

# Delhi Air Pollution Crisis and Its Effects on Human Health

Arun Singh Maurya

Assistant Professor, Department of Forensic Science, School of Sciences, B-II, Jain (Deemed to be University), JC Road, Bangalore-560027.

Email Id- m.arunsingh@jainuniversity.ac.in

**ABSTRACT:** *In general any kind of environmental pollution is harmful for us humans and our environment. But one the most prevalent in our cities and urban areas nowadays is air pollution. In India, the air quality situation throughout the capital of India have went through several highs and lows with respect to pollutant concentrations. As a result, Delhi has been designated as that of the world's most polluted capital city for the past few years. And since many concerned measures to control these severe situations taken by the authorities to reduce the pollution level in the capital. The study delivers the empirical insights study for severe rank of the pollution caused in air acquired every year in the winter season of Delhi and its terrible long term effects on the health of the citizens and to control these severe conditions initiatives and measures taken. This study shows and evaluates the potential health and environmental risks in the Indian National Capital Territory of Delhi (NCT Delhi) due to severe air pollution in terms of mortality and morbidity.*

**KEYWORDS:** *Air pollution, Control Measures, Delhi crisis, India's Capital City, Human Health Risks, NCT Delhi, WHO.*

## INTRODUCTION

Pollution is a phenomena of contamination of the natural resources of earth's environment in a bad way with materials. Pollution not only interferes with human health, or the quality of the human life but and it has a negative impact on the normal functioning of the environment's ecosystems. Air pollution, noise pollution, water pollution, and soil pollution are the most common forms of contamination and pollution. Radioactive hazards and thermal emissions are two other forms of pollution that are less well-known. The majority of health risks are caused by toxins in the air and water. Like every other country, India is also struggling with severe conditions of pollution and trying to handle the situation [1].

The National Capital Territory of India, Delhi (NCT Delhi) is famous for various outstanding things and specialities and one of them is its severe air pollution which makes it famous worldwide. Delhi is confirmed to be the densely contaminated capital for the consecutive few years be it 2018 records or 2017, according to a Swiss based environmental scientists team which accumulates the air quality information and relevant data at global level [2]. In 2014, the World Health Organisation (WHO) declared Delhi in a class of utmost contaminated capital of the world, because of the air quality which is in even worsen level than Beijing, China.

In addition, India now has 21 of the world's 30 most polluted cities, according to IQ Air Visual's report, which concentrated on the importance of Particulate Matter (PM<sub>2.5</sub>). In most of India's metropolitan areas, the fine PM. The study calculated the proportion of toxic particulates PM<sub>2.5</sub>, which are particles with a diameter less than 2.5 microns and are likely to be inhaled along with oxygen deep into the human organ lungs, and hence even higher PM<sub>2.5</sub> severity levels are capable to cause deadly conditions and diseases among the people exposed in the environment, later effects includes the severe cancer conditions and cardiac problems [3]. The toxic air in New Delhi is caused by car and industrial pollution, as well as smoke from garbage burning and crop residue in nearby fields. Inhabitants Delhi, which has a population of even more than 20 million people, could hardly breathe "progressive" to "satisfactory" air for four days in November and December last year, when pollution levels were at their highest. The rise in air pollution levels prompted authorities to close schools twice, deeming the situation a public health emergency. According to the report, India saw "global optimization" in PM<sub>2.5</sub> levels in 2018 compared to the previous year, due to favourable weather, government attempts to purify the air, as well as an actual financial slowing [3]. Figure 1 illustrate depicting the severe Pollution in the air of the nation-wide capital of the territories of India.



**Figure 1: Depicting the severe atmospheric excellence in the capital of the country's territory in India (NTC).**

### *Research Questions*

- What are the reasons which make even a big capital city like Delhi so polluted? Discuss these reasons and the appropriate control measures taken by the official authorities to control the situation.
- What type of prevalent pollutants are found in the NCT Delhi creating this one of the world's utmost contaminated capital city. How citizens are tackling this issue along with the governments?
- What are the human health risks associated with these prolonged exposure to this severe air pollution in the country. Discuss the short term and long term health problems affecting the people.
- Why is the capital of the country being so much contaminated? What are the factors behind this pollution? Why nothing is done in regards to this major problem of pollution that New Delhi become one of the most polluted capital city amongst other capitals of the world?

### **REVIEW OF LITERATURE**

Since Pollution is such a serious issue all around the people, environmentalists and governments are concerned about this problem and regular surveys and controlling measures are taken around the world to control the severity of the situation. And to save the ecosystem and so the environment. There are numerous Research papers available online as people are worried about the environment conditions since it affects the whole ecosystem so badly and of course the associated human health risk makes it an important topic of concern in the society. A paper entitled by Arun K. Sharma et al. The study aims to describe the severity of atmospheric contamination in the capital NCT, extents regarding health related issues occurred because of the contamination as well as risks analysis of the health related issues corresponding to the contaminated air. Also the chemical composition has been discussed present in the ambient air pollution.

Another paper by Neha S. Parkhi, et. al discusses various thick blanket of haze smog which triggered an emergency kind situation in National capital Delhi during the winters of 2017. Paper emphasises on the Monsoon weather dynamics. And how corresponding dust storms in the city played a key role in contamination

of the air quality. Moreover, how heavy aerosol loads changed the upper land surface, skin and altered the air temperature as well that facilitates the quick scattering. One more research paper considered which discusses this significant issue which is written by SA Rizwan et al. from All India Institute of Medical Sciences (AIIMS) [1]. This paper presents an evidence-based analysis that describes the current state of hazardous air pollution in Delhi, its detrimental health effects, and the control steps taken to improve the situation.

A government report is also being considered for this research paper. The report discusses this significant issue from the political point of view and actions of the Delhi and center government. The government of Delhi, which has taken a number of steps to combat vehicular pollution, has implemented an odd–even travel scheme to restrict the movement of cars on roads based on their current date form. Several significant experiments were carried out to remove some cars from the road, especially those with diesel engines larger than 2 litres, with little attention paid to smaller vehicles, which made up 70–80 percent of the capital's diesel fleet. Several Supreme Court mandates, including the temporary closure of coal-fired power plants, have been enforced. These papers and reports helped so much to analyse the complete situation of the severe air pollution in Delhi and why it remains unsolved every year. How it is affecting the lungs and heart of delhiites and the politics behind this major issue.

## METHODOLOGY

### 1. Design:

Delhi just hasn't suddenly become such a polluted city in the world. In the previous few decades Delhi has gone into major development in every way from the massive population immigration, infrastructure to financial growths which have never made the act of reducing the contamination any easier in any way which ultimately Rosen the pollution level in the city. With the industrial growth the power plants, automobiles on the roads, infrastructure construction sites, Metro development and the major burning of crops in the neighbouring states all ultimately contributes to the air pollution crisis of the city. Control measures are important to be taken especially in the winter season and most importantly amid the scenario of COVID -19. When the situations are already critical the increase in air pollution makes the conditions even hazardous and deadly particularly for senior citizens, children and patients with respiratory health conditions.

### 2. Sample:

The Government of Delhi, local civic bodies and the citizens were not very serious about the severity and their slow steps towards the implementation of the control measures of the air pollution but along with the little efforts made and awareness of local people made the situation a little better. But more efforts need to be made and proper control measures are required to be taken by the Indian and Delhi government authorities to proceed with clean and renewable energy sources for domestic use. A restriction on the working of industries, automobiles and chemical factories are required. Ban on the import, an energy fuels which are even greatly contaminating as compared to the non-renewable energy resource like coal. For example learning from countries like the US of America which has banned it due to its high pollution reasons and so use of it should be banned or discouraged. But another fact is until the carbon taxes are increased on coal and as well on the petroleum coke, the dependence of the industry on the high polluting non-renewable fossil fuels will never stop.

The major concern nowadays and one of the important contributors to make Delhi the most polluted capital in the world is the practice of flaming the crop chaff on the fields in the neighbouring states particularly Haryana and Punjab remains a common problem in north India despite the official ban of this practice farmers are burning these crop husk every year due to lack of official support and financial issues. Every year estimated around 35M tonnes of crop husks are burnt, that becomes the highest to the hazardous smoke and fog for the national capital . The low temperature acts as a blanket in the environment, trapping pollutant matter in the atmosphere. Air quality in the city is usually worsened during the winters cold weather. This smog blanket appears to be dull and dissolved a little in the spring and summer due to the higher wind speed.

### 3. Data collection:

The data collection for this study has been collected from very reliable sources like WHI report, Delhi government survey and other famous journals. PubMed searches are also referred for the exact reports. In addition, there have been several studies conducted in Delhi that have looked into the serious effects of air pollution on human organs, respiratory functions, and cardiac problems. The Central Pollution Control Board (CPCB) conducted a comprehensive review in 2008 that found substantial associations with all related adverse health outcomes. When compared to rural controls, Delhi had nearly 1.7 times higher chances of respiratory symptoms and health risk prevalence (P 0.001). In addition, 36 percent of Delhi residents had high blood pressure, compared to 9.5 percent in the areas under jurisdiction [1].

### 4. Data analysis:

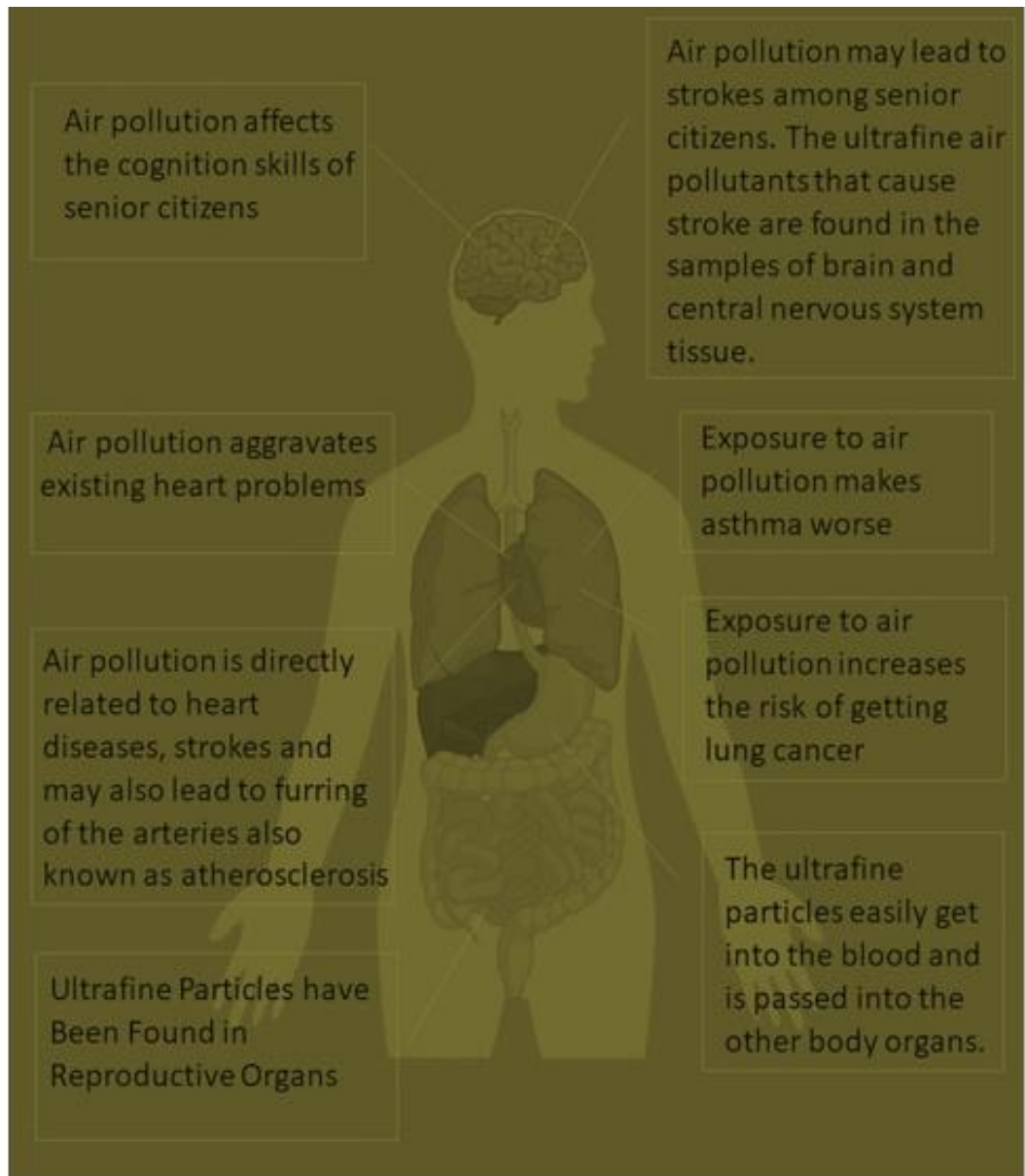
#### 4.1. Reasons for Contaminated Air in the Capital:

Severe heights of contamination as well as bad air quality in and around the capital city Delhi is showing the environmental crisis of the world. Hence creating a menace among the people, environmentalists and governments. Additionally, the temperature and weather changing circumstances might have contributed to locking the matter contaminants within the atmosphere as well as through the conditions even poorer. Health warnings were declared among folks of serious significances as well as doctor's even disheartening people after going outside the doors. But what are the main reasons and cause behind this severe pollution and hazardous air quality?

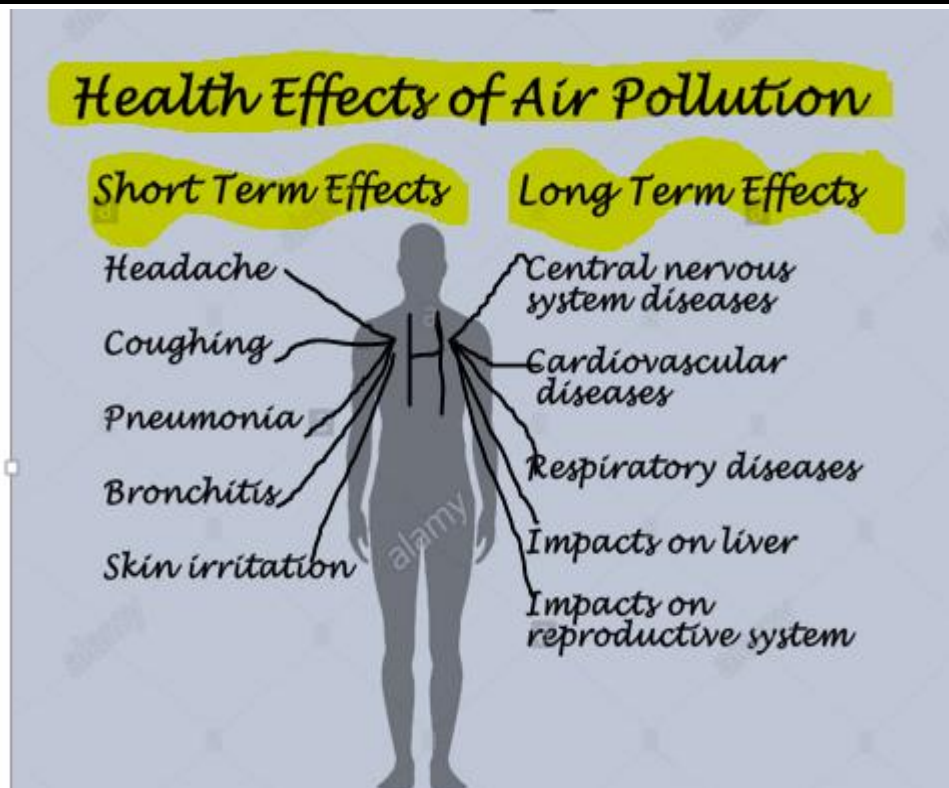
- NCT Delhi attached to the boundaries of Uttar Pradesh as well as Haryana. Moreover, it is a neighbour to Punjab as well. These states contribute a big proportion in Delhi pollution by burning the crop husk open on the fields. Agriculturalists burn the rice husks in Haryana, Uttar Pradesh and Punjab even after a strict ban because of lack of official support and cost issues.
- Pollution caused by the automobile traffic on the roads running on non-renewable and high potential polluting fuels in capital is one more reason underwriting the contamination and smoke and fog. As a result, the air pollution and quality index have dropped to 'severe' levels. Automobile pollutant emissions exacerbate the dangers of air pollution and build a toxic smog blanket. Vehicle smoke emissions, according to the National Environmental Engineering Research Institute (NEERI) and the Central Pollution Control Board (CPCB), are as hazardous as and a major contributor to Delhi's increasing contamination and air pollution.
- During the winter, the low temperature allows a layer of minute dust particles and contaminants to form in the atmosphere, preventing them from moving. Because of the stationary winds, these pollutant materials become trapped in the city, affecting weather conditions and resulting in heavy smog.
- Another source of air pollution in the capital is overcrowding. Overpopulation leads to an increase in different forms of emissions, such as air pollution and increased noise pollution.
- Large scale construction is additional reason which contributes in the increasing of the dust pollutants and the contamination of the air in Delhi. Seeing the decrease in air quality index, the government bans the construction of a number of sites for some time or stalled this work for some time to control the severity [4].
- Industrial pollution: chemical and garbage dumps in open environments are also deteriorating the quality of air and increasing the pollution resulting in building-up of thick blankets of smog in the atmosphere.
- Firecrackers: despite the strict official ban on the use or sale of the cracker it is a common sight during the festive season of Diwali and New Year. It definitely contributes to the development of heavy pollution in NCT Delhi [5].

## EFFECTS OF THE SEVERE AIR POLLUTION AND BAD AIR QUALITY ON HUMAN AND ENVIRONMENT HEALTH

Figure 2 shows a diagram represents effects of contaminated and polluted air on the human body, Figure 3 shows the short as well as long terms impacts of atmosphere contamination on the human body in terms of severe disease that could attack the human body.



**Figure 2: Diagram represents effects of contaminated and polluted air on the human body.**



**Figure 3: Representing the short as well as long terms impacts of air pollution on the human body in terms of severe disease that could attack the human body.**

### **THE CONTROL MEASURES TAKEN BY THE DELHI GOVERNMENT AND THE CITIZENS OF THE INDIAN CAPITAL**

After the coming of severity report one by one and the increase of air pollution in the capital city makes the governments take steps towards this environmental issue. Since 2015, the Delhi Government, started making attempts to tackle the problem, and in an attempt to deal with the automobiles pollution, the government has started a scheme called “odd–even vehicle scheme” for the travellers to restrict the circulation and presence of the car vehicles on the roads. Several other experiments tried to take some proportion of the cars off from the roads, more specifically the particular diesel engines of limit more than 2L were taken into consideration, and Smaller vehicles, which account for 70 to 80 percent of Delhi's diesel agile, received very little coverage. The Supreme Court (SC) has issued many significant directives, including the temporary closure of the capital's most polluting coal power plants.

The other reason which contributes the most in the air pollution is harmful firecrackers which are in high demand in the country in the festive season of Diwali and New Year. So the Indian authorities mandate to ban the sale of firecrackers in the month of October. Infrastructure Construction projects, and some other building constructions which donated in enhancement of the smoke and fog level were postponed or stopped for some time [6]. Though those control measures only help in quick fixes to reduce the hazardous situation but become important especially in the winter season and most importantly amid the scenario of COVID -19. When the situations are already critical the increase in air pollution makes the conditions even hazardous and deadly particularly for senior citizens, children and patients with respiratory health conditions.

### **RESULTS AND DISCUSSION**

Pollution is not very new to any city or nation most of the time. It's so serious that almost every nation is suffering from human pollution. But now it is becoming a big danger to humans themselves and maybe that's why it is also becoming talk for us. In a developing country it is now important to handle the situation as the air pollution not only damages the ecosystem but the humans in a very harsh way and every other it's getting more severe. The people need to understand why a national capital is not able to handle such a hazardous problem every year is it their fault or Government. And what could be the steps and measures they should adopt to minimize the severity of the sake of the environment and for themselves at least air contamination over human body is too harmful. The paper discussed all these aspects in detail the cause, the responsibility, its short term effects and long term impacts on citizens of Delhi. It's high time for people and governments to

be serious about this issue. The Delhi government and local civic bodies would take the situation seriously and even their slow steps towards the implementation of the control measures towards the minimisation of the air pollution because along with the little efforts and awareness of local people will make the situation a little better.

More efforts need to be made and proper control measures are required to be taken by the Indian and Delhi government. Authorities need to adopt and proceed with clean and renewable energy sources for domestic and industrial use. A restriction on the working of industries, automobiles and chemical factories are required. Ban on the import or the dense usage of petrol products, an energy fuels which are even contaminating as compared to the non-renewable energy resource like coal. For example learning from countries like the US of America which has banned it due to its high pollution reasons and so use of it should be banned or discouraged. But another fact is until the carbon taxes are increased on coal and as well on the petroleum coke, the dependence of the industry on the high polluting non-renewable fossil fuels will never stop. Though those control measures only help in quick fixes to reduce the hazardous situation but become important especially in the winter season and most importantly amid the scenario of COVID-19. When the situations are already critical the increase in air pollution makes the conditions even hazardous and deadly particularly for senior citizens, children and patients with respiratory health conditions.

## CONCLUSION

The paper aims to study the air pollution and its cause particularly in Delhi first because when a nation's capital territory city is deemed the world's most polluted city in only a few years, it's a significant crisis. As a result, finding serious solutions for the city of Delhi should be a top priority for the Indian state government. The environment has fundamental rights of good quality air and for it it's important that the government must unite to resolve such an important environmental issue. The Agricultural practices need to be managed and changed, a proper committee should be made to manage the farmers problem and to stop crop husk burning in open fields especially in the northern Indian states. Industrial plants and polluters must be subjected to a strict prohibition and harsh penalties if they violate it. Fuel efficiency must be increased, and an outright ban on old, polluting vehicles must be enforced. Focus should be on environmental sustainable development and greener infrastructure growth is key for the clean and high quality air. Moreover, cutting in the contamination and air pollution would also impact fruitfully towards India's economic growth.

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