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Role of COVID19 lockdown in reducing air pollution: A study of National Capital Territory

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ABSTRACT

Responding to the ongoing world pandemic (COVID-19), India has implemented the largest quarantine in the human history in whole India from 24 March, 2020 to 30 May, 2020. Human mobility, production and consumption of goods have reduced significantly. Apart of this side effect of reduction many cities which were highly polluted has experienced a significant reduction in the air pollution. The main air pollutants are PM2.5, PM10, NO2, NH3, CO, OZONE. We have studied the air pollution in Delhi which is one of the highest polluted National Territory of India in which air pollution is being studied in three phases i.e. before, during and after the lockdown. The data shows that air pollution has been decreased during the lockdown period. Air Quality Index (AQI) was 458 in January which has been reduced to 171 at the end of April which means that during the lockdown period it has been reduced by 62.67%. Not only pollution rate reduces but prominent pollutant also shifted from PM2.5 in January to PM10 in April to Ozone in June. The main reason of reduction of this pollution is transport vehicles and industrial areas. The sample size of this study is ten different stations of Delhi. The methodology adopted is descriptive cum exploratory.

KEYWORDS

Pollution | Lockdown | Air Quality Index | Reduction.

CITATION

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Introduction

Started in December, 2019 from Wuhan, China, the outbreak of pandemic COVID-19 has been rapidly spread all over the world. The most affected countries includes the United States, Italy, Spain, Germany, China, France, and the United Kingdom. As of 31 May, 2020 there were approximately 58 lakhs cases which includes 3.5 lakhs deaths due to this pandemic. In India, there were 1.73 lakh cases which includes approximately 5000 deaths. In response to this many counties declared lockdown. Firstly, China introduced lockdown in Wuhan city to reduce COVID-19 impact. This lockdown includes closure of all factories, suspension of transportation, and non-movement from one part of city to another city. When first case was indentified in India on 30 January, 2020. After that the cases has been increased in India, to stop this effect a voluntary curfew of fourteen hour was observed on 22 March, 2020. After this voluntary curfew, first lockdown was introduced from 24 March to 31 May, 2020 which was in four different phases *i.e.* 24 March to 14 April, 2020 first phase, 15 April to 3 May, 2020 second phase, 4 May to 17 May, 2020 third phase, and 18 May to 31 May, 2020 was fourth phase. Due to this lockdown the fatality rate was lower at 2.8% as compare to world fatality rate which is 6.13%. The half of the cases are reported from Mumbai, Delhi, Chennai, Ahmedabad, Pune,and Kolkata. As possible effect of this unexpected lockdown, air pollution dropped down. PM 2.5, PM 10, CO emission has been reduced due to decrease in shut down of factories and movement of vehicles. A recent study by Zhu *et al*. (2020) shows that there is direct relationship between air pollution and effect of COVID-19 infection. This study shows that higher the air pollution level higher will be the risk of COVID-19 infection.

Human health is strongly affected by air pollution and many of the activities which give rise to air pollution are related to human such as industrial production, transportation and traffic. These both human and air pollution are highly correlated with each other. As human reduces its harmful activities, air pollution automatically reduces and in return it will have positive impact on the health of the human. In the current work, we try to clarify the effect of lockdown on the air pollution. We take the data from ten different stations of Delhi of three months which includes January, February and June. January and February are taken to show the air pollution before Lockdown and June is the month which shows the air pollution after lockdown. Amann, *et al*. (2017) demonstrated that the level of air pollution in Delhi can only be controlled with the help of neighbour states. As the collaboration with other states is highly needed to control air pollution in the Capital City of India, Delhi. To analyze the results GAINS-CITY policy analysis framework was employed. Bao and Zhang (2020) founded that with the decrease in production and consumption activities pollution in various cities have shown a downward slope. A sample of forty four cities was taken from china and it was founded that travel restrictions have positive impact on reducing air pollution, various air pollution factors like CO, PM 2.5 are directly associated with human mobility. Cole, Elliott, and Shimamoto (2005) stated that there is positive relationship between pollution intensity and human capital used. It was also

founded that size and productivity have negative relationship with pollution intensity (Nayak *et al.,* 2018). Government rules and regulations plays a very significant role in reducing pollution level generated by industries. Dutheil, Baker, and Navel (2020) analyzed the effect of lockdown on the reduction of air pollution and it shows that with the introduction of shut down of factories, control over transportation vehicles has reduced concentration of CO_2, NO_2 which has reduced the fatality rate due to air pollution. This subsequently reduced the death rate. Mahato, Pal and Ghosh (2020) showed that air pollution has been reduced drastically during this lockdown period. The most prominent factors PM 2.5 and PM 10 responsible for air pollution has showed the maximum reduction that is more than 50%. It is suggested that to control the air pollution level there should be temporary shut down after a suitable time interval so that environment can be healed time to time. The region of study was Delhi. Yin, Zheng and Chen (2015) identified that environmental regulations have direct impact on the Kuznet Curve which shows the slope of CO_2 emission. Due to high regulations industries were shifted from eastern to central and western regions where CO_2 emission firstly become higher in increasing stage and then lower at decreasing stage. The area of study was China. Energy structure, efficiency and industrial structure have direct impact on CO_2 emission.

Objectives

- To study the change in air pollution level in NCT of India.
- To identify the correlation between various variables.

Materials and Methods

Delhi was ranked as fifth highest polluted city in the world by the world air quality index which shows average 98.6 PM 2.5 emitted city in 2019. Considering that Delhi is suffering from long term air pollution and the average concentration of air pollution is higher in Delhi as compared to other parts of India. Its only behind Ghaziabad in case of air pollution in India. Delhi is one of the most affected area from COVID19. From Delhi 10 station has been taken and their air pollution index has been studied. The data has been used is taken from central pollution control board ministry of environment, forest and climate change. The ten station which has been studied includes Anand Vihar, Bawana, Delhi Technological University (DTU), Wazirpur, Vivek Vihar, Jahangirpuri, Mundka, Patparganj, Narela, Rohini. Bar diagrams has been used to show the change in level of air pollution before and after lockdown phase which involves three months *i.e.* January, February (before lockdown) and June (after lockdown). To identify the relationship between various variables a sample of 200 people was taken from

Data Analysis and Interpretation

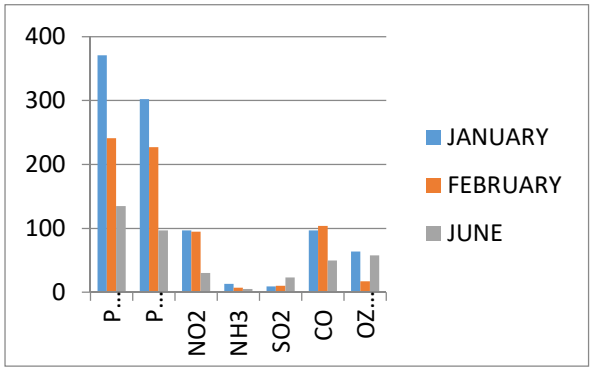

Fig.1: The air quality index was 446 in January which was severe and it comes down just 250 in June which is still concluded as poor. Whereas the prominent pollutant shifted from PM 2.5 to OZONE. **(Anand Vihar)**

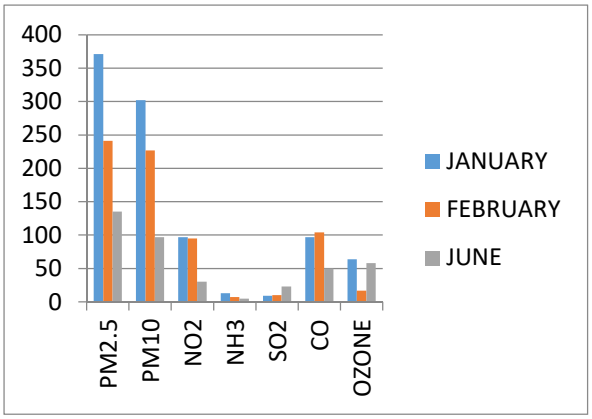

Fig. 2: The data shows that Air Quality Index (AQI) was 476 in January which was concluded as severe and it comes down to 167 (AQI) which becomes moderate but the prominent pollutant remains as PM 2.5 **(Bawana)**

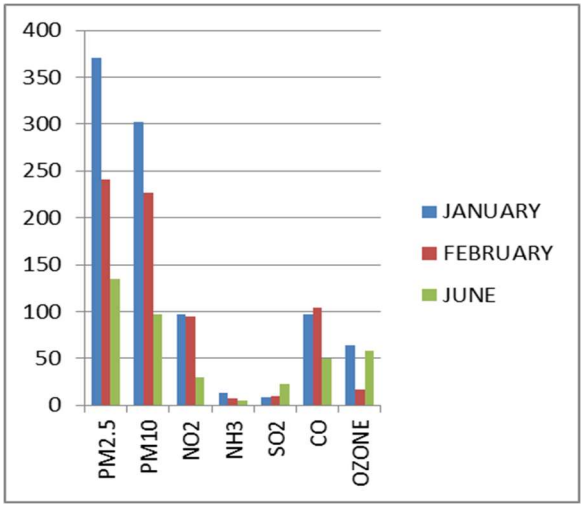

Fig. 3: The air quality index was 450 in January which was severe and it comes down just 56 in June which is concluded as satisfactory. Whereas the prominent pollutant remains same which is PM 2.5 **(Delhi Technological University (DTU)**

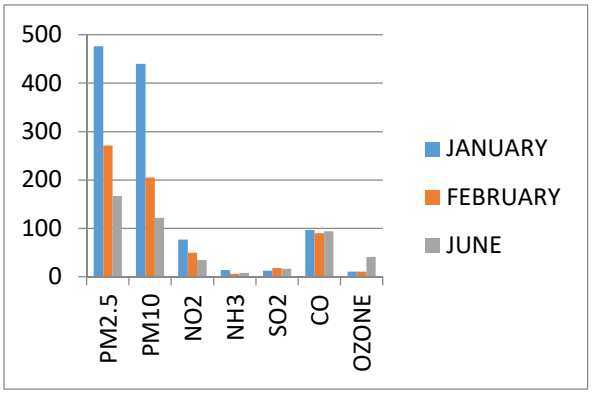

Fig. 4: The air quality index was 465 in January which was severe and it comes down just 87 in June which is concluded as satisfactory. Whereas the prominent pollutant shifted from PM 2.5 to CO. **(Wazirpur)**

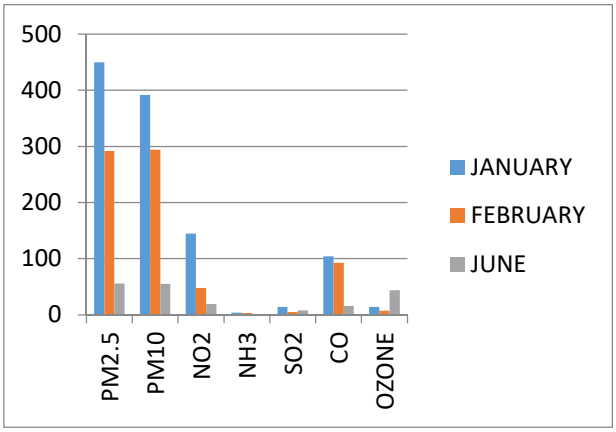

Fig. 5: The air quality index was 444 in January which was severe and it comes down just 115 in June which is concluded as moderate. Whereas the prominent pollutant shifted from PM 2.5 to CO. **(Vivek Vihar)**

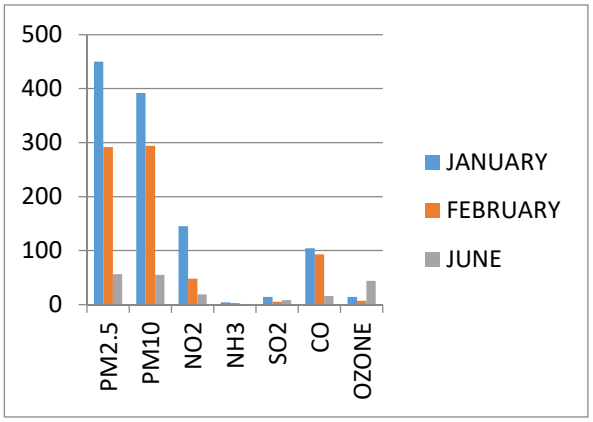

Fig. 6: The air quality index was 456 in January which was severe and it comes down just 56 in June which is concluded as satisfactory. Whereas the prominent pollutant remains same which is PM 2.5 **(Jahangirpuri)**

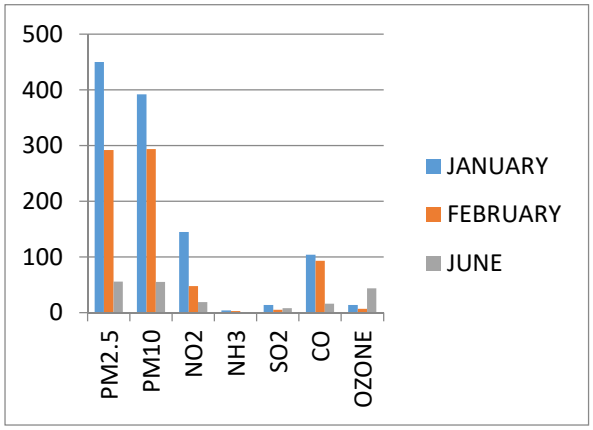

Fig. 7: The air quality index was 434 in January which was severe and it comes down just 40 in June which is concluded as satisfactory. Whereas the prominent pollutant PM 2.5 remains the prominent pollutant**. (Mundka)**

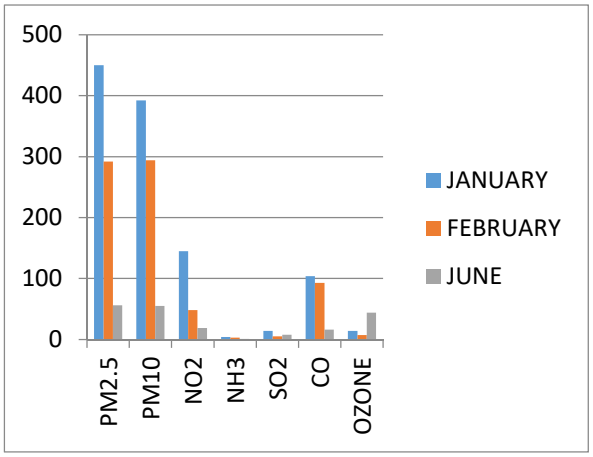

Fig. 8: The air quality index was 465 in January which was severe and it comes down just 44 in June which is concluded as good. Whereas the prominent pollutant shifted from PM 2.5 to CO. (**Pratapganj**)

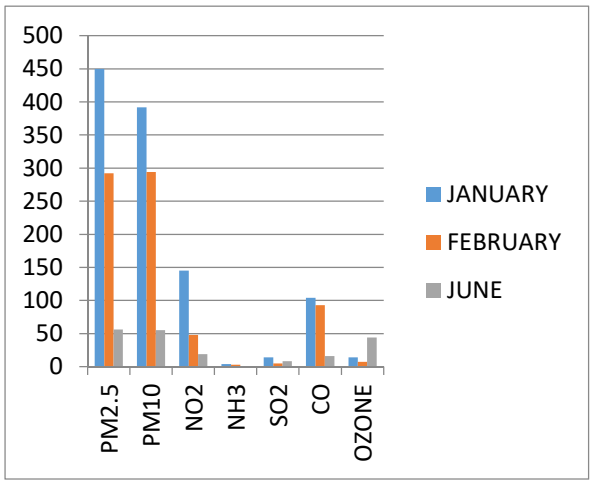

Fig. 9: The air quality index was 447 in January which was severe and it comes down just 123 in June which is concluded as moderate. Whereas the prominent pollutant shifted from PM2.5 to PM10. (**Narela**)

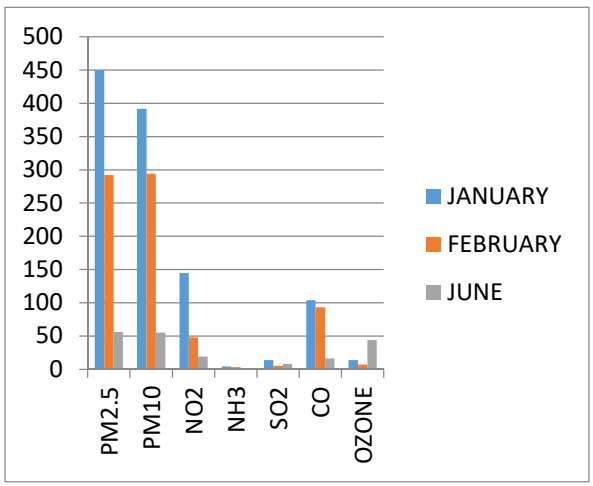

Fig. 10: The air quality index was 353 in January which was severe and it comes down just 143 in June which is concluded as satisfactory. Whereas the prominent pollutant PM2.5 remains the prominent pollutant. (**Rohini**)

Conclusion

From above data it is concluded that the air pollution has been reduced in all the areas. Some areas have become this Air Quality Index has come too much down, in some it come just a little bit. For example, In Pratapganj it comes down from 465 to just 44 which is being concluded as good and in Anand Vihar it comes down to 250 from 446 which is still declared as poor. Not only Air Quality Index falls but prominent pollutants also shifted for example in Narela it shifted from PM2.5 to PM10, in Pratapganj and Vivek Vihar prominent pollutant shifted from PM2.5 to CO. But overall it can be said that lockdown has played a vital role in reducing pollution level. The level of air pollution reduced in this lockdown is very high as it never happen before that the city like Delhi get so much clean view. Not only Delhi but cities like Gaziabad, Noida, Mumbai also benefitted from this lockdown. With the reduction in air pollution the death due to it also comes down. The main pollutants in this megacity includes PM2.5, PM10, CO, SO2, NH3, NO. It is founded that PM2.5 is the pollutant which is highly responsible for the pollution in most of the areas. After PM2.5, CO contributes maximum to the air pollution. The main sources from which PM2.5 is emitted are vehicles, airplanes, forest fires, power plans, residential wood burning, etc.

Every coin has two sides. So, the COVID-19 also has. On one hand where COVID-19 proved to be a disaster, another side it proved to be a blessing to the nature. There is a old proverb that says if you don't care of the nature, it will take care of it by itself. May be this COVID-19 is an example of this. With the

increase in air pollution a lockdown is highly needed but people were not ready to give up their regular lifestyle. In future also government should introduce temporary lockdown after some time interval so that nature can heal itself.

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