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Coughing Capitals: Unraveling the Link between New Delhi's Air Quality Index and the Increased Incidence of Lung Diseases

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Abstract: ***In the past decade, New Delhi, the capital of India, has seen a terrible worsening of its Air Quality Index (AQI) which has become a cause for national concern and one of global attention. These circumstances have led to rising cases of respiratory diseases, especially in the winter months when the air quality worsens due to factors such as vehicular pollution, bursting of firecrackers, and stubble burning. Despite the apparently adverse effects, there remain controversies with respect to the various causes of air pollution, which take away from the implementation of concrete solutions. This paper reviews the literature on the causes of air pollution in Delhi and supports the correlation between air pollution and the incident of respiratory issues through primary data collated from doctors in New Delhi. Drawing from this data, the paper proposes policy recommendations and suggests a focus on long - term, sustainable solutions.***

Keywords: Air pollution, Respiratory issues, Air Quality Index (AQI), Stubble burning

1. Introduction

The author recalls how winters in New Delhi were a thing to be cherished and enjoyed. That is how my family describes it too – after the scorching summers, everyone used to look forward to being outdoors in the winter and having outdoor afternoon soirees. However, over the last couple of years, winters have become dreaded due to the rising pollution levels. Blankets of smog descend upon the city, the sky is ash grey, people are coughing, and visibility is reduced. I see my younger brother aged fourteen, suffering every winter as he suffers from wheezing and associated respiratory issues when the AQI worsens. He was put on an inhaler in the winter of 2021 and we had also put in air purifiers around the house. However, he also had to be put on steroids. With these circumstances around me, I began to conduct research and reading on this issue.

Through my research, as elaborated upon further in this paper, I have found that people are affected in large numbers, and hospitals and clinics are thronged with patients with respiratory illnesses. It has become a yearly epidemic and changes must be made to save the health of the people, the expenditure on treatment, and the burden on our systems. At the pulmonologist's office, I have witnessed many more children and adults who face these health issues every winter. This is therefore correlated with the worsening AQI levels in the city. Rising air pollution has innumerable health risks. Respiratory problems, skin issues, high blood pressure and headache, watering of eyes, and eye infections are some of the problems (Godbole, 2022). There are various health risks caused due to the increase in air pollution.

Acknowledging these health risks, it is also important to understand and target the causes of this worsening air quality in New Delhi. Contributing factors include 1) stubble burning by the farmers in neighboring Haryana & UP – the thick clouds of smoke that rise thus form a blanket - like cover over Delhi, 2) Automobile exhausts – a large city with a large number of vehicles – with falling temperatures the automobile fumes or exhaust start adding to the fog resulting in increased smog, 3) industry fumes and 4) Crackers burst around festivals like Diwali (Chatterji, 2020). Each year, from the month of September the AQI starts to worsen. This reaches a peak in the months of October and November, stays high in the month of December, and starts to wane in the month of January. The citizens of New Delhi have been experiencing this trend in the last decade.

Despite the visibly adverse effects and knowledge of contributing factors, there is still a lack of consensus on the precise causes of the pollution, with some blaming stubble burning but other studies attributing high vehicle emissions as the cause. This is also heightened by disputes between political parties which seek to ascribe blame to one another's policies for the issue of poor AQI in Delhi. However, there is an urgent requirement for both the State and Central governments to change their entire approach to urban development in a sustainable manner (Narayanamoorthy, 2021).

This paper will examine this issue through the analysis of primary data obtained from a pulmonologist in New Delhi along with relevant literature, and explore possible solutions and interventions to address the issue.

2. Background

Delhi has managed to become one of the most polluted cities in the world. The 19 million people living in the metropolitan area have been strangled by the airborne particles and harmful compounds that make up the smog; at its worst, simply breathing the air was equivalent to smoking 50 cigarettes per day. Doctors have proclaimed a public health emergency after hospitals reported a 20% increase in patients with pollution - related diseases (Irfan, 2017). According to measurements made by the US Embassy, PM2.5 concentrations in the air in New Delhi exceeded 1,

200 micrograms per cubic meter, which is 48 times the World Health Organization's recommended standard. The record was set in Shenyang, China, where concentrations exceeded 1, 400 micrograms per cubic meter. This is still below that level (Irfan, 2017).

In the quest for the reasons that have led to this situation, there are difficulties in correctly identifying the causes. The source of pollution is not being accurately described and the interventions have therefore not been as effective as they could be. It is important to conduct 'pollution - based source attribution. ' It is crucial to stop looking at the emission inventories and start looking at the pollution - based source attribution if the objective is to figure out what is contaminating Delhi (Urbanemissionsinfo, n. d). One can get an idea of the sources from the emission inventories. The attributions we find in the emissions may be comparable to those found in the ambient pollution if the mix of sources is not very different. However, this is not feasible in Delhi's case (Urbanemissionsinfo, n. d).

The city is situated such that the influence of long - distance transit is frequent and significant, and the mix of sources in Delhi and its satellite cities is extremely diverse. In order to determine the source shares, it is ideal to collect a large number of ambient samples from all over the city from various locations (road, industrial, residential, and background), analyze them for their chemical profiles, and then statistically match them with a set of source profiles (knowing which sources are likely to influence the ambient pollution). This is what top - down source apportionment entails. This is the most exact route, but it is also the most expensive (from sampling to analysis) (Urbanemissionsinfo, n. d).

It is also important to acknowledge the holistic case at hand and acknowledge the involvement of all factors in air pollution – government, external factors, and the actions of individuals. For example, despite governmental measures to curb air pollution in winter during the festival of Diwali, individual citizens continue to flout these orders and ignore the consequences by bursting firecrackers (Das Gupta, 2022). Therefore, society cannot hope to effectively tackle this issue without measures taken from all corners. In light of the above background, the following section of this paper discusses the data collected from the pulmonologist in New Delhi in more detail to corroborate the negative health effects of increased air pollution.

3. Discussion

To further investigate the correlation between the prevalence of respiratory illnesses and poor AQI in the winter, I contacted a General Physician Dr K. P. Sinha (MBBS and MD), practicing respiratory & general medicine in South Delhi. Dr. Sinha is the primary point of contact for patients experiencing respiratory symptoms. Some of those patients are referred by Dr. Sinha to a Pulmonologist for specialist intervention. With due permission, I conducted a study of the number of patients visiting the outpatient department with respiratory and other complaints in the months of September, October, and November 2022 and I contrasted these numbers with the summer months of May and June in the same year.

I also studied the AQI trends in the same months and I found a striking association in the rise of a number of patients presenting with respiratory illnesses to the OPD and the AQI levels, being a direct correlation. This correlation demonstrates if AQI levels can be improved, this will consequently reduce the burden on healthcare. This data therefore provides key insights for future study in the field.

A comparison in the number of total patients to the number of patients visiting with respiratory complaints was made between the summer months of May and June 2022 and the winter months of September, October, and November. The percentage of patients with respiratory illnesses visiting the OPD is much higher in the months when the AQI worsens. The data is as detailed below:

Month of May

Number of Patients	
Total (all diseases)	99
cough	8
COPD	7
Fever with respiratory symptoms	10
Percentage of patients with respiratory symptoms	25/99= 25.25%

Month of June

Total patients (all complaints)	85
cough	10
COPD	5
Fever with respiratory symptoms	9
Percentage of patients with respiratory symptoms	24/85=28.2%

Month of September

Total patients (all complaints)	98
cough	24
COPD	16
Fever with respiratory symptoms	14
Percentage of patients with respiratory symptoms	54/98=55.10%

Month of October

Total patients (all complaints)	110
cough	30
COPD	24
Fever with respiratory symptoms	15
Percentage of patients with respiratory symptoms	69/110=62.72%

Month of November

Total patients (all complaints)	95
cough	19
COPD	17
Fever with respiratory symptoms	18
Percentage of patients with respiratory symptoms	54/95=56.8%

The above data shows a clear correlation between the percentage of patients with respiratory illnesses visiting the OPD and the months when the AQI worsens. From a qualitative perspective, Dr. Sinha also spoke about how those with existing lung diseases and those with pre - existing conditions like Pulmonary Tuberculosis invariably face exacerbations of the symptoms during the months with high AQI.

I also had an opportunity to shadow Dr Nevin Kishore (MRCP, (LON) FRCP (EDIN) who is the Head of Bronchology, Department of Respiratory Medicine at Max Hospital Saket, New Delhi). During a bronchoscopy procedure, he detailed the increasing number of respiratory illness patients that he is seeing daily. One interesting observation made by him was that he saw many families move away to smaller towns or the hills for the sake of a cleaner environment and when those patients came back to New Delhi, he noted a reversal or improvement in the disease and symptoms.

The data and statements from the two doctors interviewed corroborate the consensus among doctors who have raised alarms about this situation, including an increased risk of lung cancer (Clarance, 2022 and Perapaddan, 2022). It is pertinent to note that there is no level of exposure to air pollution which is desirable at all. Even a small level of pollution can lead to harmful and long - lasting impacts of air pollution on people's health, particularly those of children, and prevents children from developing to their full potential in terms of their mental and physical health. It lowers life quality and makes us all more susceptible to various illnesses, including cancer (Perapaddan, 2022). According to the World Health Organization (WHO), breathing in pollutants at any concentration causes cells all throughout our body to become inflamed, under oxidative stress, immunosuppressed, and mutagenic, which has an adverse effect on the heart, lungs, brain, and other organs and ultimately results in disease (Perapaddan, 2022).

From an individual perspective, potential solutions could be growing indoor & outdoor plants, wearing masks, using public and shared transport, using CNG vehicles and fuel - efficient cars, sharing taxis, using solar power, refraining from burning waste, etc. From a governmental perspective, potential solutions could be introducing laws on permissible emissions and other such regulatory measures (Brara, 2018). However, relying on individuals when corporations emit far more pollution and farmers create more effects through stubble burning is not a sustainable solution. There need to be concrete, long - term measures and effective implementation of laws which are important since measures for individuals are most often short - term solutions.

The government is making improvements to the air, but they are still few and far between. Several coordinated, combined efforts, according to TERI, might reduce particle pollution in Delhi by 50%. By converting agricultural waste into marketable products, winter PM2.5 concentrations might be 12% lower (Patel, 2019). Levels might be reduced by 13.7% with a more dependable grid electricity supply to avoid using diesel generators and more clean - burning liquefied petroleum gas cooking stoves to replace biomass burning. Another 10.5% might be saved by requiring companies to adhere to environmental limits and by introducing 8, 000 electric buses. Implementing current regulations, however, is a significant barrier to reducing pollution in India, according to the Centre for Science and Environment. Several rules and policies are already in place, but they are not being followed in practice. People have continued to use fireworks despite regulations. Centers that test for vehicle emissions are known for issuing fake certifications of conformity. Construction companies fail to properly control dust through the use of techniques including creating barriers, covering trash, or misting building materials with water during storage and transportation (Patel, 2019).

4. Conclusion

The data above and statements from doctors clearly show the correlation between rising cases of respiratory diseases and complaints of distress, and worsening AQI levels in Delhi. Therefore, there is a clear need for the political and personal will to solve the crisis of air pollution in Delhi. The entire model of urban development that is being used needs to be reconsidered by the Center and the State. Putting a cap on the number of vehicles per household, regulating the registration of diesel vehicles, phasing out old commercial vehicles, using CNG engines for public transportation, restricting and regulating construction activities, effectively managing garbage, and outlawing smoke - producing fireworks at all social events are some long - term measures that can be suggested for reducing the extreme pollution levels. To make sure that the mechanized harvester does not leave the crop stubble behind, research activities must also be launched (Narayanamoorthy, 2021).

It is the aim of this paper to shed light upon this correlation and for the data to be utilized in further study in the field, as it points towards the need for long - term and sustainable solutions through effective action by local bodies and the government, as well as individual citizens.

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