_OccasionalPaper\\_291\\_AirPollution.pdf](https://www.orfonline.org/wpcontent/uploads/2020/12/ORF_OccasionalPaper_291_AirPollution.pdf)
- Choudhary, S. (2019, November 3). Why is Delhi's air so toxic? *Livemint*. Retrieved from <https://www.livemint.com/news/india/why-is-delhi-s-air-so-toxic11572782475997.html>
- Commission for Air Quality Management. (2023). Graded Response Action Plan (GRAP). Retrieved June 4, 2025, from <https://caqm.nic.in/WriteReadData/LINKS/GRAP%20Schedulebc030504-9c75-4773-8c69-9942a9175aab.pdf>
- Dutta, A., & Jinsart, W. (2022). Air pollution in Delhi, India: Its status and association with respiratory diseases. *PLoS ONE*, 17(9), 1-22. <https://doi.org/10.1371/journal.pone.0274444>

- Dutta, S., Ghosh, S., & Dinda, S. (2021). Urban Air-Quality Assessment and Inferring the Association Between Different Factors: A Comparative Study Among Delhi, Kolkata and Chennai Megacity of India. *Aerosol Science and Engineering*, 5(1), 93–111. <https://doi.org/10.1007/s41810-020-00087-x>
- Government of Delhi. (2025, December 18). Economic Survey of Delhi 2023-2024, Environmental Concerns: Chapter 8. Delhi Planning, 1-68. Govt. of Delhi. Retrieved December 18, 2025, from [https://delhiplanning.delhi.gov.in/sites/default/files/Planning/chapter\\_8.pdf](https://delhiplanning.delhi.gov.in/sites/default/files/Planning/chapter_8.pdf)
- Government of Delhi. (2025, December 17). Economic Survey of Delhi, 2021-22, Environmental Concerns: Chapter 8. Delhi Planning, 1-46. Govt. of Delhi. Retrieved December 17, 2025, from [https://delhiplanning.delhi.gov.in/sites/default/files/Planning/e8\\_env.pdf](https://delhiplanning.delhi.gov.in/sites/default/files/Planning/e8_env.pdf)
- Outlook Web Desk. (2023, January 7). Explainer: Everything You Need to Know About Air Pollution in Delhi. Outlook Web Desk. Retrieved January 18, 2024, from <https://www.outlookindia.com/national/explainer-everything-you-need-to-know-about-air-pollution-in-delhi-news-251658>
- Ganguly, T., Selvaraj, K. L., & Guttikunda, S. K. (2020). *National Clean Air Programme (NCAP) for Indian cities: Review and outlook of clean air action plans*. *Atmospheric Environment: X*, 8, 1-11. <https://doi.org/10.1016/J.AEAOA.2020.100096>
- Gargava, P. (2016). Improving Air Quality in Delhi: Moving Beyond Status Quo. *Working paper, eSocialSciences*. <https://EconPapers.repec.org/RePEc:ess:wpaper:id:10733>
- Ghude, S. D., Govardhan, G., Kumar, R., Yadav, P. P., Jat, R., Debnath, S., Kalita, G., Jena, C., Ingle, S., Gunwani, P., Pawar, P. V., Ambulkar, R., Kumar, S., Kulkarni, S., Kulkarni, A., Khare, M., Kaginalkar, A., Soni, V. K., Nigam, N., ... Rajeevan, M. (2024). Air Quality Warning and Integrated Decision Support System for Emissions (AIRWISE): Enhancing Air Quality Management in Megacities. *Bulletin of the American Meteorological Society*, 105(12), E2525–E2550. <https://doi.org/10.1175/bams-d-23-0181.1>
- Gulia, S. & Goyal, P. & Prakash, M. & Goyal, S. K. & Kumar, R. (2021). Policy Interventions and Their Impact on Air Quality in Delhi City — an Analysis of 17 Years of Data. *Water, Air, & Soil Pollution*, 232(465). DOI:10.1007/s11270-021-05402-x
- Guttikunda, S. K., Dammalapati, S. K., Pradhan, G., Krishna, B., Jethwa, H. T., & Jawahar, P. (2023). What Is Polluting Delhi's Air? A Review from 1990 to 2022. *Sustainability*, 15(5), 4209. <https://doi.org/10.3390/su15054209>
- Hindustan Times. (2025, June 4). CM Releases Plan to Curb Pollution (Air Pollution Mitigation Plan 2025). *Hindustan Times*, Page 4.
- Khanam, Z., Sultana, F.M., Mushtaq, F. (2023). Environmental Pollution Control Measures and Strategies: An Overview of Recent Developments. In F. Mushtaq, M. Farooq, A. B. Mukherjee, M. Ghosh Nee Lala. (Eds. ) *Geospatial Analytics for Environmental Pollution Modeling*. Springer, Cham. [https://doi.org/10.1007/978-3-031-45300-7\\_15](https://doi.org/10.1007/978-3-031-45300-7_15)
- Kumar, A. (2024). Innovative Solutions for Urban Air Pollution in Delhi/NCR Region. *Indian Scientific Journal of Research in Engineering and Management*, 8 (4), 1-7. <https://doi.org/10.55041/ijsrem31346>
- Max Lab. (2023, November 7). Exploring the Devastating Health Effects of Air Pollution in Delhi [Blog post]. Max Hospital. Retrieved from:

- <https://www.maxlab.co.in/blogs/exploring-the-devastating-health-effects-of-air-pollution-in-delhi>
- MoEFCC. (2023, December 7). Strategies to control the rising pollution in the country. PIB Delhi. Retrieved from: <https://pib.gov.in/PressReleasePage.aspx?PRID=1983680>
- MoEFCC. (2014, October 17). “National Air Quality Index (AQI) launched by the environment minister AQI is a huge initiative under Swachh Bharat”. PIB Delhi. Retrieved from: <https://pib.gov.in/newsite/printrelease.aspx?relid=110654>
- MoEFCC. (2024, November 25). “Parliament Question: Air Pollution caused by Stubble Burning”. PIB Delhi. Retrieved from <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2076918>
- MoEFCC. (2024, December 31). “Delhi Records Highest Number of ‘Good to Moderate’ Air Quality Days in 2024, Excluding COVID Year: CAQM”. PIB Delhi. Retrieved from: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2089055>
- National Air Quality Index. (2024, November 18). Central Pollution Control Board. Ministry of Environment and Climate Change, Homepage. Retrieved July 3, 2025, from [https://airquality.cpcb.gov.in/AQI\\_India/](https://airquality.cpcb.gov.in/AQI_India/)
- Nigam, S., Rao, B., Kumar, N. & Mhaisalkar, V. (2015). Air Quality Index – A Comparative Study for Assessing the Status of Air Quality. *Research J. Engineering and Tech*, 6(2), 267-274. Doi: 10.5958/2321-581X.2015.00041.0
- Niti Ayog, SDG Index (2023-2024). (2025, March 20). Retrieved March 20, 2025, from [https://www.niti.gov.in/sites/default/files/2024-07/SDG\\_India\\_Index\\_2023-24.pdf](https://www.niti.gov.in/sites/default/files/2024-07/SDG_India_Index_2023-24.pdf)
- Real-Time Air Quality Index (AQI). (2024, November 18). New Delhi, Delhi, India (AQI.in). Retrieved November 18, 2024, from <http://www.aqi.in>
- Rizwan, S. A., Nongkynrih, B., & Gupta, S. K. (2013). Air pollution in Delhi: Its magnitude and effects on health. *Indian Journal of Community Medicine*, 38(1), 4-8. <https://doi.org/10.4103/0970-0218.106617>
- Sahbaz, M., Dutta, M., & Patra, A. (2025, February 12). Where Delhi’s air is worst: Mapping the city’s pollution hotspots and reducing air pollution. *Council on Energy, Environment and Water* (CEEW). Rederived March 20, 2025, from <https://www.ceew.in/blogs/which-areas-in-delhi-have-worst-air-quality-mapping-air-pollution-hotspots>
- What’s Delhi smoking: Major pollutants behind toxic NCR smog. (2024, November 18) The Times of India. <https://timesofindia.indiatimes.com/city/delhi/whats-delhi-smoking-major-pollutants-behind-toxic-ncr-smog/articleshow/115403755>
- World Health Organisation (WHO). (2019, November 11). Fact sheet 1: What is air pollution? World Health Organisation. 1-2, PDF. Retrieved from: <https://www.who.int/docs/default-source/searo/wsh-och-searo/what-is-air-pollution-2019.pdf>