

Summer Training

A report on

The Coronavirus outbreak and the AIR QUALITY INDEX of Delhi, a blessing in disguise.

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The Coronavirus outbreak and the AIR QUALITY INDEX of Delhi, a blessing in disguise.

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ABSTRACT

RATIONALE-

Over the past few months, one of the most devastating global tragedy has troubled the entire nation illustrating a dystopian future to the people. As lockdown were announced to contain the ongoing spread of covid-19, business, industries and daily functioning were halted for months, a steep drop in air pollution brought a sense of temporary optimism.

OBJECTIVES-

- To study the effect of corona outbreak on the Air quality of Delhi which is a major hotspot of the pandemic.
- Comparison and analysis of the situation of air pollution in Delhi before and after the outbreak.
- To analyse the effect of air quality index on health of a person.

METHODOLOGY-

Primary data was collected using online questionnaire. The primary respondents were individuals above 18 years of age who can read and write English having a working internet access with a basic knowledge about healthcare. As many as, 150 responses were received.

Collection of data on number of cases of COVID-19 was done from websites of WHO, MoHFW (India). Search engines used for review of literature and collecting secondary data were; PubMed, Google Scholar.

Analysis and Interpretation of primary data collected, was done using Ms Excel and graphical representations.

RESULTS-

Air pollution is seen as one of the major environmental concern and it's rise can lead to the growth of many dangerous diseases such as asthma, cancer lung, hypertrophy of ventricles, Alzheimer's and Parkinson's diseases. It can also lead to some major psychological disturbances, retinopathy, foetal growth. Air Quality Index is a measure through which the public can be made aware about how polluted the air is and how polluted it may become in the future. New Delhi is considered as one of the most polluted cities in the world. Recently its AQI dropped down to 93 which is considered as a moderate level. According to IQAIR, in march 2019 the AQI was around 161 and New Delhi air quality was considered unhealthy. After the Janta cerfew, AQI dropped to 103 in Delhi. This decline in AQI was the result of massive reduction in vehicular traffic. With most vehicles off the roads, flights grounded and all but essential businesses shut, people in Delhi appear to be breathing relatively clean air with relatively safer levels of pollutants according to the Central Pollution Control Board (CPCB)

CONCLUSION-

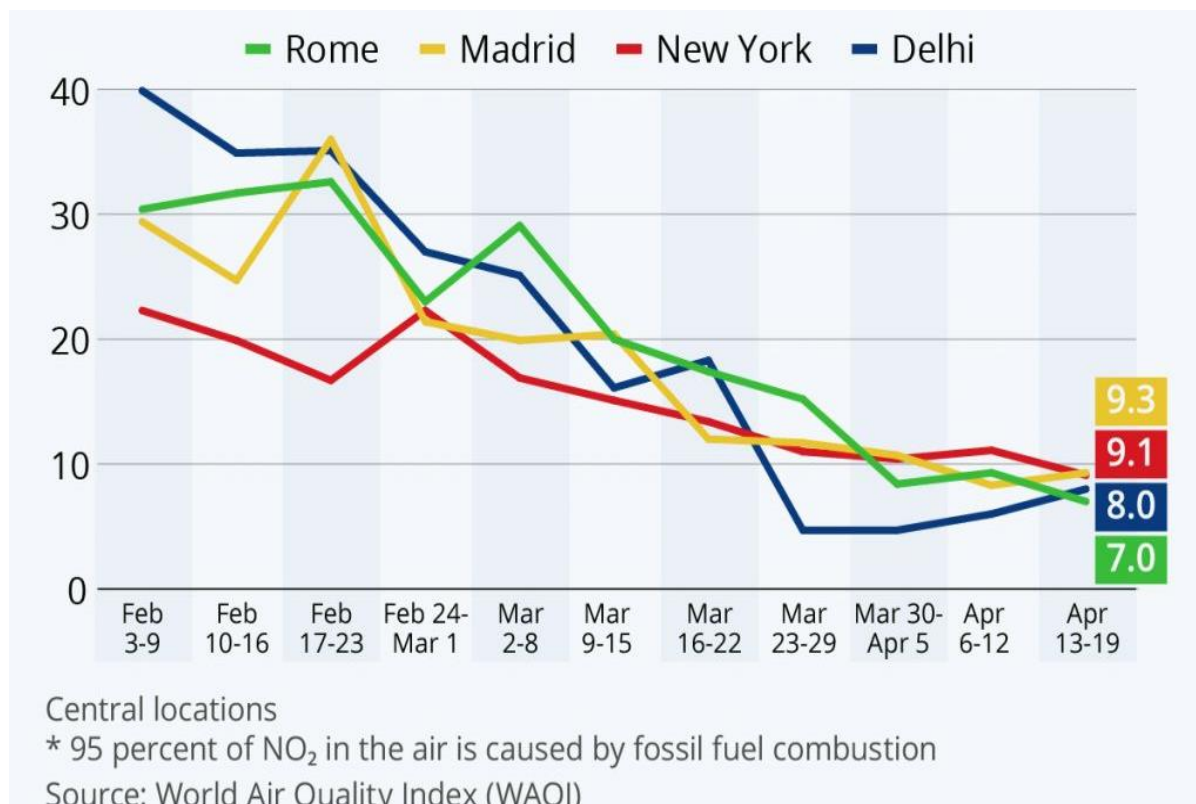
Therefore, this clearly depicts reduction in the air pollution and improvement in the Air quality index of the major hotspot of corona that is Delhi. In a nut shell, there are various downsides to the world's getting walloped by the coronavirus and being put under severe lockdown. However, here in one of the most polluted cities on earth, where many people routinely wear face masks to filter out the virus, something rare and wonderful has emerged: a pure blue sky.

INTRODUCTION

Coronavirus is a virus that is found in mammals, which can be transmitted from animals to human and from person to person. The symptoms of the coronavirus include cough, fever and shortness of breath. The first case of 'covid-19' pandemic in India was reported on 30 January, 2020. However, the total confirmed cases in Delhi were 14000 with 600 deaths according to WHO. It is a respiratory virus and the mode of transmission is through droplets generated by an affected person through cough, sneeze, exchange of saliva or any discharge from nose. It can also be transmitted directly by coming in close contact with an infected person who has any of these respiratory symptoms.

It can be transmitted through surface in immediate environment of infected person or may be airborne only in specific procedure example bronchoscopy or tracheostomy. Incubation period is defined as the duration between catching the virus and starting to show symptoms of the virus. The incubation period of covid-19 varies from 0 to 14 days. Around 5 days, the infected person starts to show symptoms. The elderly population above 60 years, people with pre-existing medical condition or immunocompromised patients are highly susceptible. One of the public health strategies is the epidemic curve which gives us a visual representation of the data concerning the number of infected people who are in need of healthcare. In case of a pandemic, the number of infected people can exceed and the healthcare system loses its capacity to provide proper healthcare which can lead to the breakdown of the healthcare system. Flattening of this epidemic curve is a result of slow spread of pandemic. The initial diagnosis begins with the clinical manifestation of symptoms in patient like fatigue, fever, dyspnoea which is followed by CT scan representing multiple, patchy shadow in one or both the lungs with honeycomb shaped septal thickening. The techniques for lab testing include nucleic acid testing (PCR), next generation sequencing and flu antigen testing. Patients who are suspected or confirmed need to be kept in isolation in the assigned hospitals with regulation of proper isolation and safety measures. The patients who are suspected are made to stay in a single room for self-isolation and patients with confirmed cases are admitted in the same ward whereas the critical cases are admitted to ICU. Till now, there is no specific treatment against this virus. The precautions include washing your hands with soap and water, or alcohol-based sanitisers, practising social distancing, covering your mouth and nose while coughing and sneezing, maintaining some distance from people who are coughing or sneezing.

The lockdown in India was imposed on march 24 by our Honourable Prime minister Shri Narendra Modi. Initially, the lockdown was planned for 21 days, but as a precautionary measure was extended till may 3. Everyone had to stay at their homes, all industries and factories were shut and many labourers migrated back to their native places due to lack of money and employment to sustain themselves in urban areas. As a result of this lockdown, first time in Indian history Railway operations were stopped around the country. The supply chain has also affected. This was indeed a reflection period for us to introspect how much we are neglecting the environment and how better the air quality is since the lockdown.



The above graph clearly illustrates how Air quality index has affected the daily air quality in the past few month. AQI communicates to us how unhealthy or clean the air quality is, and what might be the consequences associated with it. The major issue targeted through this study is the purpose of the AQI and how it impacts the health of an individual. The AQI is divided into six major groups. When the AQI is between 0 to 50, it is considered as good and is symbolised by green colour, when it is between 101 and 150, it is usually considered unhealthy for sensitive people and is symbolised by orange colour. However, more than 150 is considered unhealthy and more than 300 is hazardous for individual. Therefore, this index is very important because it provides simple information regarding the air quality, effects of unhealthy air on individuals and how can we protect ourselves.

REVIEW OF LITERATURE

1. Indirect Impact of COVID-19 on Environment: A Brief Study in Indian context

Snehal Lokhandwala, Pratibha Gautam (PubMed)

- A closer look into the refinement of the environment during the lockdown as compared to before the lockdown supported with evidence.
- The study states improvement in the air quality and water quality, which shows signs of restoration.
- However, it lacks the basic understanding of the Air Quality index and how it largely affects the health of an individual.

2. Possible Environmental Effects on the Spread of COVID-19 in China

Hao Xu, Chonghuai Yan (PubMed)

- The basis of the study was Poisson regression model and the effects it had on the AQI. An analysis was done on the confirmed cases which showed that the effect of AQI on confirmed patients were associated with a hike in each unit of AQI.
- The risk of transmission of COVID-19 associated with AQI was seen to be more in higher humidity in an increased impact of AQI on the spread of COVID-19 under low RH.

3. Association Between Ambient Temperature and COVID-19 Infection in 122 Cities from China

Jingui Xie, Yongjian Zhu

- The results of this study show that the mean temperature has a positive linear relationship with the number of COVID-19 cases with a threshold of 3 °C. There is no evidence supporting that case counts of COVID-19 could decline when the weather becomes warmer, which provides useful implications for policymakers and the public.

- Xie and Zhu collected data from 122 cities where they collected daily confirmed cases and a general additive model (GAM) was applied to explore the non linear relationship between temperature and covid-19 confirmed cases. This study shows the relation between the ambient temperature and the transmission and the survival of the novel coronavirus.

4. 21-Day Lockdown in India Dramatically Reduced Air Pollution Indices in Lucknow and New Delhi

Sudhakar shrivastav, Amit kumar

- The author scientifically made an analysis through the available data on primary air pollutants (PM₂, NO₂, SO₂, CO) from Lucknow and New Delhi.
- The analysis was on the basis of comparison of the quality of air pre and post the lockdown.
- A reduction in the pollution and refinement of the air quality was seen in Lucknow and New Delhi.
- The author also presents a perspective to control air pollution in the future by adopting lockdown as a tool.

5. Decline in PM_{2.5} Concentrations Over Major Cities Around the World Associated With COVID-19

Akansha Chauhan, Ramesh P Singh

- The author represents a significant decline in the particulate matter (Pm_{2.5}) which shows the Air quality of a location.
- The major reason "social distancing" which resulted in less movement of people. The steps taken in the cities to control the virus and improve air quality showed low concentration of the pollutant PM thereby improving the quality of air.
- Analysis of PM_{2.5} of cities like (New York, Zaragoza, Rome, Dubai, Delhi, Mumbai, Los Angeles Beijing and Shanghai) was presented by the author around the world suffered severely .

METHODOLOGY

A primary research was done using an online questionnaire survey, created using google forms. Non-Probability sampling was done to select the respondents. The respondents were forwarded a survey of 14 questions using mail ids and social media platforms. As many as 100 responded to the survey from the capital state Delhi which is a hotspot of the pandemic.

To begin with, a detailed description was given to the participants about what is the importance of the study and why is it conducted. Also, the survey was anonymous to maintain confidentiality. After giving the details, the respondents were presented with the initial questions regarding the demographic details. The participants were asked about their location in Delhi (East, west, north and south). Reasoning questions were asked which were based on the reasons in perception of air quality before and after the lockdown in Delhi.

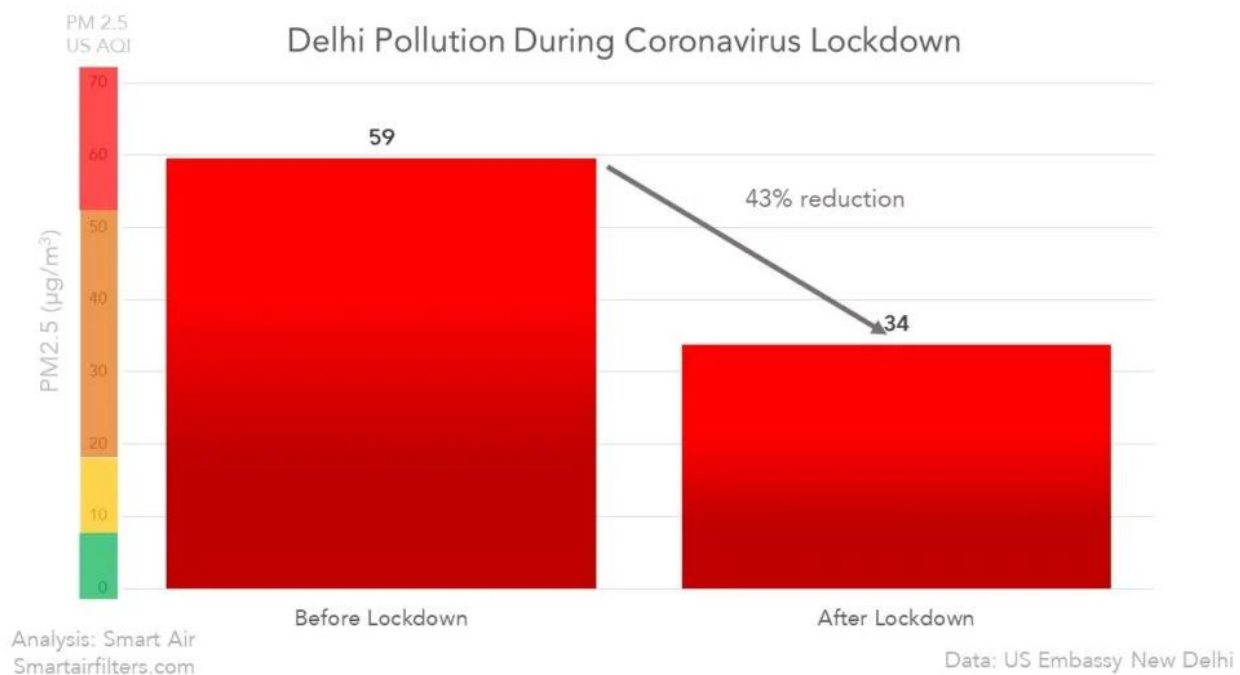
After the data was collected, analysis and interpretation of the data were done using Ms Excel spreadsheets. After obtaining the key findings, the data was represented using Graphical representations.

Websites of WHO and MoHFW were taken as reference for the secondary data used in the study regarding the number of cases of coronavirus infection, globally and nationwide. Review of literature for conducting the study were searched with the help of PubMed and Google Scholar. The research papers dated from 2019 – 2020 were studied to understand the impact of social distancing strategies on the number of cases of COVID-19 nationwide and globally.

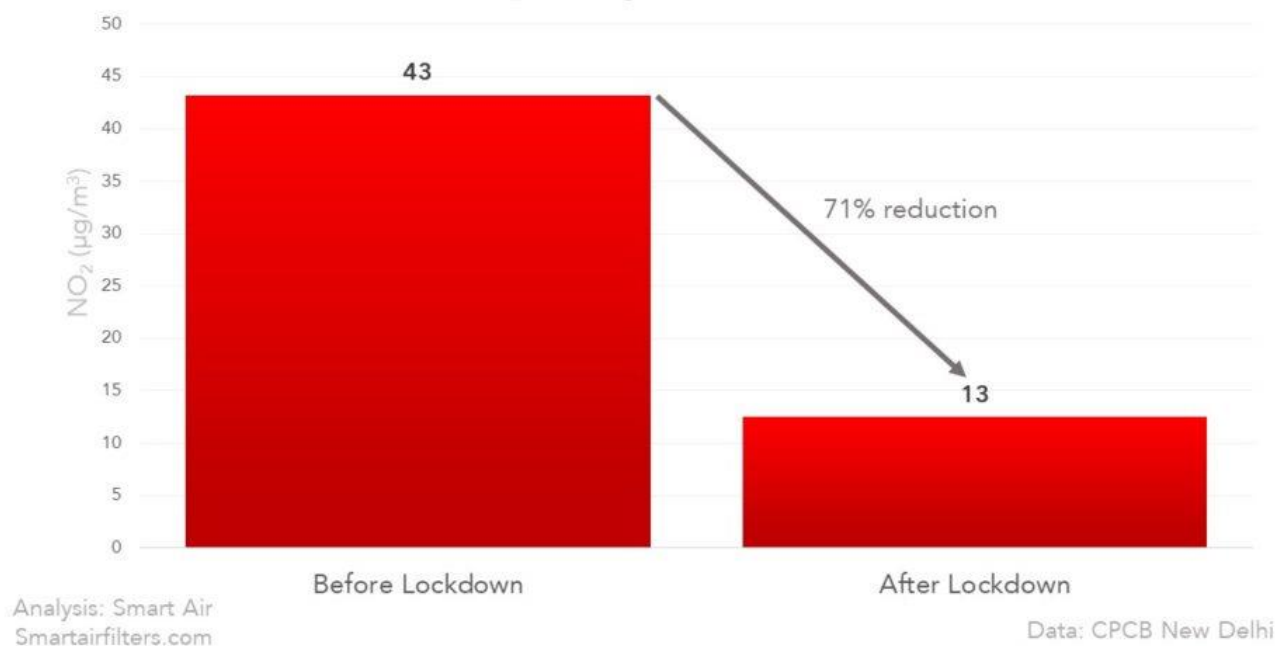
COMPARISON



Before and after the lockdown



Delhi NO₂ During Coronavirus Lockdown

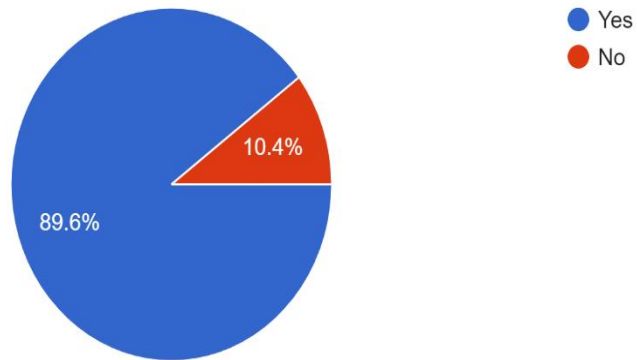


before lockdown				During lockdown				Overall variation		
NCT Delhi avg.	Industrial locations avg.	Transport locations avg.	Residential and other locations avg.	NCT Delhi avg.	Industrial locations avg.	Transport locations avg.	Residential and other locations avg.	Net	%	
PM ₁₀	176.07	190.74	195.77	160.48	84.79	91.25	90.11	76.48	-91.28	-51.85
PM _{2.5}	80.51	88.05	94.83	72.67	37.75	39.67	44.23	31.09	-42.76	-53.11
SO ₂	16.08	15.48	14.56	14.17	13.19	14.07	12.53	11.20	-2.89	-17.97
NO ₂	42.59	34.81	47.35	48.75	20.16	18.80	23.38	18.79	-22.44	-52.68
CO	1.03	1.33	1.13	1.01	0.72	1.04	0.71	0.64	-0.31	-30.35
O ₃	34.05	26.37	35.07	37.36	34.32	31.00	38.87	37.97	0.27	0.78
NH ₃	33.93	38.43	38.02	30.66	29.75	35.84	33.06	25.97	-4.18	-12.33
NAQI	185.99	196.38	215.29	174.78	72.64	92.45	87.29	79.8	-113.36	-60.95

KEY FINDINGS

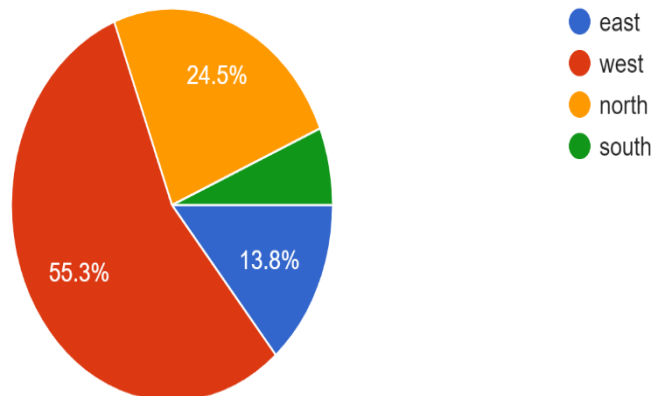
Are you a resident of delhi ?

106 responses



Which part of Delhi do you reside in ?

94 responses

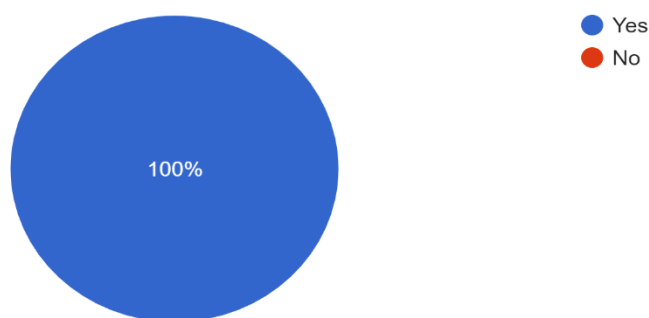


According to the above statistics, approximately 89% people are resident of Delhi. Demographic analysis is majorly important as this study is aimed at the hotspot of the pandemic and the capital of the country.

Participants were asked which part do they reside in order to get an in-depth comparative analysis of different areas of Delhi. About 55 % participants belong to west region, 24% people belong to north. However, only few participants are from the south region.

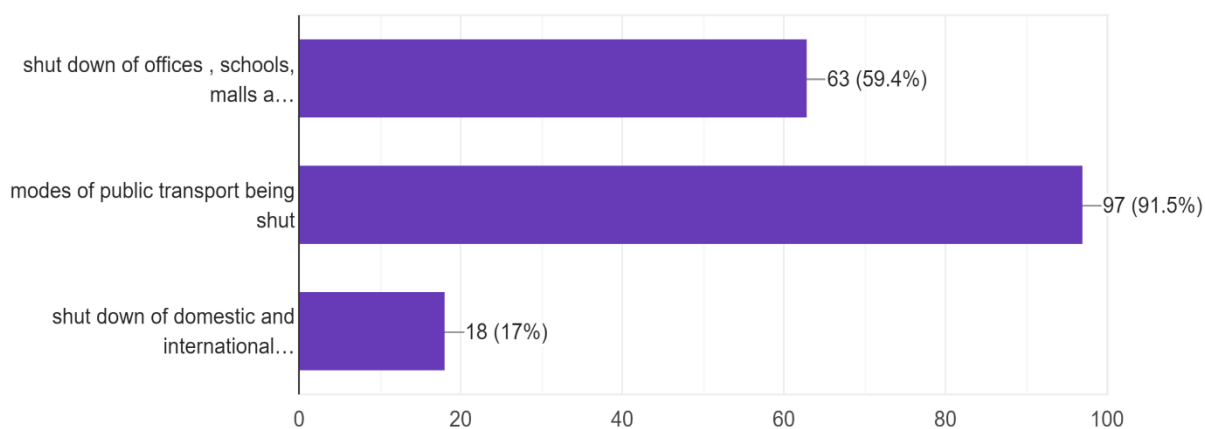
Do you think the pollution level in delhi has reduced due to this lockdown ?

106 responses



What are the major reasons for the improvement in the weather in Delhi?

106 responses



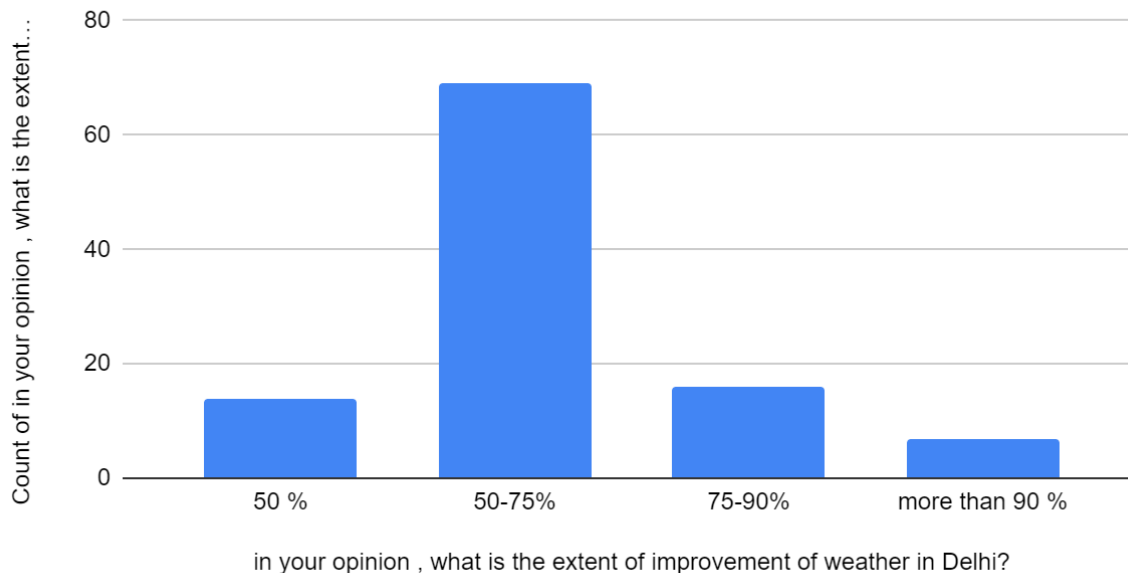
Every single participant thinks that the pollution level has reduced post this lockdown which brings our attention to the reason behind it.

Approximately 91% people think that the major reason behind this is the shut down of the mode of public transport in major areas of Delhi.

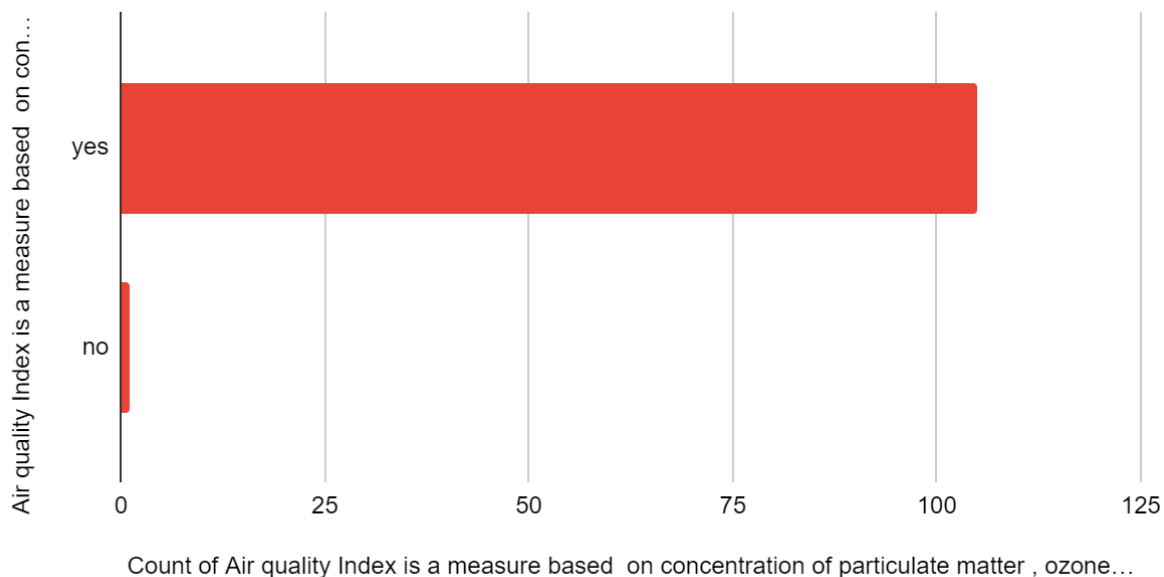
About 59 % participants have an opinion that due to the schools, offices and malls being closed, people have had to stay indoors which leads to the improvement in the weather conditions.

However, a small minority about 18 % people contribute this to the domestic and international airports being closed. Whatever the reason might be the sky appears to be blue and cities have little traffic or commercial movement.

Count of in your opinion , what is the extent of improvement of weather in Delhi?



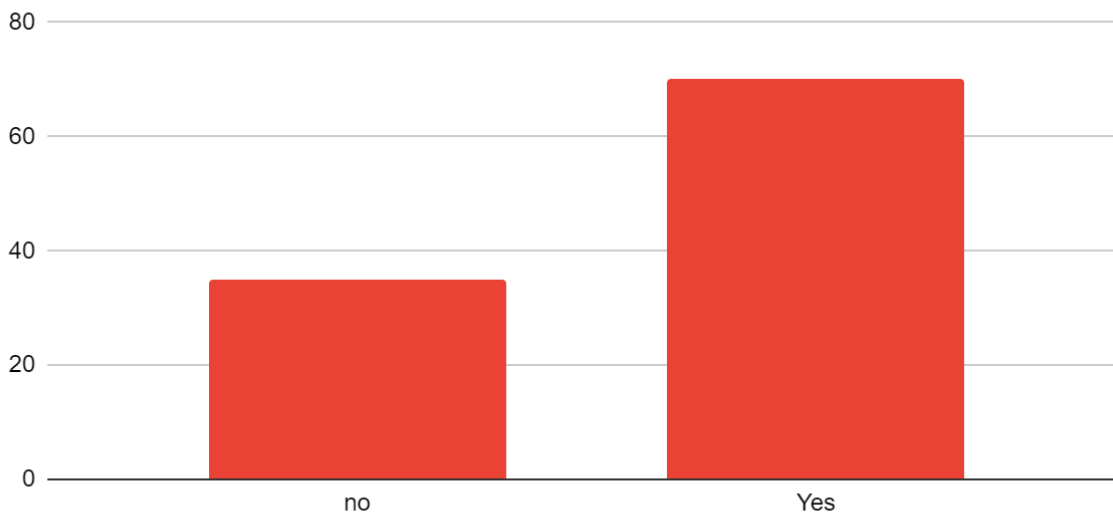
Count of Air quality Index is a measure based on concentration of particulate matter , ozone , nitric oxide , sulphur oxide & ca...



As shown by the statistics, almost 50-75% participants think that there is improvement in the weather condition of Delhi. However, only a small amount of people think that the extent is more than 90 %.

Air Quality Index is a tool used by the government departments to analyse and interpret how polluted the air is or how polluted it is predicted to become. AQI increases as the public health risks increases.

Count of Do you think the air quality will tend to improve more after the lockdown ?/no

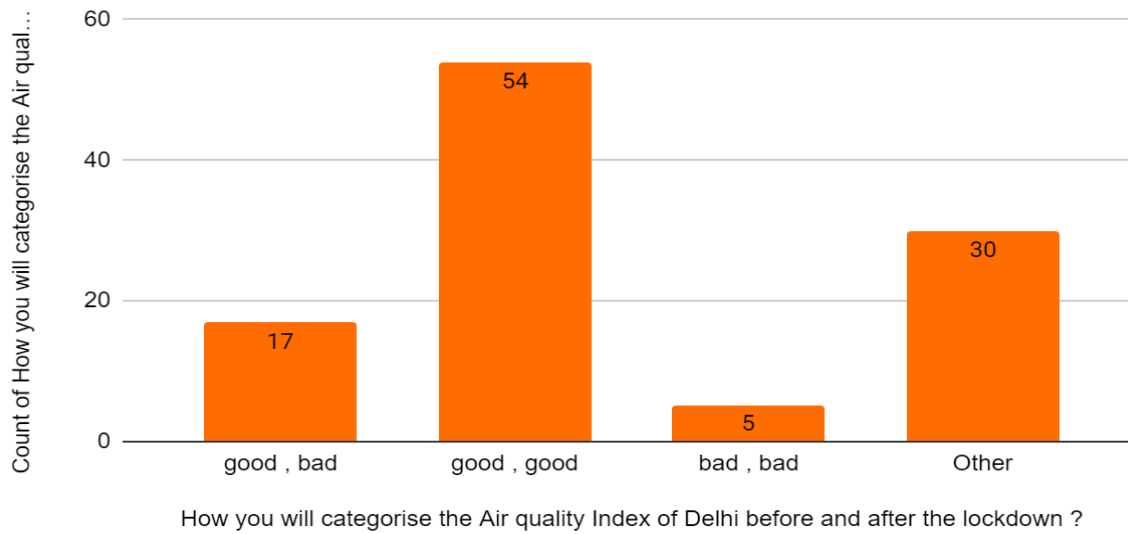


Count of Do you think the air quality will tend to improve more after the lockdown ?/no

The major question that is a topic of a huge discussion is this going to continue in the future or the situation is going to be the same prior to the lockdown. About 70% participants responded yes and about 30 % said no which opens room for further opinions.

According to (CPCB), when the lockdown was implemented without any relaxations, the pollution level remained in the “satisfactory” category. However, as the rules were eased, the pollution graph went up again.

Count of How you will categorise the Air quality Index of Delhi before and after the lockdown ?



The participants were asked about what is their opinion upon the post lockdown pollution levels of the capital city. In response to that 54 out of 100 people think that the pollution levels are going to be good post the lockdown. However, on the contrary, 17 people perceive that due to vehicles combustion and other toxic gases and combustion the situation is going to turn bad.

DISCUSSION

The initial analysis was based upon the demographic characteristics which tells us that majority of the participants are resident of Delhi.

Secondly, the reasons for improvement in the weather conditions were taken into consideration. Specifically, this lockdown served as a way to reflect on the extent of air quality.

Therefore, which brings into light the six major pollutants which play a role in the air pollution and hamper the national capital. First is Pm_{2.5} which lowered down to an average of 35ug/m³. The second one is Pm₁₀. The main contributor of this is road dust and construction dust. With low traffic and limited construction activities, it dropped down to an average of 35. The next is Sulphur dioxide and nitric oxide. The major drop was seen in the average of nitric oxide as its main source is combustion of vehicles. The last is carbon monoxide and ozone which drop down from 600-1000 to 500-800 and 15-40 to 25-70 respectively.

This explains to us that the nation needed an intervention at such a huge level where the movement was completely restricted and all industrial activities stopped. This needs to be an awakening for us. Without our presence, the nature is nurturing itself and hence, it is a blessing in disguise

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