

# 1. A Descriptive Study of Air Pollution in India

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## **Abstract:**

*India is the world's second most polluted country. Air pollution shortens the average life expectancy of Indian by 5 years. Air pollution in India is a major environmental issue. The fast growth in motor vehicle and industrialization have contributed to the high levels of air pollution in urban areas. The present chapter aims to discuss different aspects of air pollution and its control measures in India. Air pollution has become a serious problem that threat in the recent years posing serious risks to environment and social wellbeing. In India, the policy action to address air pollution is urgently needed. Due to the presence of different sources of pollutants, the problems of air pollution as well as solutions become complex.*

**Keywords:** Air pollution, Life expectancy, Environmental issue, Industrialization, Pollutants.

## **1.1 Introduction:**

Air pollution has become a serious problem in many parts of the world. India is no exception and dealing with the critical issue of air pollution, particularly in its urban areas. Rising urbanization, growing industrialization and anthropogenic activities are the main reasons that lead to air pollution. It is expected that by 2030, almost 50% of the global population will be inhabiting in urban areas and more than 80% of the urban population is exposed to emissions which exceeds the standards set by World Health Organisation. At present, air pollution is widely known and affects over human health, ecology, agriculture, and climate. In case of health, common issues are related to respiratory, cardiopulmonary, cardiovascular and reproductive systems. In India, air pollution became the second leading risk factor in health after child and maternal malnutrition. This risk factor encircles the both outdoor and indoor air pollution. The common sources for outdoor air pollution are emissions caused by combustion from fuel burnings, motor vehicles and industry. The indoor air pollution caused due to household products, smoke, pesticides, molds, pet dander etc.

### **1.1.1 Objectives:**

- To study the causes of air pollution in India.
- To analyse the scenario of air quality during lockdown in COVID-19 pandemic.
- To study the various preventive measures of air pollution.

## 1.2 Methodology:

The information presented in this chapter are collected from secondary sources such as books, research papers, journals and websites.

### 1.2.1 Current Scenario of Air Pollution in India:

The State of Global Air Report 2022, shows that India is mostly affected by air pollution among other countries in the world. The report estimates that Delhi as the most polluted city, Kolkata taking the next position after Delhi and Mumbai stands 14<sup>th</sup> on levels of particulate matter, which is the important measure of air pollution. Again the World Air Quality Index 2022 has included the three cities and number of smaller cities namely Kanpur and Rohtak, among the most polluted places in the world. In case of India, air pollution hardly receive attention. People are not completely aware about the dangers of inhaling polluted air and the governments are lax in order to take measure to prevent air pollution. The sources of air pollution are used to fossil fuels, vehicular emissions, industries, factories, dust from construction etc. The National Clean Air Program aimed to reduce the levels of particulate matter by 20-30% in

132 cities by 2024 was launched in 2019. Air pollution creates serious health and economic consequences. According to WHO, air pollution as the world's largest health risks and accounts for one in eight deaths worldwide. And the economic costs are also high, particularly in developing countries. In this respect, India is the worst place. India's Air Quality Index (AQI) and Real-time levels are shown in the below figure.

**Table 1.1: India-States Air Pollution Level**

States	Status	Aqi(Us)	Pm 2.5	Pm 10	Temp	Humid
Andhra Pradesh	POOR	110	39	80	27	70
Arunachal Pradesh	MODERATE	59	16	30	23	56
Assam	POOR	131	59	94	24	70
Bihar	UNHEALTHY	286	223	320	22	48
Chandigarh	POOR	150	69	125	18	46
Chattisgarh	POOR	114	38	127	23	43
Dadra And Nagar Haveli	UNHEALTHY	310	260	283	25	38
Daman And Diu	POOR	226	176	203	25	36
Delhi	UNHEALTHY	248	197	295	17	68
Goa	POOR	166	84	125	28	56
Gujarat	POOR	155	87	125	22	49
Haryana	UNHEALTHY	228	169	219	18	56
Himachal Pradesh	MODERATE	105	43	67	15	31
Jammu And Kashmir	MODERATE	69	22	34	11	36

States	Status	Aqi(Us)	Pm 2.5	Pm 10	Temp	Humid
Jharkhand	POOR	155	45	225	20	58
Karnataka	POOR	102	36	41	23	81
Kerala	POOR	138	58	137	28	73
Madhya Pradesh	POOR	154	78	149	20	45
Maharashtra	POOR	153	75	147	24	50
Manipur	MODERATE	64	19	33	24	65
Meghalaya	MODERATE	63	18	24	20	36
Mizoram	GOOD	19	03	16	28	60
Nagaland	MODERATE	40	10	23	22	45
Odisha	POOR	143	55	131	24	64
Puducherry	POOR	126	46	78	28	76
Punjab	POOR	152	69	142	19	35
Rajasthan	POOR	154	77	143	21	33
Sikkim	MODERATE	98	34	41	13	46
Tamil Nadu	POOR	91	31	59	27	79
Telangana	POOR	133	60	89	25	72
Tripura	POOR	170	92	125	25	71
Uttar Pradesh	POOR	179	104	186	20	36
Uttarakhand	POOR	140	61	104	19	39
West Bengal	POOR	179	114	205	24	52

### 1.2.2 Sources of Air Pollution:

Air pollutants arise from both natural process (volcanic activities, forests, oceans etc.) and human activities (transportation, fossil fuel combustion etc.). The sources of air pollution are –

- a. **Transport emissions:** The vehicle pollution is the major contributor to air pollution in every city, but this is worse in urban areas, where car ownership rates are more than compared to rural areas. When car burns gasoline, then it emits pollutants in the air which is harmful for the environment, vehicle emits carbon monoxide, nitrogen oxide, hydrocarbons and particulate matter (PM 2.5 and PM 10). In urban areas, road traffic emissions are the prime contributions to the air pollution.
- b. **Industrial Emission:** India has witnessed large-scale industrialization from the last few decades. Industrialization has deteriorated the air quality in urban cities. These activities emit several pollutants which affect the air quality. Particulate matter 2.5 and 10, Sulphur dioxide, Nitrogen dioxide, carbon monoxide are the main pollutants emitted from the industries that use coal and wood as the energy sources for production process. The Central Pollution Control Board categorized the polluting industries into 17 types and these are fall under the small and medium scale.

Seven industries are categorized as “critical” industries which include iron and steel, paper, sugar, fertilizer, cement, aluminium and copper.

- c. **Agriculture:** Agricultural activities produce emissions which create a serious impact on decreasing air quality. To begin with, ammonia and nitrous oxide are the main pollutants that are released from agricultural activities. Now a days, fertilizers and pesticides are mixed with new invasive species for the purpose of quick growth of vegetation, but these species are not found in nature. Other sources are methane emissions from the enteric fermentation process, nitrogen emissions from agricultural soils and emissions of methane from wetlands. Agricultural procedures such as ‘slash and burn’ are the prime reasons for photochemical smog.
- d. **Domestic sector:** Domestic sector is also responsible to pollute air. When family’s burn fuels such as wood, dung, kerosene, agricultural waste in their homes then various types of pollutants are generated. Household air pollution was considered as a responsible factor for an estimated 3.2, million deaths per year in 2020. The combined effects of household and ambient air pollution is related with 6.7 million premature deaths annually. In poorly ventilated households, Indoor smoke have fine particles 100 times higher than acceptable.
- e. **Construction and Demolition Waste:** Another key source of air pollution is waste which is the outcome of construction and demolition. Construction and demolition waste is created from construction, repair, renovation and demolition of houses, building structures, bridges, roads and dams. Construction and Demolition waste is serious because it contains hazardous materials namely asbestos and lead. Now a days, application of green technologies and green infrastructure during construction could tackle the issue of waste and maintain clean air quality.

### **1.2.3 Impacts of Air Pollution from Various Perspectives:**

**a. On the ecosystem:** The terrestrial ecosystem is extensively affected by ground air pollution. The bad effects include respiratory and pulmonary disorders for animals and humans. The effects on the marine ecosystem include eutrophication, acidification of lakes and mercury accumulation in aquatic food.

These processes indirectly affect the living organism. And due to soil acidification, long term pollutant accumulation exists in the environment. Soil pollution affects the ecosystem of plants and animals which are susceptible on soil for nutritional absorption. Air pollution can create damages to crops and trees in various ways. Ground level ozone can reduce agricultural crop and forest yields, reduce growth and survivability of trees. Air pollutants reduce the ability of ecosystem to perform functions in a well manner.

**b. On biodiversity:** The ill-effects of air pollution could impact on the biological diversity. Acid rain, which is caused by oxidation and deposition of NO<sub>2</sub> and SO<sub>2</sub> emissions in the atmosphere. Therefore, acid rain as a result of air pollution can create harmful effects on the biodiversity. Another pollutant is ozone which can be considered as toxic for the both plants and animals. Due to ozone, the growth of plants become slower and reduced photosynthesis. In case of humans and animals, ozone can affects lung tissues causing respiratory diseases, such as asthma. Moreover, the reproductive process of animals also affected due to increasing oxidative stress.

**c. On Human Health:** People inhabiting areas exposed to high pollution level and poor air quality prone to dangerous health risks. Such deleterious implications lead to both the respiratory diseases and fatal diseases. Various studies showed that emissions namely particulate matter, ozone, NO<sub>2</sub> and SO<sub>2</sub> have the potential to damage of the cardiovascular and respiratory disorders of humans.

In urban areas, health risk arises in terms of mortality and morbidity due to poor air quality. Exposure to severe of air pollution can causes heart disease and lung cancer. The particulate matter can cause nasal irritation and other disturbances. The risk of death increases with the long term exposure to polluted air.

**d. On Materials and Buildings:** SO<sub>2</sub> and NO<sub>2</sub> emissions harm the material surfaces and buildings. The negative effects are in the form of loss of material, discoloration, structural failing and soiling. Air pollution can decrease the services of buildings and severely damage the historical monuments. For instance, India's white marble Taj Mahal, which become yellow as a result of exposed to SO<sub>2</sub> emission from factories and acid rain. Another example is Hyderabad's Charminar, is turning black because of highly polluted air.

#### **1.2.4 A Review of COVID-19: Impact of Lockdown on Air Pollution in India:**

The COVID-19 pandemic has created an innumerable crisis in the whole world socially, economically as well as environmentally. This crisis causes a huge loss to human life, but made significant improvements in environment as Air Quality Index has reduced to 49% in India. To curtail the virus transmissions, lockdowns have been implemented. These lockdowns had positive impact on the air quality due to reduction in vehicle movement. The key factors contributing to air pollution are transport, industries, constructions, power plants, road dust, restaurants, landfills fires etc. As a result of travel restrictions and prohibition of non-essential activities which are the causes of air pollution, the quality of air has been improved. On 24<sup>th</sup> March, 2020 India has declared lockdown 1 i.e. 21 days amid the COVID-19 pandemic, it is the largest lockdown in world. During that lockdown, people were at their houses, constructions and factories were stopped, traffic has decreed drastically and all these factors lead to significant reduction in air pollution

- a. Prevention of Air Pollution:** We have seen that the adverse effects of air pollution on environment and its causes. Now, it is time to discuss the preventive measures of air pollution. Air pollution can be decreased only if there is a collective support from everyone's side. The different ways which are helpful to air pollution are discussed below.
- b. Use of Public Transport:** The burning of fossil fuel is the major cause of air pollution. If most people use the public transport, then the number of vehicles decrease and thereby reduce the burning of fossil fuels. The less burning of fossil fuels leads to lessee's amount of greenhouse gases
- c. Recycling and Reuse of Products:** Some of the products that are thrown away after use could be recycled and reused for clean environment.
- d. Reduce The Consumption of Electricity:** We can reduce the consumption of electricity in homes by switching off the lights and other appliances when not in use. Here, reduce electricity leads to enhance air quality.

- e. **Avoid Plastic bags:** Plastic bags are become a curse to the environment. Because, plastic bags are not recyclable and reused and it takes a longtime to decompose. Also the burning of plastic bags releases poisonous gases to the air. There by, plastic bags should be replaced by paper bag which are decompose easily.
- f. **Avoid Use of Air Conditioners and Fans:** The heat released by the air conditioner causes global warming. The Freon gas i.e. used as a refrigerant cause's degradation of ozone layers.
- g. **Planting More Trees:** Trees absorb toxic chemicals through their stomata and filtering these chemicals from air. Plants also mitigate the greenhouse gas by trapping heat and it reduces the ground-level ozone.

### **1.3 Conclusion:**

Air pollution is a severe problem that affects the lives of billions people every year. According to World Health Organization report, more that 26% of deaths in the world directly link to the pollution. Air pollution is considered as a health threat particularly in developing countries. The type and level of pollutants vary in different urban and rural areas. Rapid and unplanned urbanization and industrialization has resulted degradation of India's air quality. With technological advantages people are enjoying the comfort and luxury appliances but overlooking the necessary evil i.e. air pollution. As India has the second largest manufacturing industry, cement industry which is one of the main contributions of particulate matter. Long-term health effects related to air pollution are health disease, respiratory disease, lung cancer etc. Air pollution also causes damages to people's nerves, kidney, liver, brain and other organs. Therefore, necessary steps should be taken in order to prevent air pollution such as save energy, minimize air pollution from cars, maintain wood stove, recycle and reuse the products, plant trees etc.

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