

REFINEMENT OF AQI DUE TO AMID LOCKDOWN

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Abstract

- Air is the major component of the Environment and for this, it is necessary for the air to be fresh. Air is the constant pressure that we can feel easily and always but we cannot see. Breeze is the word used when the air flows with speed and pressure. Without air, Earth would be just like the planets other than earth in the solar system. Plant-animal are interdependent to each other for survival since plants produce oxygen in their respiratory system and animal produce carbon dioxide.
- And as we know carbon dioxide important for plants and oxygen for animals. However, manmade contributions in the ecosystem made no longer an air a fresh that leads to **air pollution**.
- AQI is the parameter to evaluate the pollution level in which there are various concentration to measure like ozone, nitrous oxide, particulate concentration in which PM2.5 concentration (particulate) play a major role in affecting the pollution level. Higher the AQI value greater the air pollution. As we all know we are facing a pandemic situation of COVID-19.
- Due to this pandemic, India has taken a big step to conduct a lockdown from mid of March.

Introduction

- Air is the basic need of people for their survival. Without air, Earth has become like other planets of a solar system.
- We all need air for oxygen respiration. Air is a fundamental mental building block apart from which we all cannot survive.
- PEOPLE in Indian cities usually affected by harmful air pollution that is much far for breathing cleaner air. Due to these air pollutions, this will cause a variety of adverse health problems among our population.
- Over 1.2 million death are occurred in India due to air pollution every year. This included outdoor as well as indoor air pollution. Indoor pollution including cooking, vapor materials of building, tobacco, smoking, etc. Outdoor pollution includes vehicle fuel, industry, deforestation etc.

Table 1: AQI measure according to the US National Ambient air quality index. (NAAQS)

Colour	Level of Health Concern	AQI Values
Green	Good	0 to 50
Yellow	Moderate	51 to 100
Orange	Unhealthy for sensitive groups	101 to 150
Red	Unhealthy	151 to 200

Table 2: AQI measure according to India

AQI	Remark
0-100	Good
101-200	Moderate
201-300	Poor
301-400	Very Poor
401-500	Severe

Table 3: Health implication due to the AQI level.

Air Quality Index		
Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	100 to 151	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects.

Rationale of the Study

- COVID-19 cases in India cross 2.5 lakh and death toll crossing more than 9000. More than 200 countries and territories are reported with novel corona virus pandemic.
- This pandemic situation has a direct impact on the economy, health system, mortality rate of India, life expectancy rate of India etc. This COVID-19 has a drastic effect on the human body.
- Amid lockdown, there is a drastic change in the environment that may help to build our human immunity or help by protecting our body with air pollutants. This report provides information on-
- Effect of lockdown on the AQI level.
- Impact on the environment.
- How to maintain this change.
- Change in the AQI level in various cities.

Aim.

- To study the impact of Lockdown in AQI.

Objectives.

- To study the impact of lockdown in the AQI level.
- To compare the AQI level in the city with different lockdown policy.
- To compare the AQI level with the previous year.
- To provide suggestions to maintain the AQI level.

Methodology

Research Questions

- What is the effect of lockdown is AQI?
- How much variation is there in pollution change in 2019 and 2020?
- What is the impact of lockdown in the environment of various cities?

Research Design- Descriptive Study

- **Type of Data-** Secondary Data (Secondary Review)
- **Time duration-** The study was carried for Two months that is from March to April of 2019 as well as 2020.
- **Sample size-** Data of 23 cities has been taken. Since they are coming under the most polluted area in India.
- **Data Collection Tool-** Data was collected by World Air Quality Index (WAQI) Project. And by government lockdown policy by the news, media, and government announcement.
- **Data Analysis Tool-** MS Excel

Data Collection

- We are focusing in the industrialized area and an area with more traffics. Since these are the major cause of increased pollution levels. And stoppage or decreased in any of these activities will definitely give drastic changes in the effect of air pollution. Then compare it with 2019. In a study, we have taken 2-month March 2020 (a month lockdown started).
- For more confirmation of the result, we compare the area those are completely following a lockdown policy with a partial one. For this, we take one parameter to compare that is the hotspot area during the study period. Hotspot area is the area where there are more than 10 patients within a week. And after this, the policy of lockdown will be followed strictly. That will have a major impact on traffic.

Data Analysis

- According to Indian Air Quality Index, the descriptor category is there which help us to give the scale or range for health effects on pollution. We see the two main models in this.
- Firstly, compare the area pollution affect or PM2.5 AQI concentration in a time period (comparison with 2020 to 2019 year) of the month of February to April.
- Secondly, we compare the case with the control area. Here, the cases are of hotspot area during the study period and the control of corona free area during the study period, followed by lockdown due to COVID-19.

- Median in relative with width class, sample size the basic step for the statistical method followed by the normal curve distribution.

$$median = l + \left(\frac{n}{2} - f_c\right) c / f_m$$

- **For even data**

$$median = \frac{\frac{n}{2} + (\frac{n}{2} + 1)}{2}$$

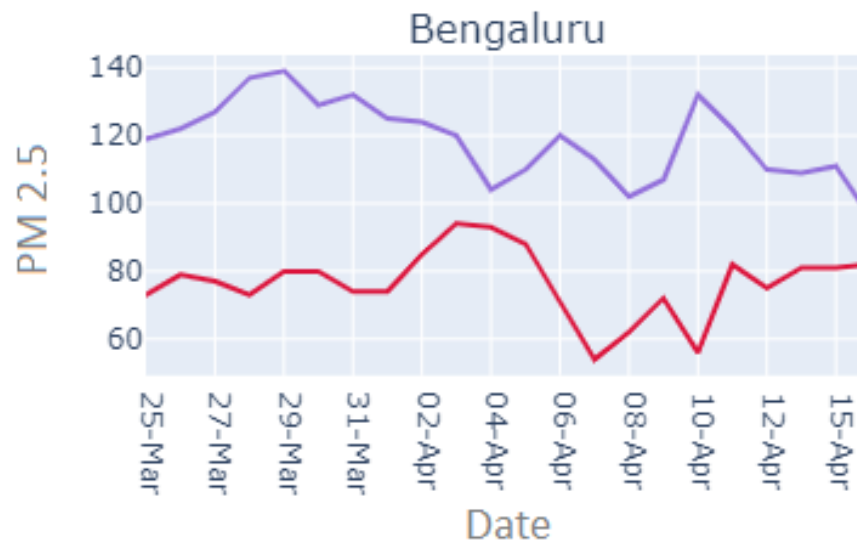
- **For odd data**

$$median = \frac{n + 1}{2} \text{ th observation}$$

The median of the data help to assist the comparison of the Pm2.5 AQI level with the last year.

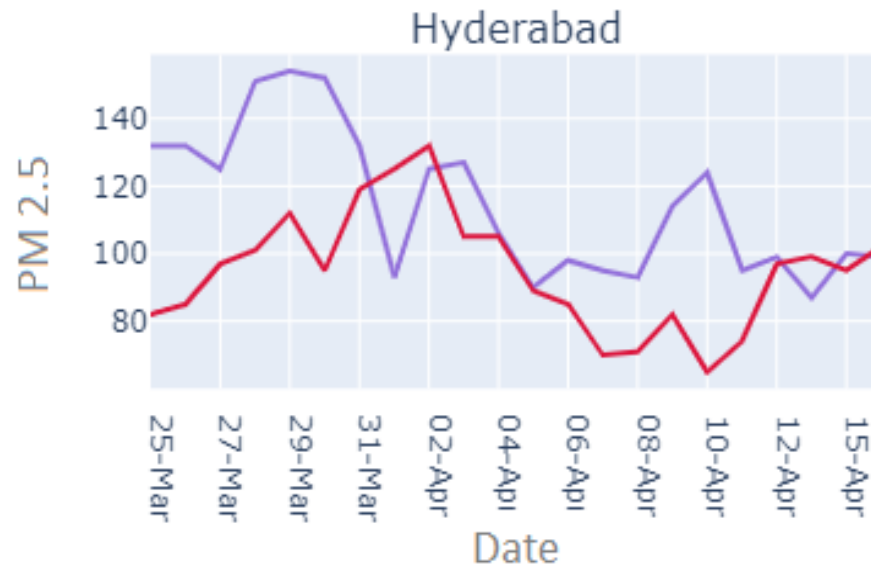
Interpretation

- It clearly shows that from day 1 of lockdown there is much decrease in air pollution and continuously maintain in the city of Bengaluru. It is the city where the air pollutant cause such as industries work, traffic that increases vehicle fuel emission. Due to which it is difficult to control the pollution level. But this lockdown has a great impact on this. Thus, by maintaining we can make our environment, health better.



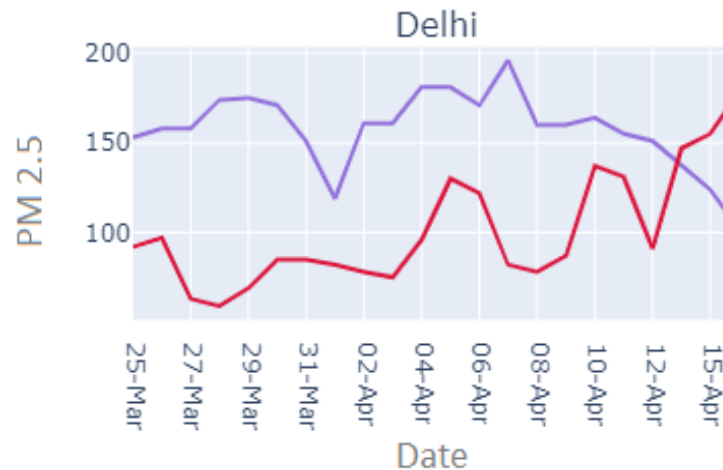
- **Interpretation**

It is an industrialized city where mostly the AQI level is at a high level but there is much declination during lockdown that is a good indication and if we maintain this will no doubt improve the health of the human.



- **Interpretation**

Delhi is the city where the pollution level is drastically increased for 3 years. Even the red alert has announced many times. The government made many policies to decrease the pollution but will achieve that goal. But this lockdown has a greater impact on pollution as shown in fig.6. But after opening of lockdown precaution should be taken to maintain it.



And other cities.....

Various causes of increased Air pollution

- Pollution refers to any particle that is out of place or in other words when toxins, containment, any other chemical substitutes come in the environment and disrupt their function.
- Our atmosphere contains 78% Nitrogen oxide and 21% oxygen. Pollutants come in the form of
 - carbon monoxide (CO)
 - and carbon dioxide (CO²)
 - sulfuric compounds like sulfur dioxide (SO²)
 - methane, radioactive decay, or toxic chemicals.

Causes

- Human Activity (Manmade)

Combustion of fuels, petroleum, industries are the major cause of pollution.

- Dust and Wildfires

Dust during fire events is the worst one and has a noteworthy effect on the atmosphere. It has been measured that 80% during wildfire emitted the particles are of dust or soil. Have a greater impact on the environment cause a serious problem in the health of the human body.

- Animal and Vegetation

Animal digestion leads to the emission of methane and greenhouse gases that has an adverse effect on the environment. In some regions, animal vegetation like black gum, poplar, willow tree, and oak are emitted a great amount of VOC, especially in summer days.

- Waste

This garbage is contained 40-50% of Carbon mass that clearly indicates that by burning trash the main gas emitted is Carbon dioxide which is a serious problem for health.

LOCKDOWN AFFECTS ON GANGA

An IIT BHU professor stated that one-tenth of the pollutants in the Ganga comes from industries nearby Hotels & other sources, with all of these Shut the Quality of water has improved by 40% to 45%. There is a 34% reduction in Faecal Coliform and a 20% reduction in biochemical oxygen demand. After a long time, the Water Quality of the river has become good for RITUAL SIPPING (ACHMAN). Also due to less pollution, the South Asian River Dolphin has been spotted by local people.

Recomendation

Since, after lockdown open, there is an abrupt increase in-crowd, traffic, industrial work for that we must take a necessary stand to maintain this environment that is much more favorable for our health. These are To understand that from where the pollution comes from:So that pollutant-free if possible, the vehicle can be made to reduce exhaust fumes that are the major cause of increasing pollution. Pollution control Awareness is the first step to maintain an improved AQI level.

- Enforce stricter emission standards.
- Retrofitting of heavy vehicles, cabs.
- Subsidies for electric vehicle.
- Cutting speed limit in polluted motorway areas

continue

- Focus in waste reduction and increase incineration- Technologies for the management of Incineration ashes.
- Training to driver for pollution awareness.
- Encourage active travel where possible.
- Routinely testing or service of vehicle.
- Stop having campfire in city.
- Planting as much as possible and care for trees.
- Become a champion for clean air, by reporting any concern you encounter.
- Reduce the number of car trips.
- Odd-even system must be followed in the places of higher AQI.
- Also promote traveling by public convenience.
- Renewable fuel and clean energy production.
- Use less plastic
- Use environmentally friendly detergents.
- Do not throw oil, chemicals, medicines in water, soil.

CONCLUSION

- After observing, analyzing, or evaluate the data set, we scrutinize the lockdown effect on the environment of India especially the air quality which has major benefits in our social, physical, mental health. We observe that such type of step that is lockdown has a drastic effect on the environment. We came up with the result that after lockdown there is about 55-60% declination in the air quality level of India when compared with 2019. Even the area where people are following lockdown partially also have some drop in pollution.
- The change in environment was mainly seen in the area of more industrialized, the city prone to traffic. And that is the reason for the higher mortality rate in these areas due to pollution. According to the Health Benefits Institute, there are 24000 to 36000 death on a monthly basis due to air pollution which is, much large in magnitude than the death due to COVOID-19 in India (during the study period). This will be averted by that much declination in the environment and furthermore also if we maintain it. Even air pollution also has an adverse effect on morbidity, effect on daily lifestyle main effect in the internal organ of the body that is Lungs. And the pandemic COVOID-19 also has the same target so to reduce the risk in the future we must take a step to maintain this level of air quality.
- In the end, our estimation on averted in many deaths is not based on real mortality data but the focus is that due to COVOID-19 we are already suffering a major problem, and this will not easily end. But by maintaining the air quality level we can hold the spread of respiratory infection, due to infection also it will make a positive effect on the environment. So, after lockdown, it is our own duty to preserve the environment so as to reduce the burden of pollution.