

REPORT ON

IMPACT OF AIR POLLUTION ON
OUR LIVES

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DESCRIPTION

Air pollution makes our Earth more harmful and dangerous. It keeps on getting worse year by year. COVID-19 virus makes the mutinous pollution under control. This report shows the Analysis of Impact of Air pollution on our lives during Pre-Corona and the Post-Corona periods.

PRE-CORONA (2016 – 2020)

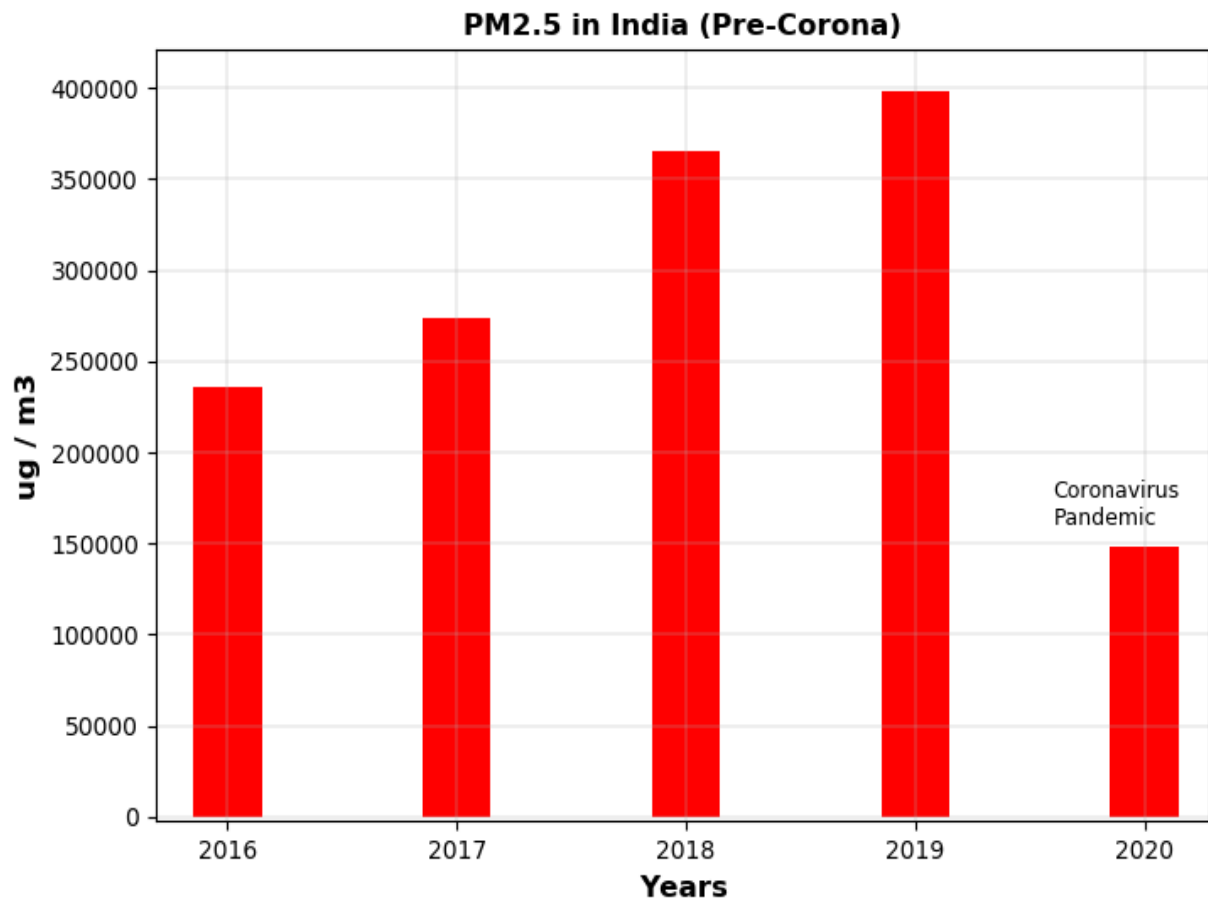
AIR POLLUTANT RATE IN INDIA (2016 – 2020)

There are different types of air pollutants which are harmful to both human beings and environment. Particulate matter (PM2.5 and PM10), Ozone, Carbon Monoxide, Oxides of Sulphur and Nitrogen, Ammonia are some of the harmful air pollutants. Here is the visualization of different air pollutant's rate before coronavirus happened.

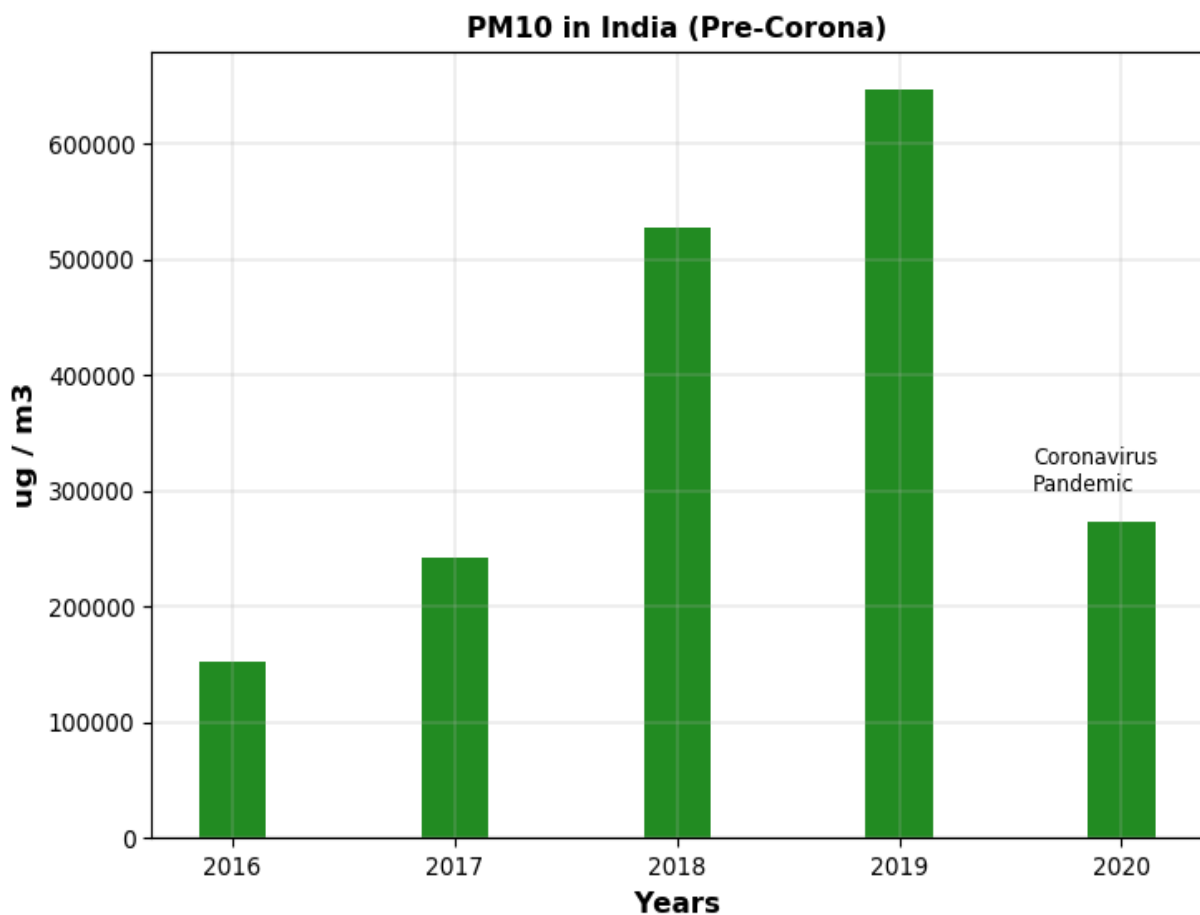
Particulate Matter (PM2.5 and PM10)

Diesel exhaust from vehicles is a major contributor to PM pollution. Some PM particles, such as dust or smoke are large or dark to be seen with the naked eye. But the most damaging particles are the smaller particles, known as PM2.5 and PM10.

PM2.5 is the fine inhalable particles, with diameters of 2.5 micrometers and smaller. The PM2.5 level gradually increases year by year. 2020 shows a relatively low level.



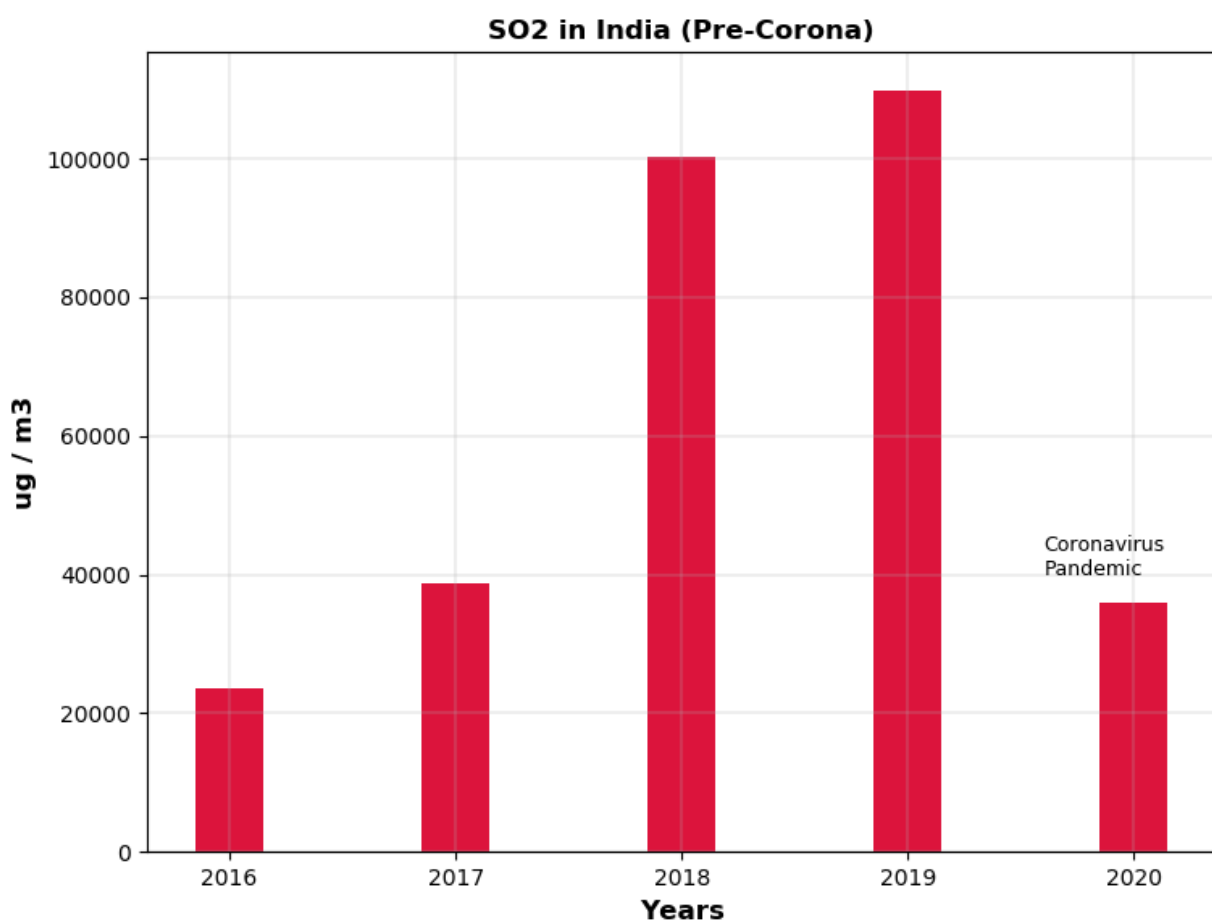
PM10 is the inhalable particles, with diameters of 10 micrometers and smaller. The PM2.5 level gradually increases. The year 2019 is highest in the PM10 level. 2020 shows a relatively low level.



Oxides of Sulphur (SO₂)

Power plants and motor vehicles create this pollutant by burning sulphur containing fuels, especially diesel. Sulphur dioxide can react in the atmosphere to form fine particles and poses the largest health risk to young children and asthmatics.

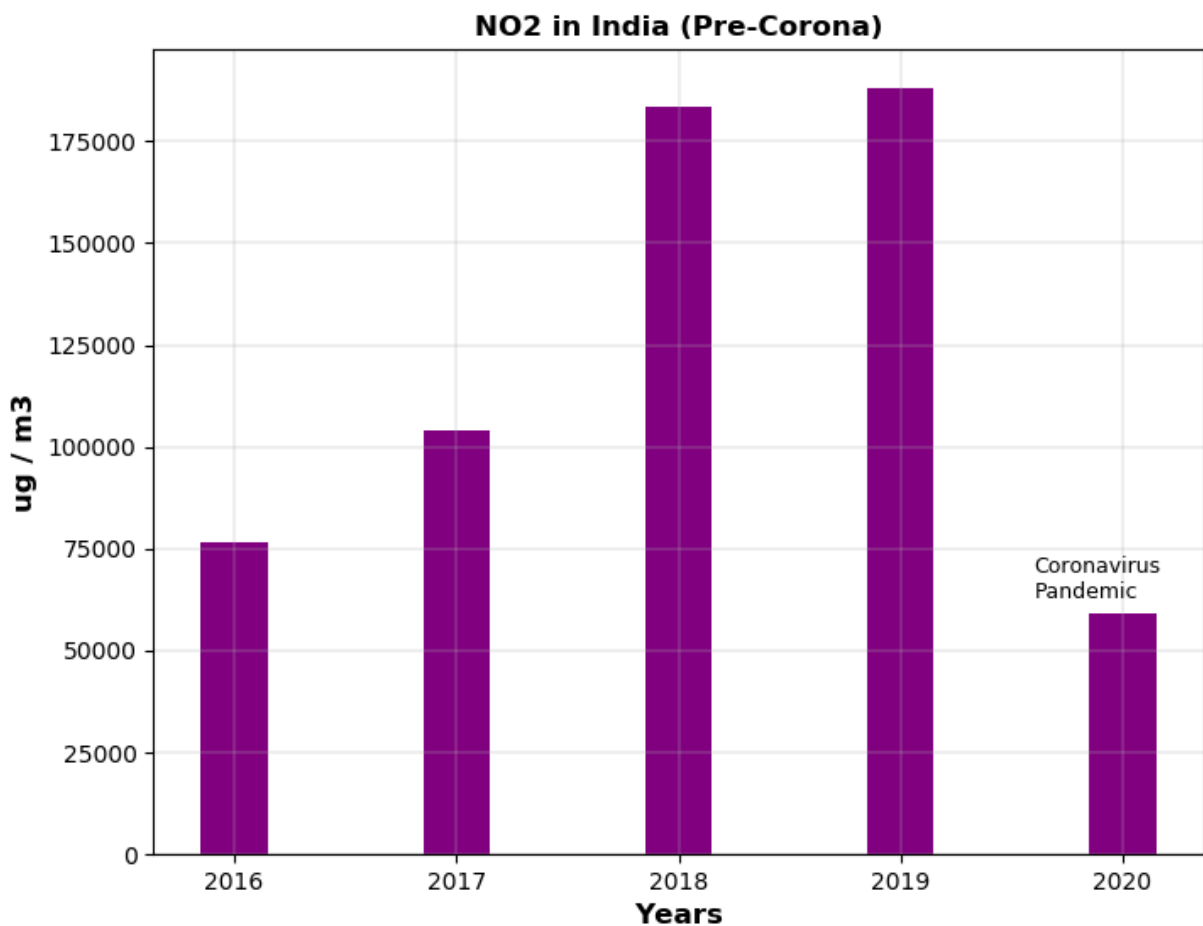
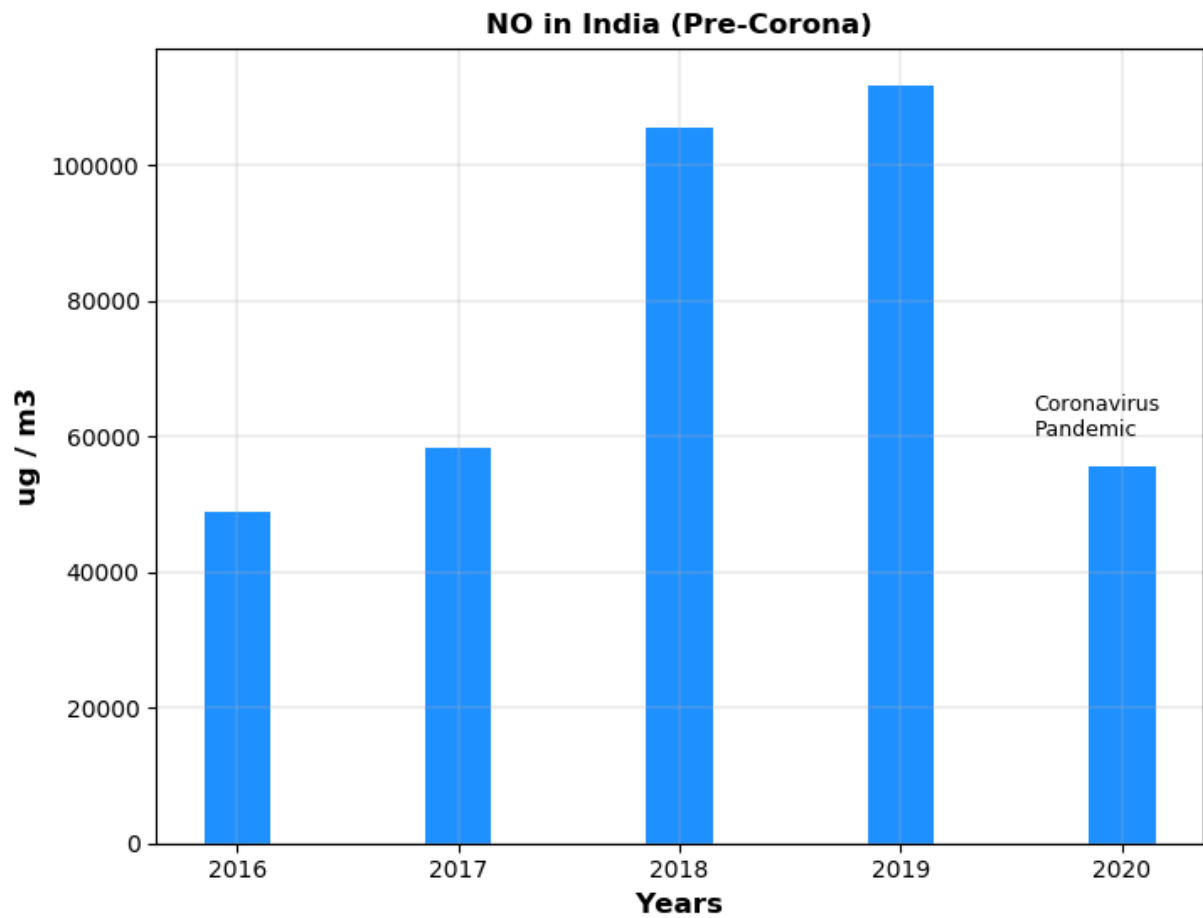
Year 2018 and 2019 shows the high atmospheric SO₂.

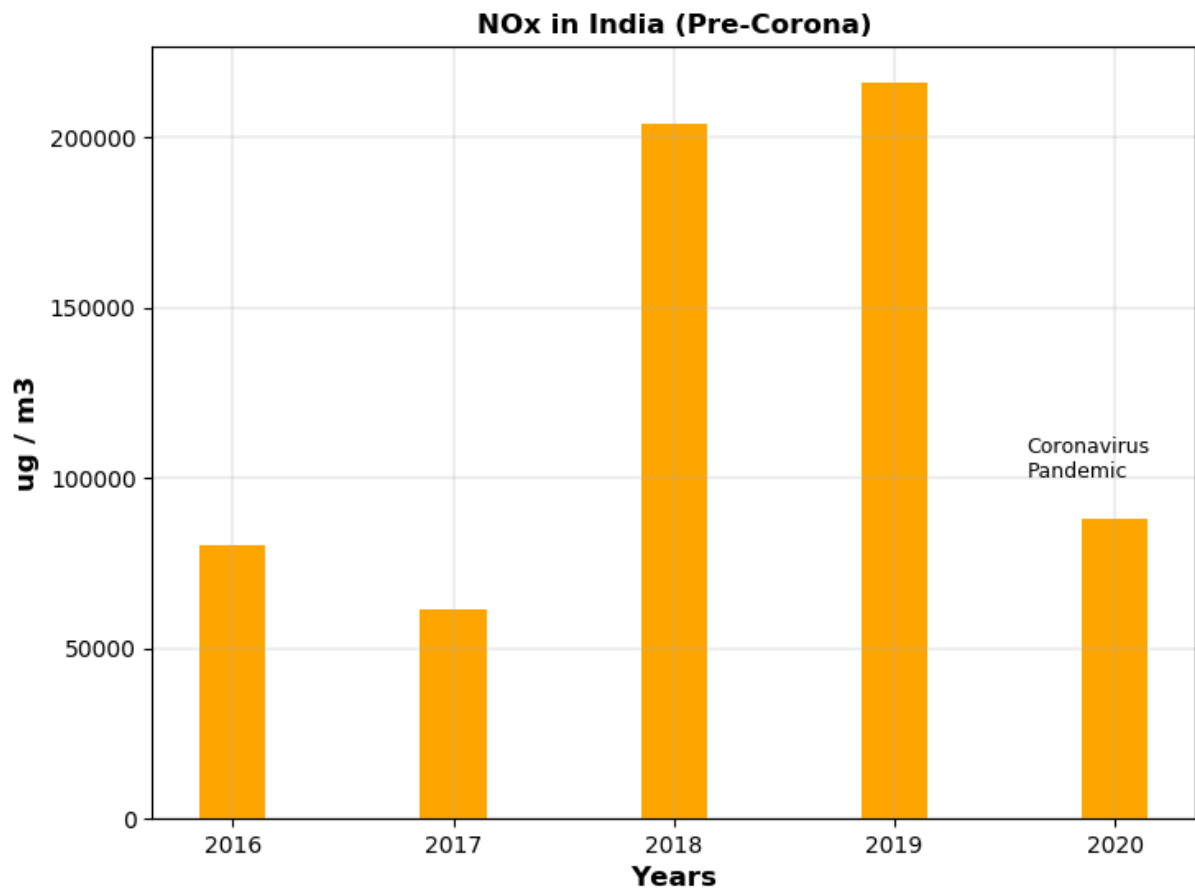


Oxides of Nitrogen (NO, NO₂, NO_x)

Oxides of Nitrogen cause lung irritation and weaken the body's defence against respiratory infections such as pneumonia and influenza. In addition, they assist in the formation of ground level ozone and particulate matter.

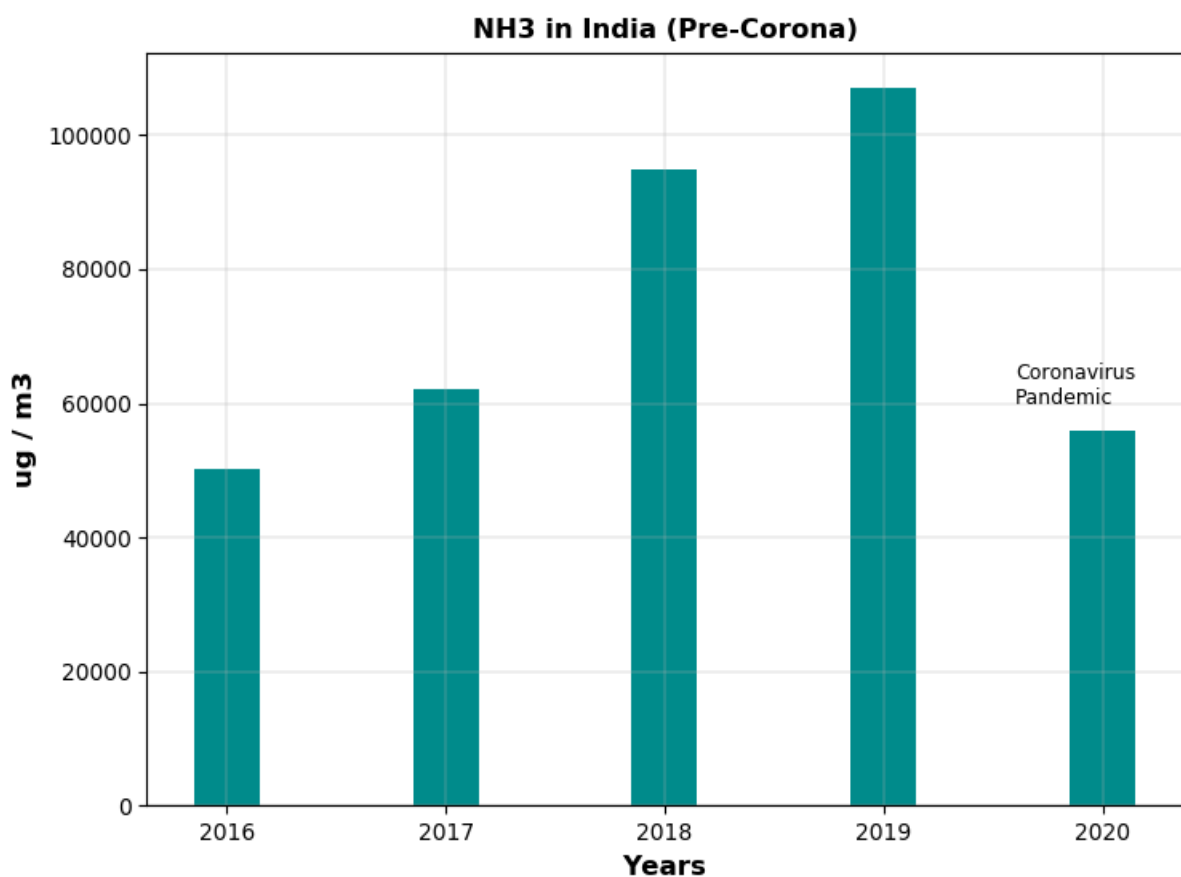
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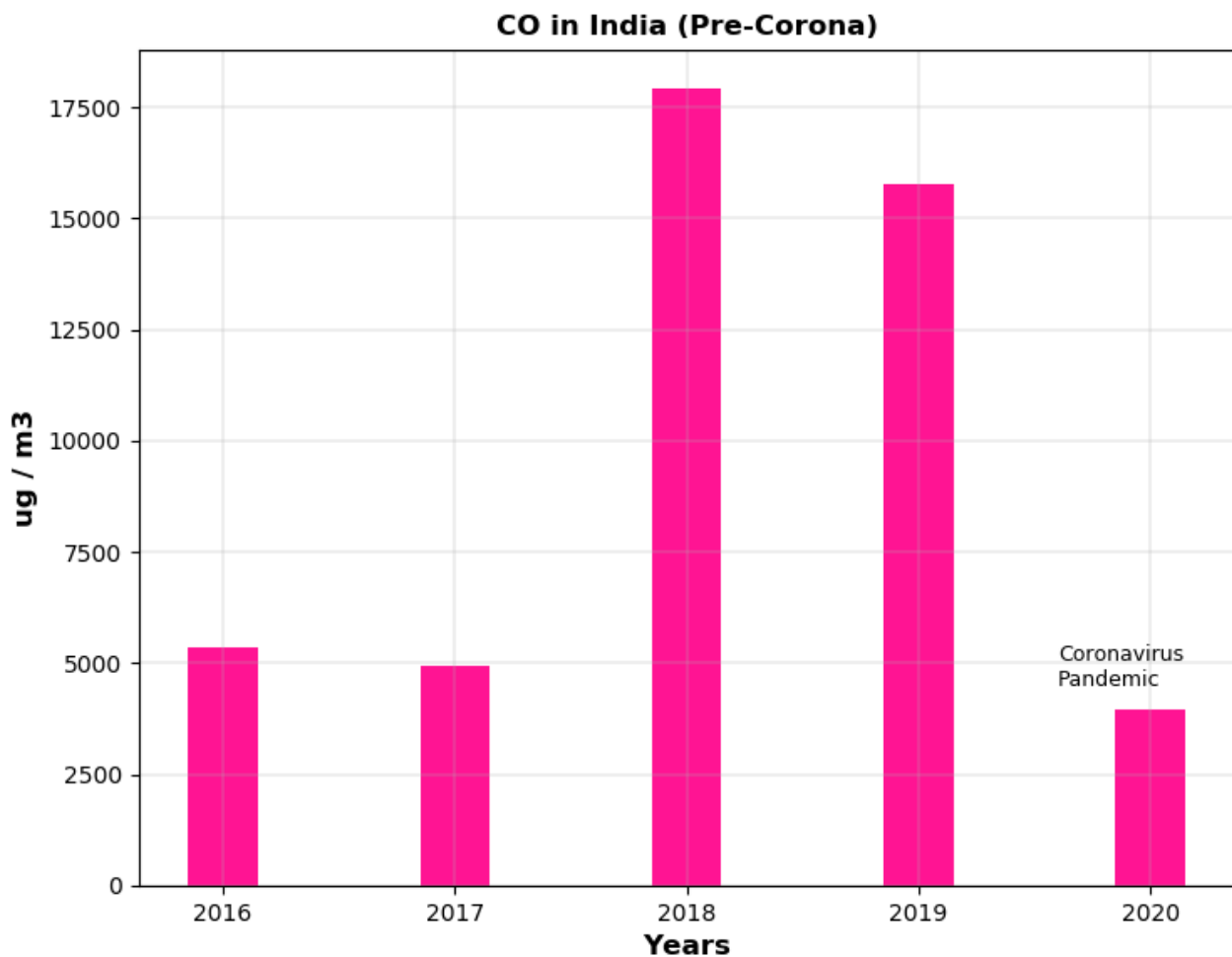
Ammonia (NH₃)

Chemical ammonia (NH₃) is a compound of nitrogen and hydrogen which is a by-product of agriculture and industry.



Carbon Monoxide (CO)

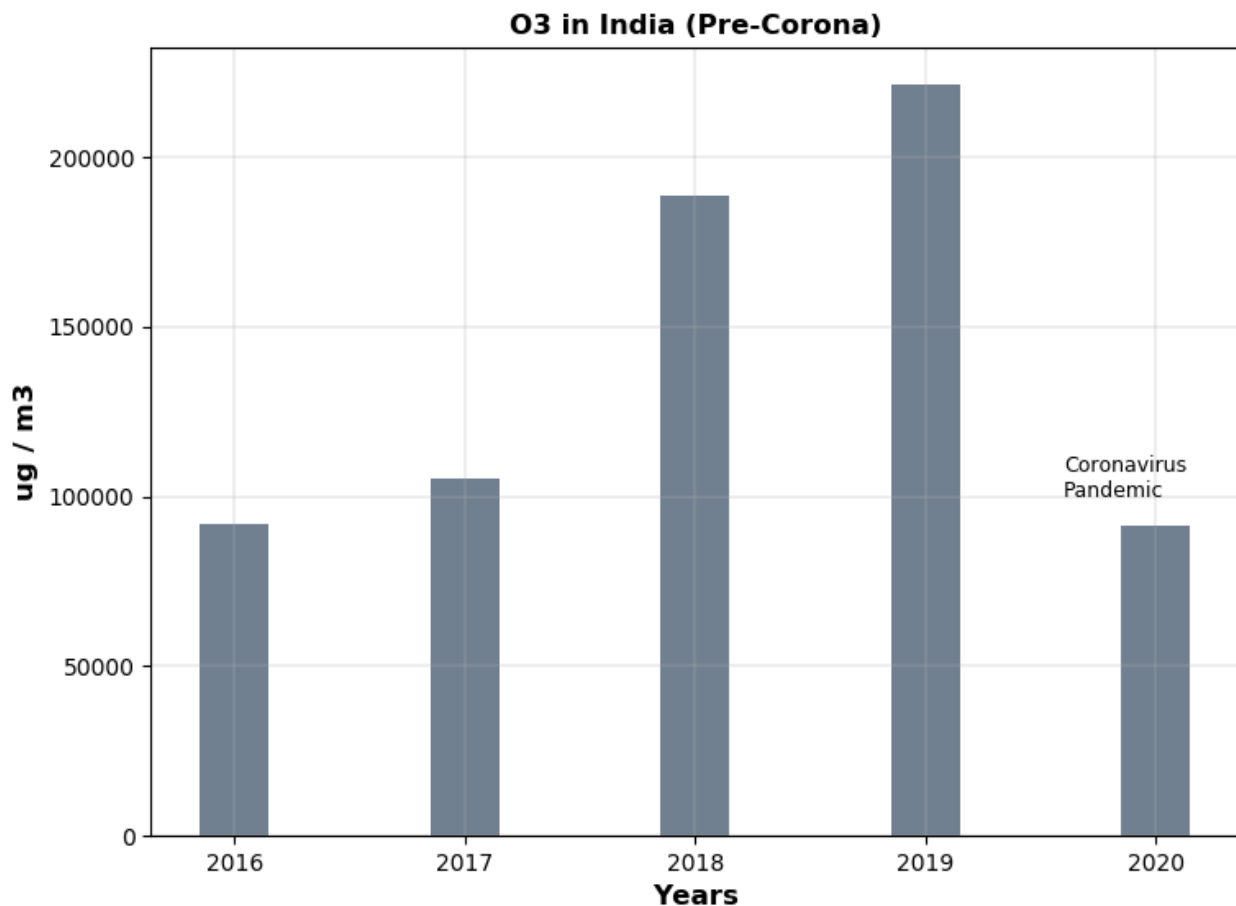
The highly poisonous gas is formed by the combustion of fossil fuels such as petrol, diesel in cars and trucks. CO blocks oxygen from the brain, heart, and other vital organs. Foetuses, new-born children, and people with chronic illnesses are especially susceptible to the effects of CO.



Ozone (O3)

It is produced when two primary pollutants react in sunlight and stagnant air. These two primary pollutants are nitrogen oxides (NO_x) and volatile organic compounds (VOCs). The Ozone (O₃) is highly irritating gas which is the main reason for air pollution deaths.

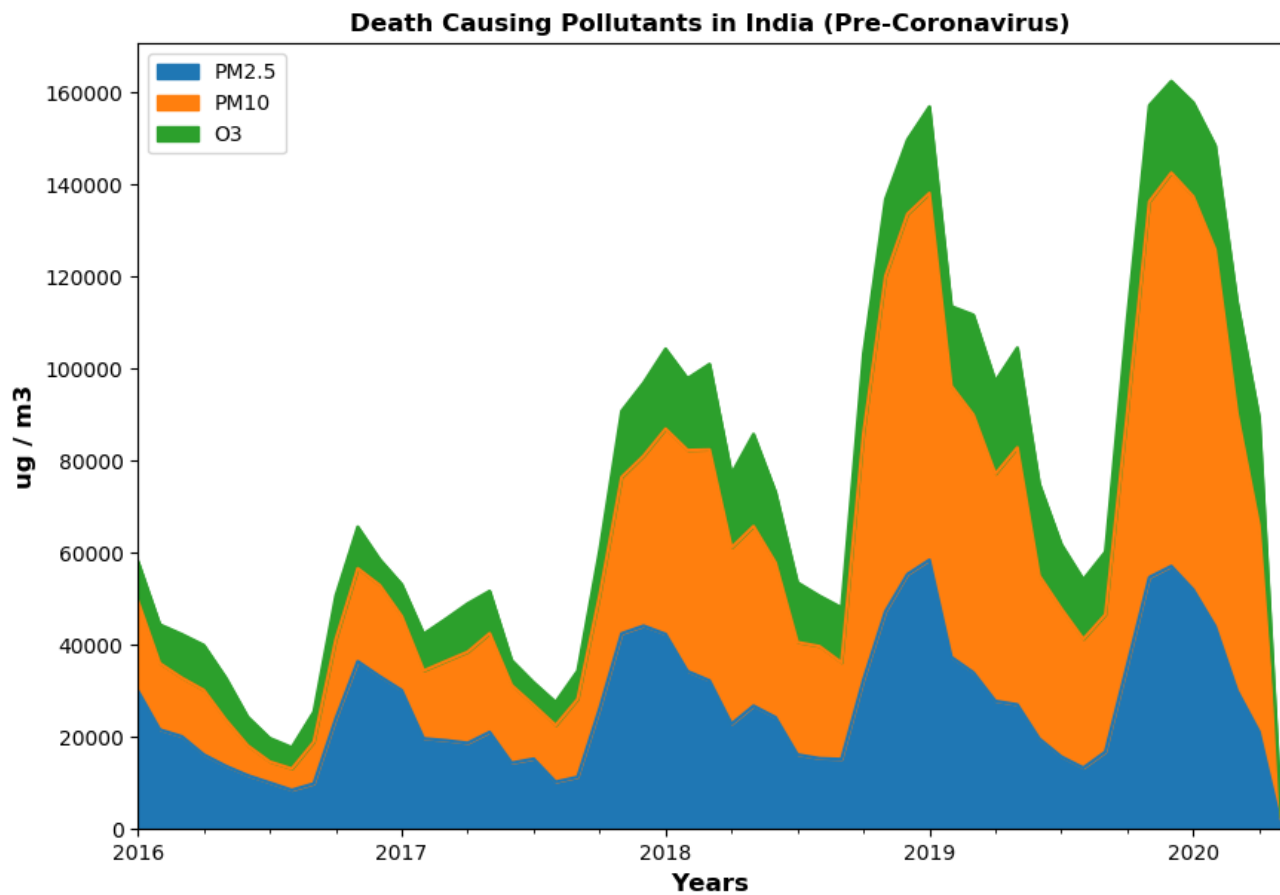
The O₃ level in India has been enormous in 2019.



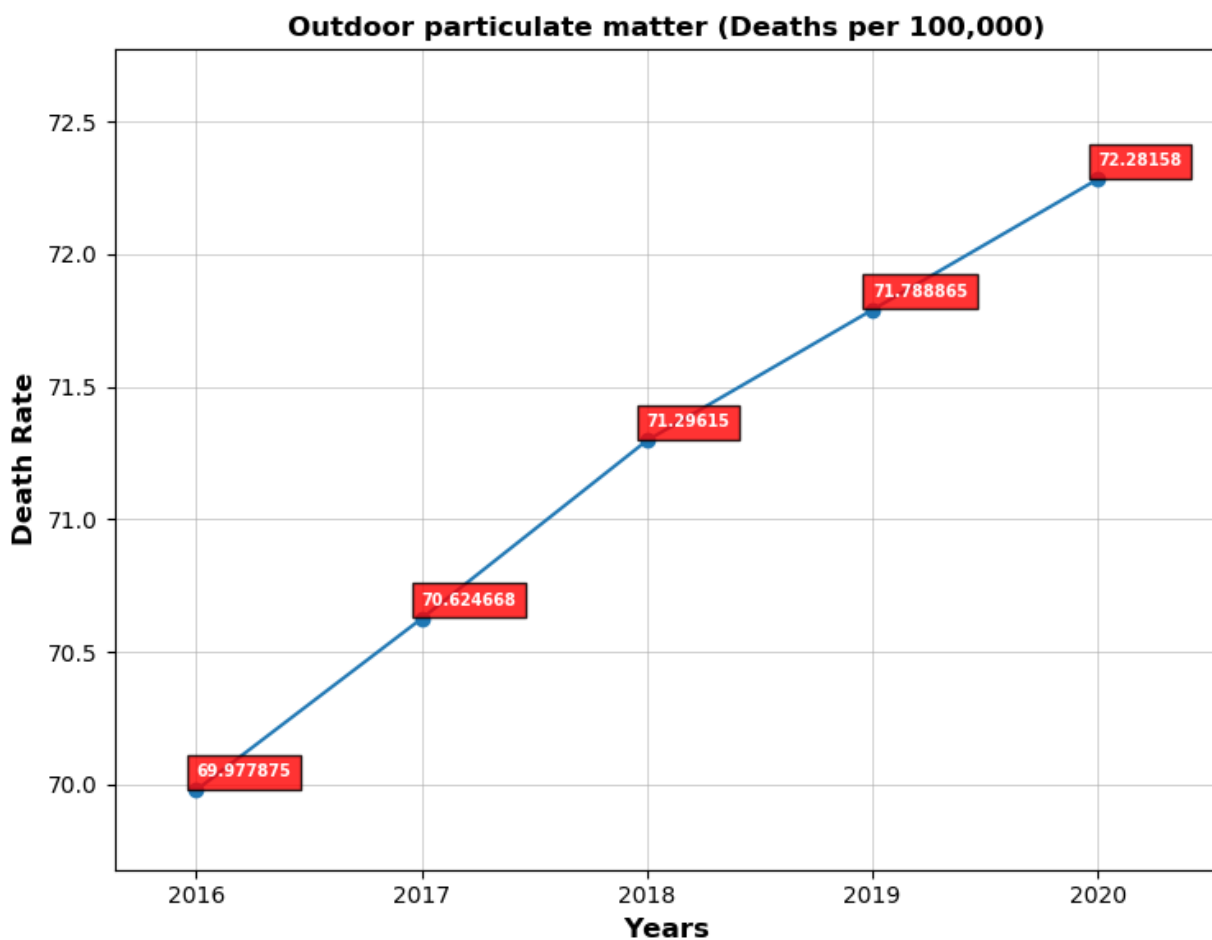
AIR POLLUTION IMPACTS

PM_{2.5}, PM₁₀, and O₃ pollutants cause serious health issues. The Particulate Matter cannot be seen in naked eyes, which is the major death causing pollutant in India.

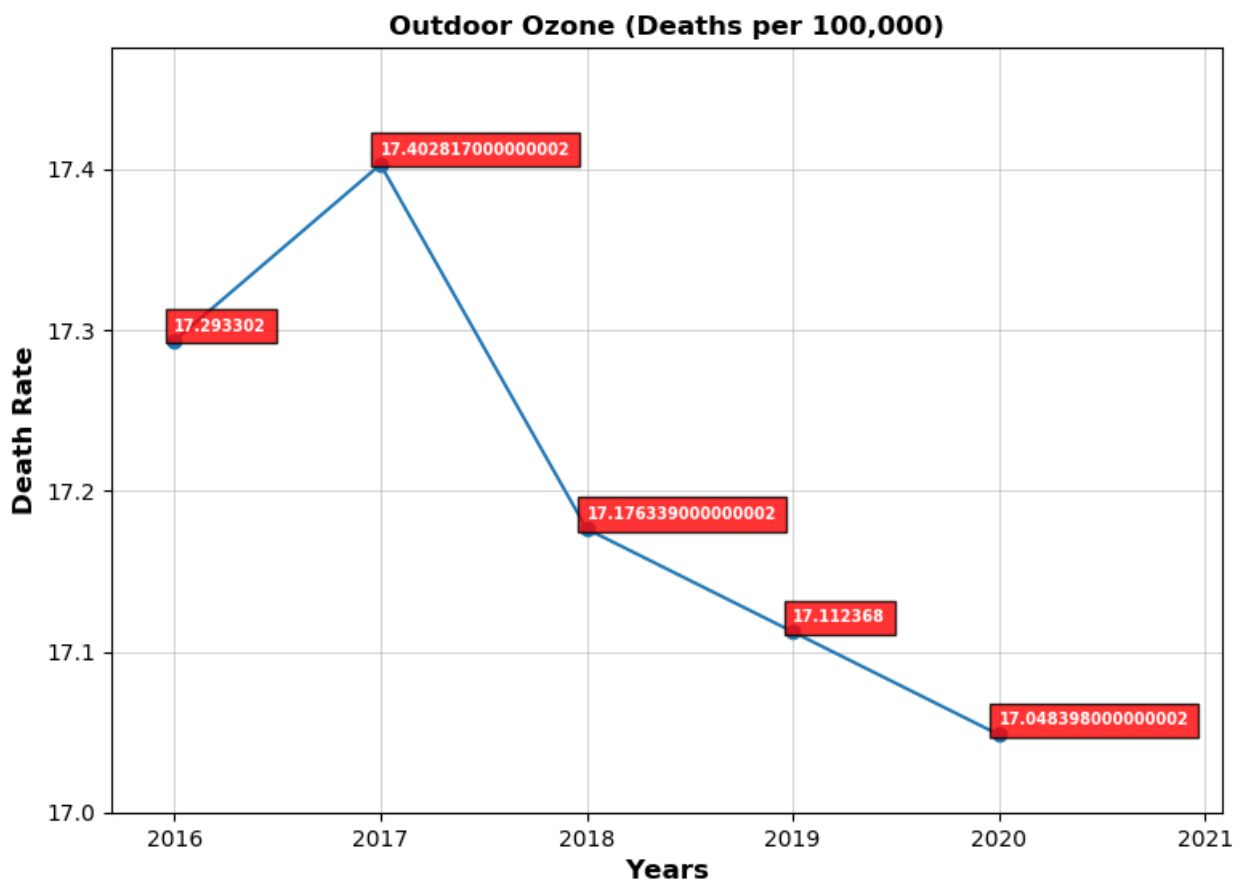
Death causing pollutant levels increased significantly over the years. The below chart of death-causing pollutants shows a steep decrease in the year 2020.



The death rate in India due to outdoor particulate matter (PM2.5 and PM10) have been constantly increasing from 2016 – 2020.



The death rate in India due to outdoor ozone (O₃) have been in constant at 17 deaths per 100,000



VEHICULAR POLLUTION

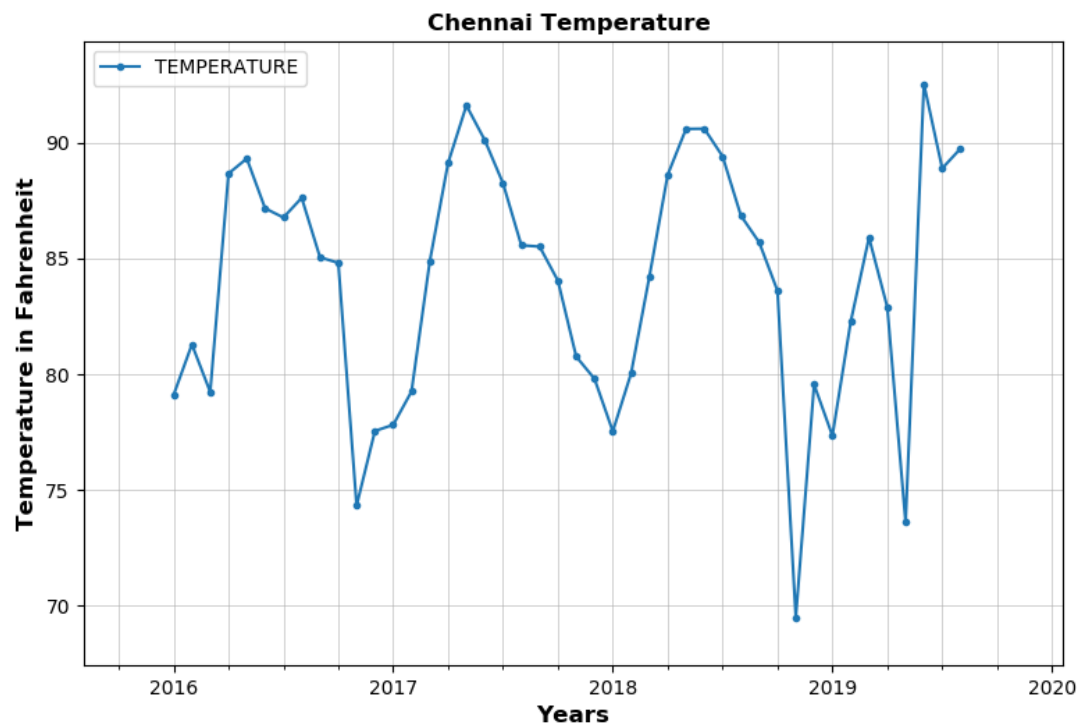
Vehicles release gas due to incomplete/complete combustion of fuel. This gas consist some amount of sulphur which in turn become oxides due to high atmospheric temperature and pressure.

Incomplete combustion of hydrocarbons results in the formation of a mixture of carbon monoxide (CO) carbon dioxide (CO₂) and water (H₂O). This cause intense high temperature and pressure.

Below is the temperature level of 4 metropolitan cities in India which shows the threat of global warming due to air pollution.

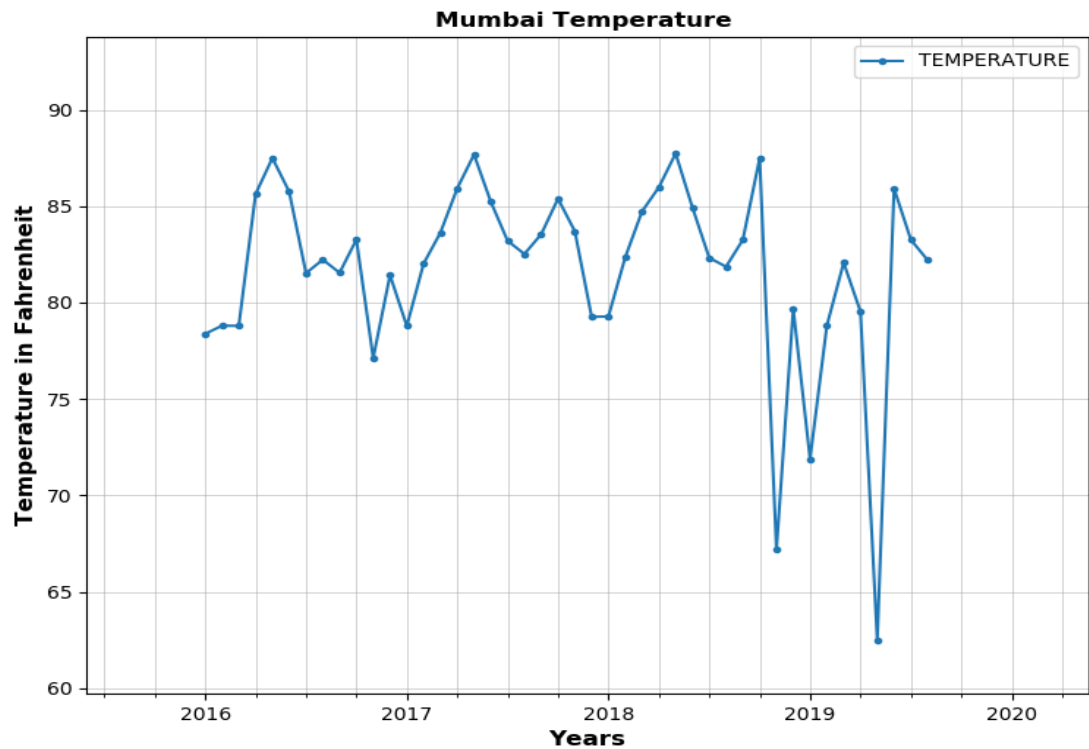
Temperature in Chennai

Located in the southern part of India, it frequently touches 90 Fahrenheit every year.



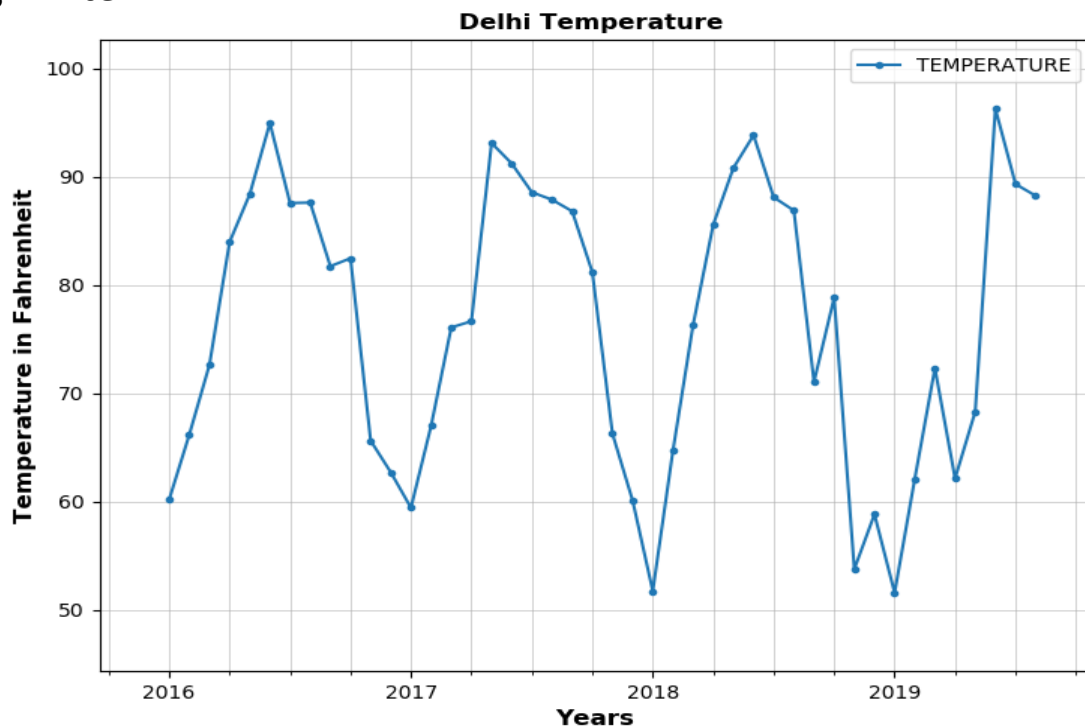
Temperature in Mumbai

Located in the western part of India, it hardly touches 90 Fahrenheit every year.



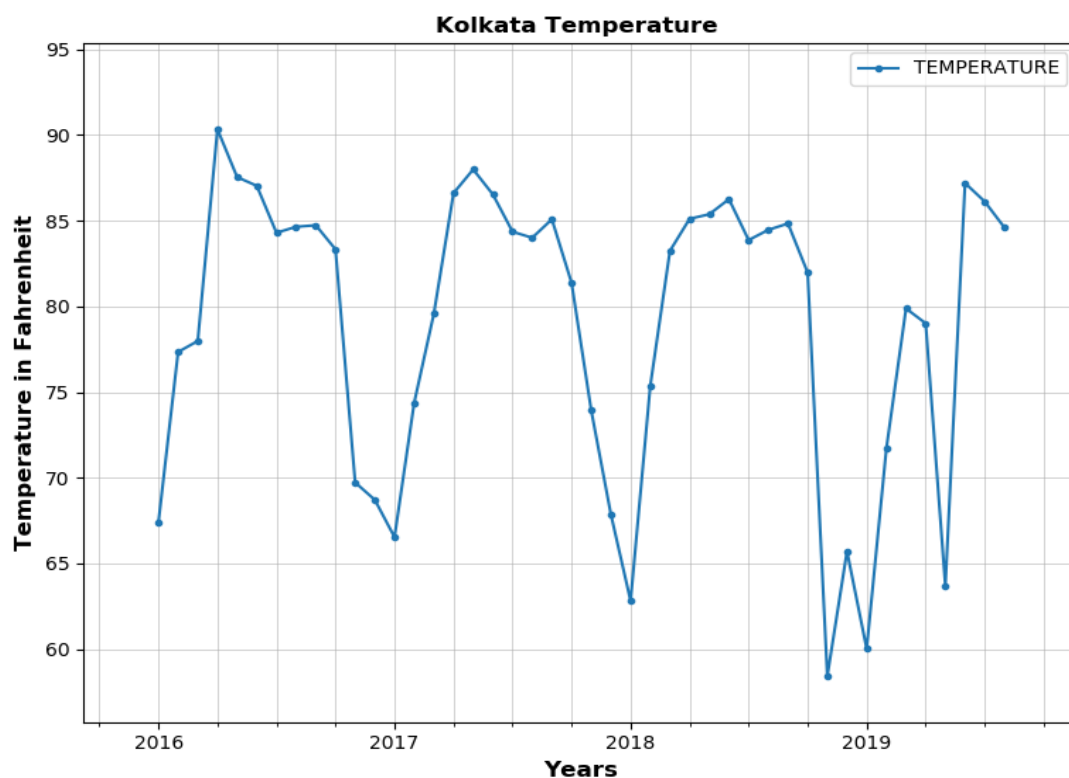
Temperature in Delhi

Located in the northern part of India, it frequently touches 95 Fahrenheit every year. Delhi shows significantly low temperature (55 Fahrenheit) during winter.

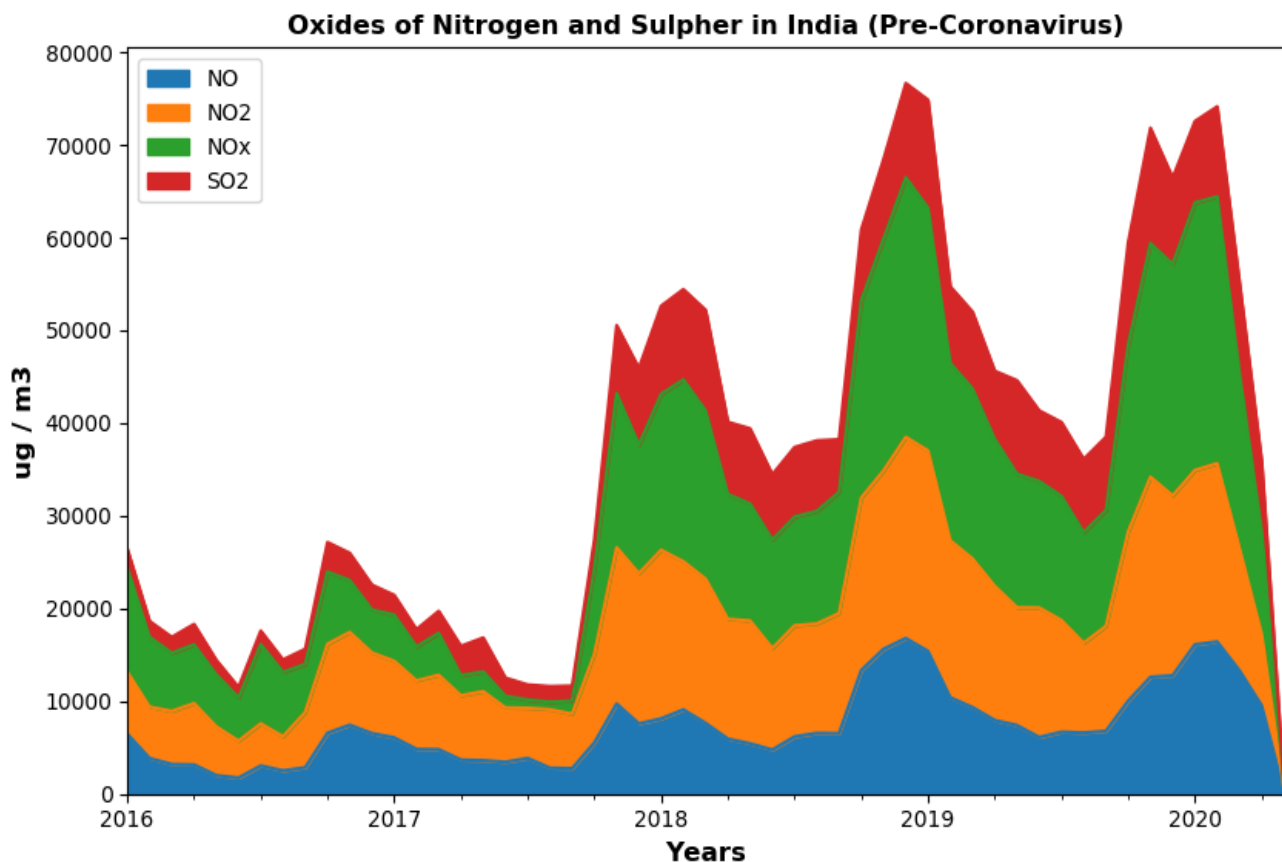


Temperature in Kolkata

Located in the eastern part of India, it frequently touches 85 Fahrenheit every year.



The very high temperatures and pressures from both the atmosphere and fuel combustion lead to the release of nitrogen oxides and sulphur oxides.

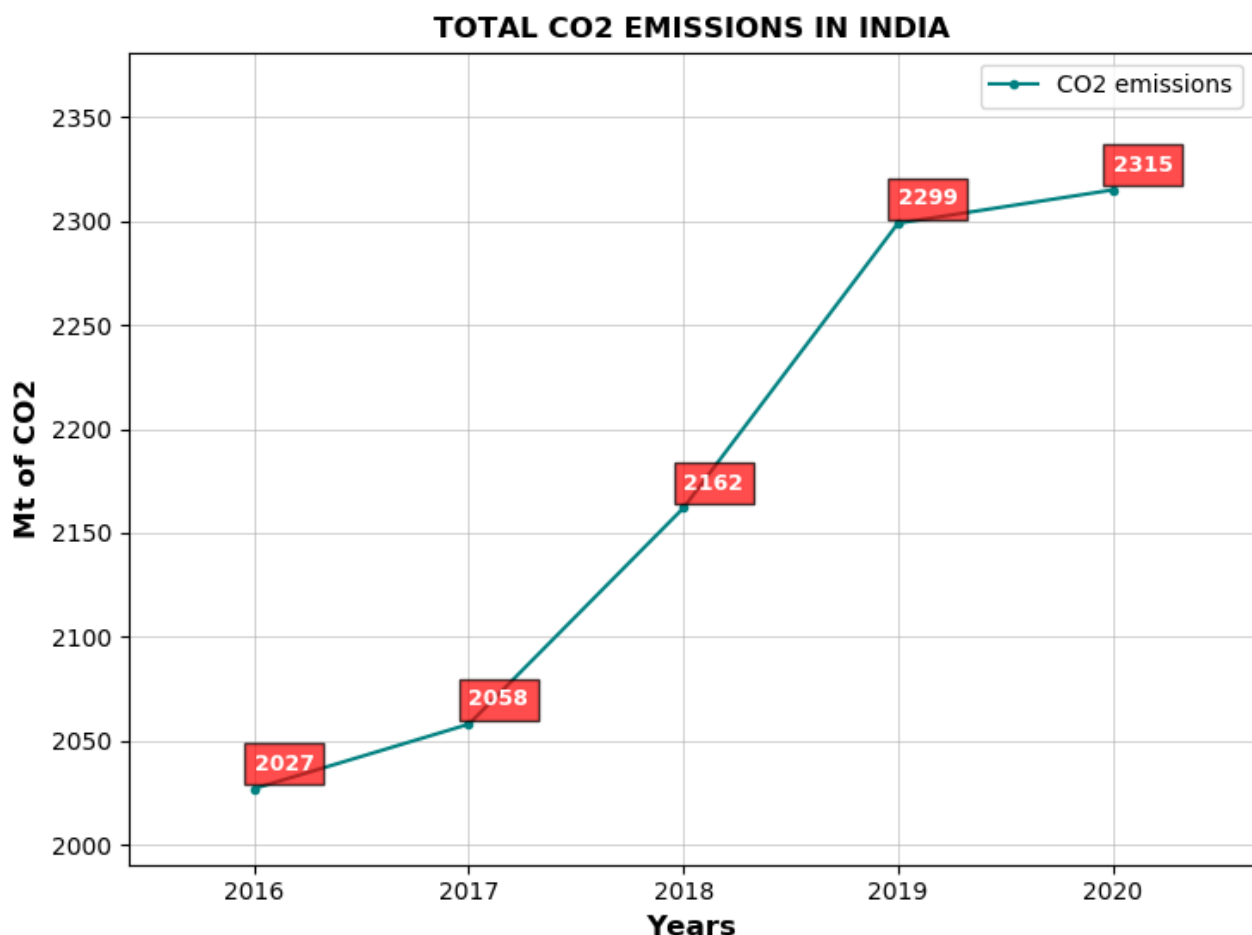


INDUSTRIAL AND VEHICULAR POLLUTION DUE TO RELEASE OF CARBON DIOXIDE (CO₂)

The thermal power industries, heat producers and other energy industries burn fossil fuel such as coal to generate power. This combustion of coal/fossil fuel release Carbon Dioxide (CO₂) which is the major pollutant for the cause of global warming.

The burning of fossil fuels releases carbon dioxide and other greenhouse gases. These carbon emissions raise global temperatures by trapping solar energy in the atmosphere.

CO2 emission in India has been increasing year by year. Emissions growth in India was moderate in 2019, with CO2 emissions from the power sector declining slightly as electricity demand was broadly stable and strong renewables growth prompted coal-fired electricity generation to fall for the first time since 1973.



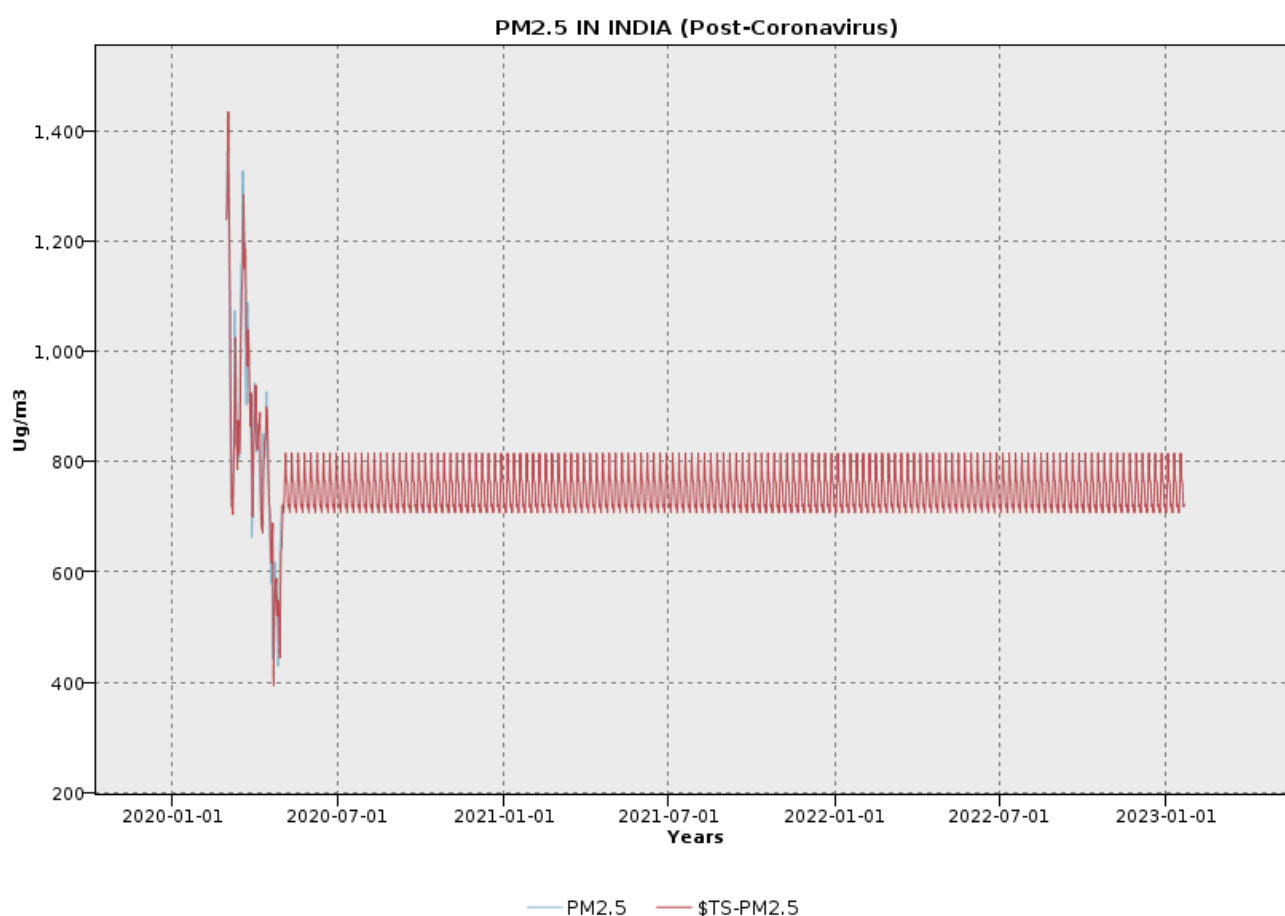
POST-CORONA (2020 – 2023)

Due to the Government guidelines on Coronavirus pandemic, we have been forced to stay indoors from mid of March. No vehicles on road, No industries running full-time. This definitely made some changes in the Air Quality Index of India.

Here I have taken the air pollutant level from March 2020 – May 2020 (Lockdown Period). Extrapolating this data till 2023, we have got the answer to the question “What if this lockdown period persist till 2023?”

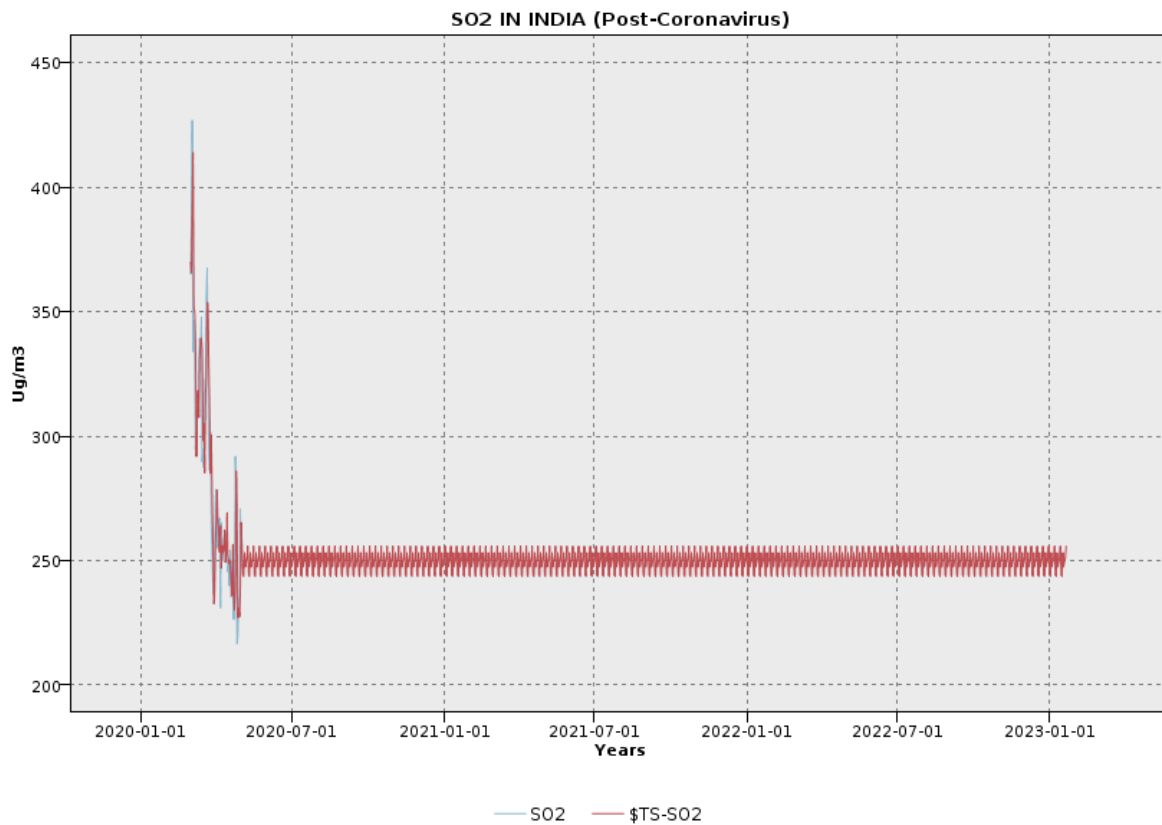
Particulate matter (PM2.5)

Extrapolating the current lockdown shift till 2023, the PM level in India will probably maintain between 600-800 ug/m³ (per-day).



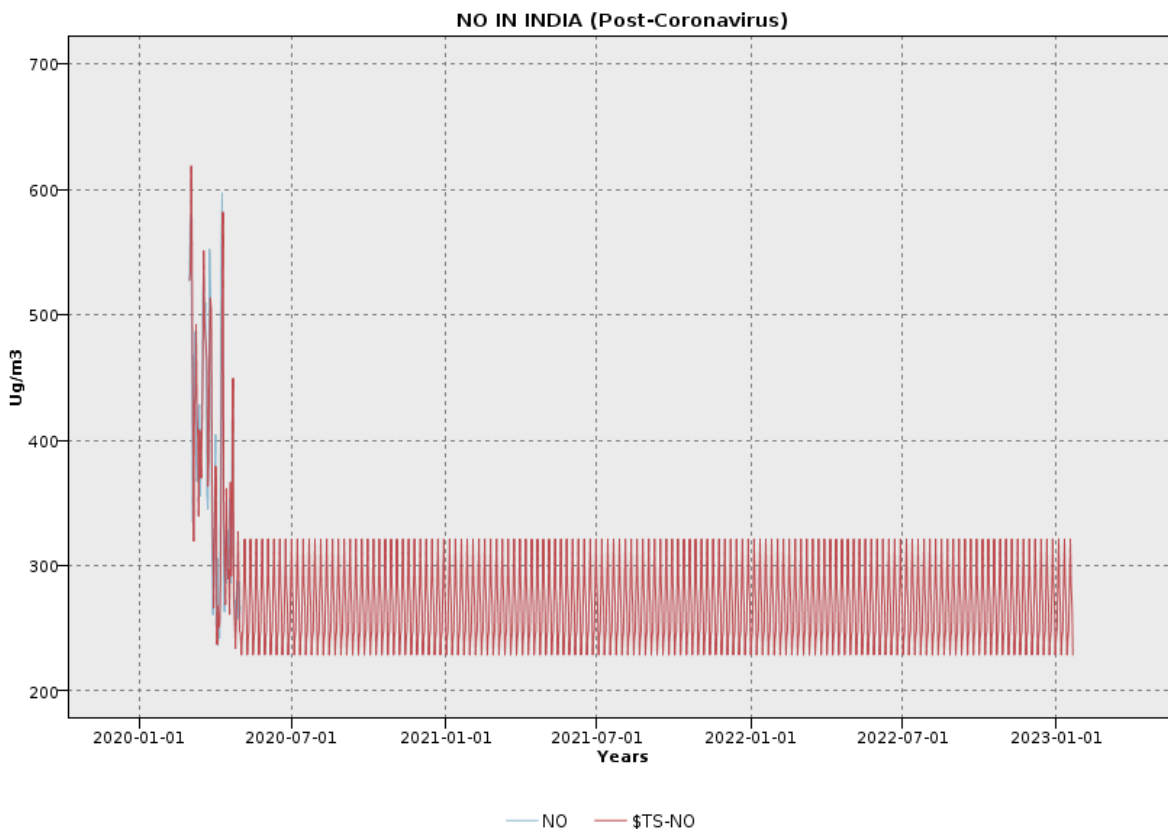
Oxides of Sulphur (SO2)

Extrapolating the current lockdown shift till 2023, the SO₂ level in India will probably maintain between 200-250 ug/m³ (per-day).

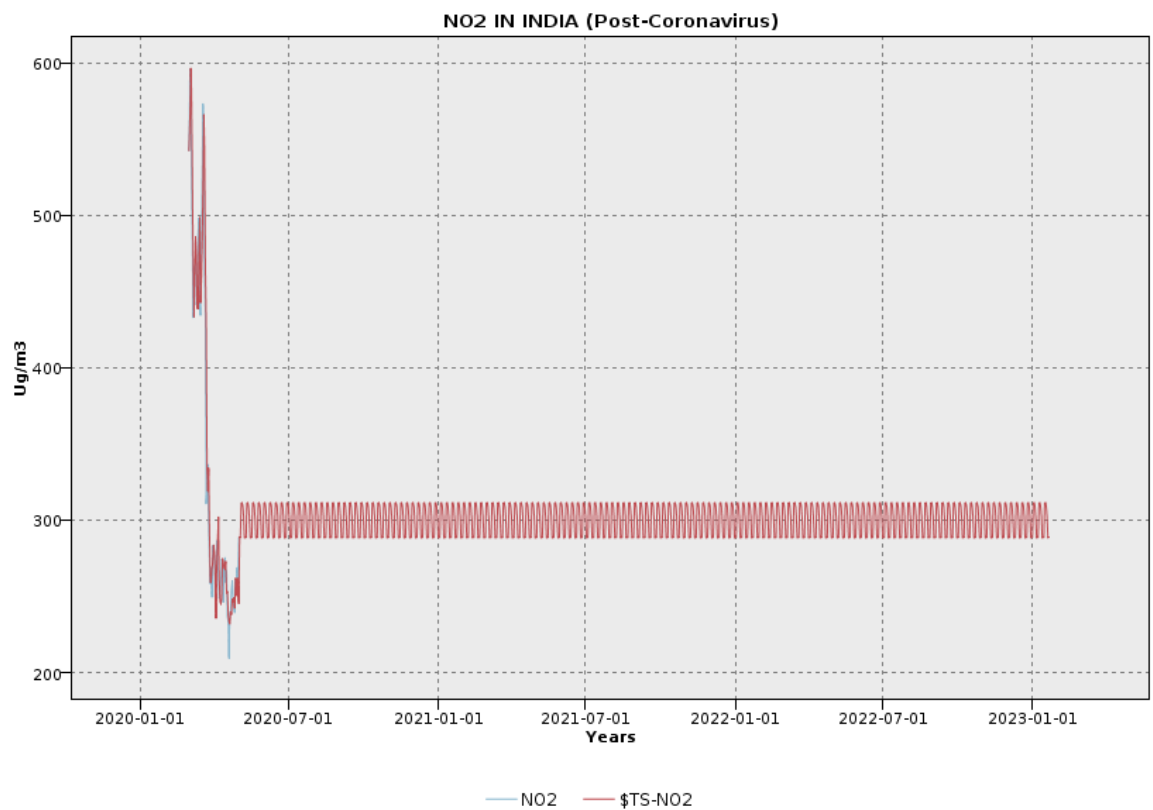


Oxides of Nitrogen (NO, NO₂)

Extrapolating the current lockdown shift till 2023, the NO level in India will probably maintain between 200-300 $\mu\text{g}/\text{m}^3$ (per-day)

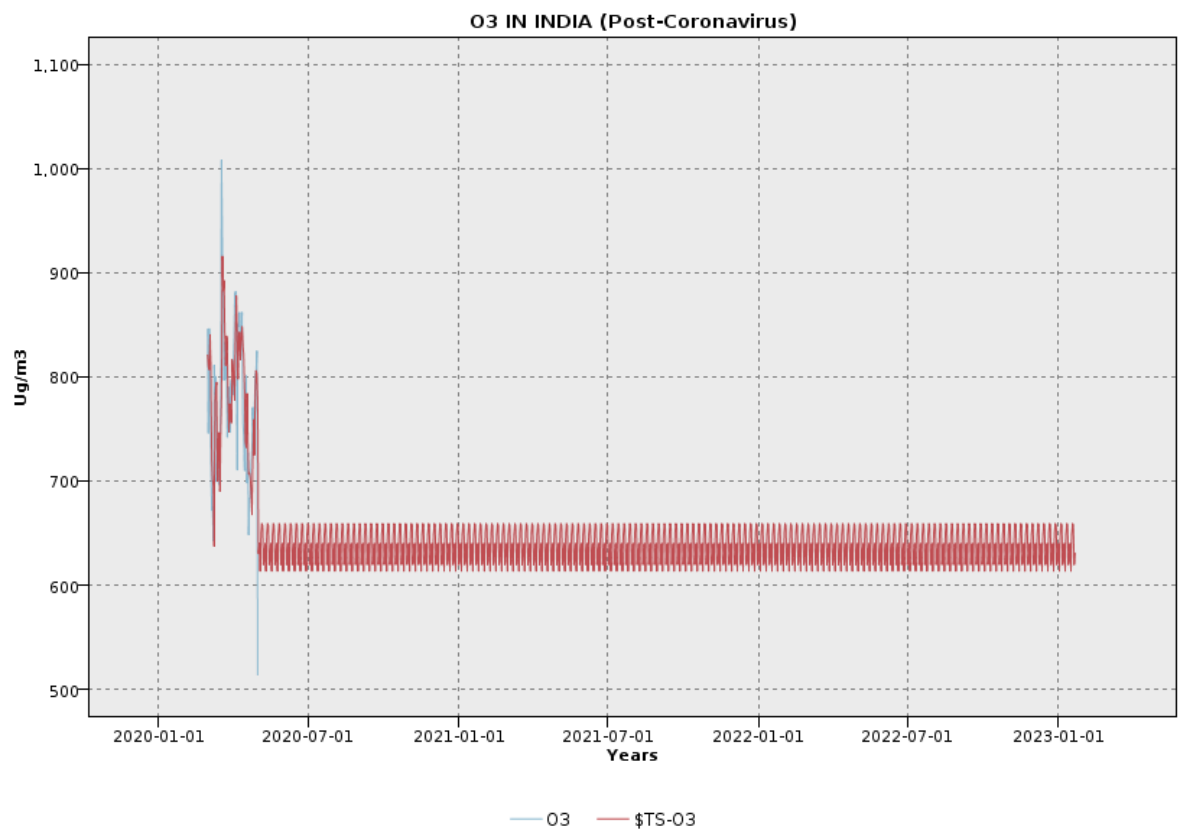


Extrapolating the current lockdown shift till 2023, the NO2 level in India will probably maintain between 250-300 ug/m3 (per-day).



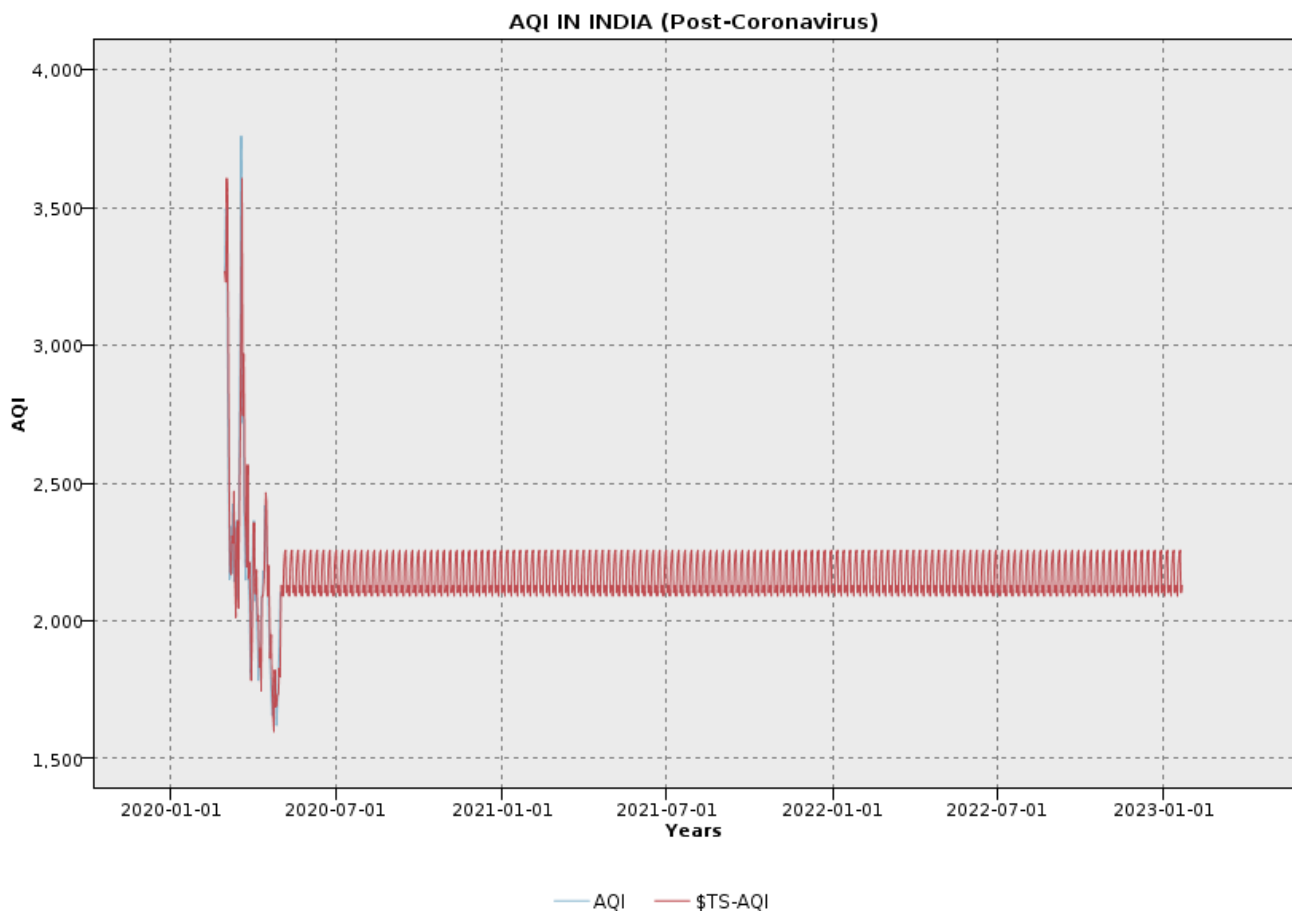
Ozone (O3)

Extrapolating the current lockdown shift till 2023, the O3 level in India will probably maintain between 600-650 ug/m3 (per-day).



AIR QUALITY INDEX (POST-CORONA)

An air quality index (AQI) is the quality of air which shows us how polluted the air is or how polluted it is forecast to become. The health risks increase as the AQI rises. Extrapolating the current lockdown shift till 2023, the AQI in India will probably maintain between 2000-2500 (per-day).



SUMMARY

There are so many pollutants present in the air which includes Particulate matter (PM_{2.5} and PM₁₀), Oxides of Nitrogen and Sulphur, Carbon Monoxide, Ozone, and Ammonia. In the Pre-Coronavirus period (2016-2020), there has been a consistent increase in the level of all the pollutants. The population in India, usage of the extensive amount of electricity and fuels increase the presence of air pollutants. Due to this, the death rate (per 100,000) has also been increasing yearly. The O₃ and Particulate Matter are the two major death-causing pollutants present in the air. Vehicles release a numerous number of pollutants. Carbon monoxide is the deadliest. Air pollution is the major cause of global warming. The atmospheric temperature touches 90 Fahrenheit in North India (Delhi), South (Chennai), East (Kolkata), and West (Mumbai). The atmospheric heat and the combustion of fuels in vehicles release Oxides of Sulfur and Nitrogen. The thermal power industries, heat producers, and other energy industries burn fossil fuels such as coal to generate power. This combustion of coal/fossil fuel releases Carbon Dioxide (CO₂). India releases 4-8% of CO₂ every year. 2019 is the year where India released comparatively less CO₂. This is because of the strong growth in renewable energy.

During the Coronavirus pandemic period, the graphs show the levels of all the pollutants present in the air are very low. The lockdown made people stay indoors. No vehicles on the road and No industries are running full-time. The emission of CO₂ in India reduced significantly, for the first time in 4 decades. Extrapolating the current lockdown shift till 2023, the prediction shows that the air pollutant level will maintain at 50% less as what it had been in the pre-corona period. When the air

pollutant levels reduce dramatically, the impacts which are caused by air pollution in our lives will also reduce.

This pandemic period will surely end someday and soon this lockdown will end. This means there is a high possibility that this prediction will be true only for a small period and not till 2023. In India, the government and people take so many steps to reduce the level of air pollution. One of which is known as “Carpooling” a group of people who travel together to work or school in a car. Having fewer cars on the road means reduced Greenhouse Gas (GHG) emissions and improved air quality. Although if lockdown is released we people are advised to main social distancing for the next 2 years. So in order to maintain social distancing, not many people can travel together, which automatically will increase the number of vehicles on the road. So the changes post-corona with respect to air pollution seem bad. Once this lockdown is over we need to make sure that we don't use our vehicles frequently. This will be hard but, if we prioritize our work the need for vehicles will be reduced.

REFERENCES

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