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Imparity in air quality index (Pre - Covid vs Post-Covid): A head-turning review

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Abstract:

Industrialization and Covid-19 - the two pillars showing the world adverse effects of air pollution and also on the other hand improvement of air index over the globe. During the pre-covid period the world saw industrialization and modernization paving path to air pollution. This 2019 pandemic still on-going did take millions of lives but healed the mother nature thus reducing pollution due to air pollutants (PM 2.5, CO2, NOx, SO2). Such adverse situation and lockdown over the world have taught people self-independence in their lives thus reducing the dependence on technology and annihilating all the possible pollution due to industrialization and automobiles: the new normal. This review solely focuses on the analysis of air index quality pre versus post covid and thus accepting the new normal for the healing of earth.

Keywords: Air pollutants, Air Index recent count, pandemic, lockdown, industrialization, new-normal.

1. Introduction:

The novel coronavirus started in Wuhan city, China in late 2019, and is now an ongoing global pandemic event. [2,20] 4,444 As of April 24, 2020, a total of 2,709,483 and 190,861 people were reported as confirmed cases and as total deaths, respectively. [21,2]

Sources of urban air pollution are generally associated with human activities such as traffic, cooking and power generation. [22] These resources are modifiable factors; emissions can be modulated by changing either the activity levels or the intensity of the source. [22]

While previous studies have assessed the effects of event-related phase changes in emission sources on air quality, social distancing measures implemented in

response to COVID19 provide a natural opportunity to observe and quantify the effects of modifiable factors, especially major activity shocks, on air pollution in real-time as shown in Table 6 [61] with unprecedented range, speed and duration.[22,23,24,25,26]

The main pollutants such as NO2 in the atmosphere are generated by transport and power plants. Comparison of particulate matter concentrations (PM2.5; for which Allegheny County has been at least partially unreached since 1997), [22,23] CO and NO2 during the postCOVID shutdown period (March 14 to April 30, 2020) with normal periods in 2019 and 2020. [22] In this article we use data from previously published research papers by both environmentalists and writers and the files of the Pollution Control Board to examine changes in activity during pre- and post-Covid19 blockades that have impacted air pollution.

MOST POLLUTED CITIES IN INDIA:	
Indian Cities	**PM 2.5 Values**
Kanpur	173
Faridabad	172
Varanasi	151
Gaya	149
Patna	144
Delhi	143
Lucknow	138
Agra	131
Muzaffarpur	120
Srinagar	113
Gurgaon	113
Jaipur	105

Patiala	101
Jodhpur	98

2. Pollutants and their comparisons (year wise)

There are numerous sources of air pollutants, especially prevalent in India. Some of the most dangerous ones include SO2, NO2, CO etc. Apart from gaseous pollutants, particulate matter (solid/liquid particles) are also responsible for serious air pollution. Sulphur dioxide is considered as a critical pollutant, because of its harmful effects on environment, especially that of acid rain. Nitrogen dioxide also contributes to this damaging phenomenon, destroying multiple buildings and monuments. Carbon monoxide has very harmful effects on human health, causing problems like headaches, dizziness, breathing issues etc. The pollutants we are going to compare on the basis of their pre-covid and post-covid emission rates are: NOx, SO2, CO2, PM2.5.

Air quality and pollution city ranking (18 October 2021, 18:50)

Countries	Air Quality Index (AQI)	Ranking
Sarajevo (Bosnia Herzegovina)	161	1
China	145	4
India	140	6
South Korea (Seoul)	63	37
United Kingdoms (London)	55	47
Spain (Madrid)	53	50
Thailand (Bangkok)	33	65
USA (NYC)	16	79
Germany	12	82
Australia (Sydney)	12	83

Norway	8	87

Index (Table 6):	
Colour	**Rank**
	1 - 3
	4 - 12
	13 - 52
	53 - 93

2.1 CO2:

- The industrial revolution revealed that the worrisome growth of Carbon Dioxide (CO2) in the environment is now approaching levels that are 50% greater than before the widespread use of fossil fuels.Increase in population in developed countries like Australia with Co2 emission count 15.48 metric ton per capita while the developing countries like Brazil with Co2 emission count 2.04 metric ton per capita thus proving that more modern and technologically equipped a country is more it emits greenhouse gases.[Table 2] The industrialization had a great effect on the commerce of the world but it definitely increased the air pollution and thus theincrease in graph for the air pollutants emission.

- The ongoing Covid period has shown the massacre and death of people with dying economy but it did show how restricted use of industrialization did change the geography of the world improving air quality. The cities of Delhi where mask was a must way before Covid-19, blue sky and clouds could be seen (Fig. 2.) . TheHimalayan ranges were clear even in monsoon season as seen from Punjab (Fig. 1.) Even though

the population graph never decreased the improvement in air quality was a boon in curse.

- Referring to Table 2 the decrease in CO2 emission observed throughout the worlds including both the developing and the developed country as observed in the same says how lockdown period has changed the world for the better. China, the world's largest CO2 emitter has shown remarkable change in 2019 i.e. 7.4,even it increased again from middle of 2020.

- For CO2 emission as most of it comes from combustion in industries and automobiles the countries around the world has shown remarkable changes thus proving it time and again that restricted use of industrialization and right use of technology saving the energies of the world can hugely help the world with its situation of pollution and thus global warming.

Classification	Population (2021 on going)	Countries	Air Quality	
			CO2 metric tons per capita	
			Pre - Covid	Post - Covid
Developing	45728184	Argentina	4	4.42
	791427	Guyana	3.13	1.94
	1397420489	India	1.8	1.9
	214491395	Brazil	2.04	2.25
	1446463533	China	7.4	8.12
Developed	5478880	Norway	7.03	8.89
	25879581	Australia	15.48	17.27
	84128107	Germany	8.55	8.52
	17183583	Netherlands	8.77	9.13
	333495437	USA	15.24	15.52

2.2 NOx:

- One of the main sources of oxides of nitrogen are Nitrous oxide, Nitrogen dioxide and Nitric Oxide. The main sources of NO2 in the ambient atmosphere are transportation, power plants, and lighting [52,53].Various studies have demonstrated that NO2 emissions cause ailments such as impaired lung capacity, early death, lung disease, worsened asthma, irregular heartbeat, and nonfatal heart attacks, all of which increase human mortality. Short as well as long term NO2 exposure can raise the mortality rate. According to records, the decline of air quality affects a total of 2.6 million people. [2, 36, 54]

- Sources are mainly from emissions from fuel run cars and factories thus highly modern and industrializedcountries like China,India and Brazil has seenremarkable high emissions which faced a lot decreasedue to the lockdown of the factories and use of lessprivate fuel run vehicles [Table 3]. Even though Brazilhas a huge difference in population with India it still hasquite high NO2 emission due to its industry andadvanced factories.

- Excluding India and Australia, countries in the Table3have all faced atleast 3 rounds of strict lock down withno access to far rides or much use of the roadways,saving up the fuel usage and less burning of whichprevents from further NO2 emission. China being thefastest country with the largest economy and populationthus largest vehicle users, the saw a sharp decrease ofNO2 emission from 538.79 to 269.39- showing howmuch the modern fuel run vehicles contribute to theworld's air pollution.

- The shutdown of numerous businesses and factories during lockdownperiod, as well as the digitization of many services, demonstrated that there was always a method to minimise pollution or global warming. Therelentless use offuels has cost humankind a lot and thus the massive ozone hole right above the Antarctic region.

Classification	Population (2021 on going)	Countries	NOx metric tons per capita

			Pre - Covid	Post - Covid
Developing	1397420489	India	253.79	149.74
	214491395	Brazil	179.2	182.8
	1446463533	China	538.79	269.39
Developed	5478880	Norway	9.7	9.09
	25879581	Australia	7.4	7.27
	84128107	Germany	86.82	84.76

2.3 SO2:

- The main sources of oxides of Sulphur are from theemission of combustion of fossil fuels like coal, oil, anddiesel due to the running of the vehicles and thefactories using fossil fuels for production of goods.Diesel vehicles are the largest emitter of SO2 also it isone of the gases emitted during natural calamities likevolcanic emitter. It causes secondary pollutants in theatmosphere.

- Population plays a very important role for the SO2related air pollution. Really high range of SO2 emissioncan be observed from the heavily populated countriesas seen from the Table 4. China being the biggestindustrial economy after which comes USA has shownreally high SO2 emissions throughout the years due thebig lash of lockdown and shutdown of factories theyfaced a decrease in the graph of SO2 emission annuallyas it decreased from 2263 kiloton per year to 2156 kiloton per year.

- As seen from the Table 4 both the developing and thedeveloped countries has faced enough step down interms of SO2 emission.USA being the largest economyhas shown remarkable decrease in SO2 emission countfrom 2018nto 2019 UAE the fuel hub also got a majorindustrial set back thus their decrease in SO2 count.

- With the onset of several periods of lockdown major airpollution causing pollutants have shown sharp decreasein their emission indicating towards the lockdown andshutdown in industries,export and import and thusimprovement in air quality.

Classification	Population	Countries	SO2 kilo ton per year	
			Pre - Covid	Post - Covid
Developing	6871547	Serbia	349	309
	1397420489	India	6329	5953
	214491395	Brazil	205	262
	1446463533	China	2263	2156
Developed	5478880	Canada	187	9.28
	84128107	Germany	69.57	67.9
	17183583	UAE	419	271
	333495437	USA	864	823

2.4 PM2.5:

- PM is the shortened form of particulate matter, which is a combination of solid particles and liquid droplets present in the atmosphere. Particles such asdust,dirt, soot, or smoke contribute to the formation ofParticulate matter. For PM2.5 they are fine inhalableparticles with diameter of around 2.5 micrometers andsmaller i.e.the breadth of a hair strand. They constitute different types of chemicals. Their main sources are from construction sites, unpaved roads,fields, smokestacks or fires. They are typically the consequence of complicated chemical processes involving sulphur dioxide and nitrogen dioxides.

- Developing countries have always shown a very highrate of PM2.5 always as seen from the Table 5 as inNepal, India and Brazil . The mark decrease of PM2.5has proved the improvement of air quality over

India.As we can see that the clear sky of Delhi, the busiestcity of India could be finally seen[Figure1]. TheHimalayan range could be seen [Figure 2] finallyafter years.

- Developed countries are better at controlling theirPM emission as they have better technologies forenvironment safety . Through the air quality data the PM 2.5 values can be recognized and thus measurescan be taken.

- Table 1 shows the values of PM2.5 emissions throughout the country in each cities. Kanpur withhighest PM2.5 rates and they have ranked in the topmost PM2.5 emitting cities around the world thusshowing why Delhi residents had to wear masks forbad air quality but the covid did decrease thepopulation but indeed improved the air quality [59].

Classification	Population	Countries	PM 2.5 micro gm per cubic metre	
			Pre - Covid	Post - Covid
Developing	29808707	Nepal	54.2	22.2
	1397420489	India	72.5	28.8
	214491395	Brazil	16.3	11.08
	141446478682	China	41.2	35.1
Developed	25879581	Australia	17	15
	84128107	Germany	13.1	7.4
	17183583	Netherlands	20	13
	333495437	USA	9.1	5.5

3. Causes:

3.1 Caused by Natural Activities:

Such causes include natural incidents such as wildfires, volcanic activity, and dust/sand storms. In large open areas with negligible or no vegetation and which are particularly dry due to a lack of rainfall, the wind can also cause dust storms. Such phenomenon can cause immense air pollution.

Volcanic eruptions act as a substantial source of natural air pollution. When an eruption happens, it produces large amounts of sulphur, chlorine and ash products, which are released into the atmosphere and can be collected by winds to be spread over a large area. In addition, compounds such as sulfur dioxide and volcanic ash are known to have a natural chilling effect, thanks to their capacity to reflect solar radiation.[58]

Animal digestion (especially by cattle) is another source of natural air pollution, resulting in the production of methane, another greenhouse gas. On warmer days, vegetation such as black gum, poplar, oak, and willow trees generate substantial amounts of volatile organic compounds (VOCs) in several parts of the world. These combine with main anthropogenic pollutants, notably nitrogen oxides, sulphur dioxide, as well as carbon compounds, to form low-lying seasonal hazes enriched in ozone. [58]

3.2 Caused by Human Activities:

Anthropogenic, or man-made, air pollution may be dated back to the invention of fire. While air pollution was less in those days compared to today, burning biomass in confined areas for home heating or cooking would have exposed persons to the danger of respiratory ailments and accidents. As human societies became more settled and burnt more biomass and fossil fuels (such as coal) indoors,

exposure to air pollution and its detrimental repercussions increased dramatically. [44]

Air pollution may also be produced by suspended particles in our air, both solid and liquid. These particles are known as aerosols. They can come out from truck exhausts, pollen, mould spores, wildfires etc. Such gases or particles canprove to be harmful for our health, hence must be kept incheck. Among the pollution-causing gases, ozone is one of themajor causes of air pollution. Being a greenhouse gas, it badlyreacts with our lung tissues, causing various health issues. Indeveloping countries like India, the major reasons for airpollution include vehicle exhausts, brick kilns, burning ofwaste openly etc.

Agriculture is also a cause behind air pollution. According tothe IPCC Fifth Assessment Report, agriculture accounts for24% of annualemissions. This figures, however, excludes the CO2 that ecosystemsextract from the atmosphere by sequestering carbon in biomass, deadorganic matter, and soils, which offsets around 20% of emissions fromthis industry. Population expansion and urbanisation have aproportionate relationship with trash generation, which leads to anincrease in demand for dumping sites located far from metropolitanareas.These locations thusbecame a significant source of methane production.[2,36,58]The main sources of NO2 in the ambient atmosphere aretransportation, power plants, and lighting [2,36,52,53]. Manystudies (Saeha et al. 2020; Humbal et al. 2019; Arden Pope etal. 2004) have demonstrated that signs of hazardous illnesses (i.e., impaired lung capacity, early mortality, lung disease, worsened asthma, irregular heartbeat, and nonfatal heart attacks) have been documented as a result of long exposure to hazardous components (i.e., nitrogen dioxide) (NO2).[2,36] Persinger RL, Poynter ME, Ckless K, Janssen-Heininger YM Mol Cell Biochem. 2002 May-Jun; 234-235(1-2):71 (55) reported the effects of long-term exposure

toNO2 on lungs (damage to epithelial cells) and respiratory functions. Faustini et al. said that short- and long-term NO2. [74] exposure can raise the mortality rateAccording to records, the decline of air quality has a substantial impact on a total of 2.6 million individuals identified respiratory andpathogenic consequences from air pollution exposure, and alsoproposed a relationship between air pollution and ill buildingsyndromes.[2]

4. Effects:

4.1 On Health Sector:

Most studies have found out that higher rates of COVID-19 infections and mortalities are caused by long-termexposure to air pollution, especially nitrogen dioxide andPM2.5. In a few countries of the world, a notable association has been established between air pollution and COVID19 infections and mortality. Available data also reveals that exposure to air pollution can influence the transmission of COVID19. Additionally, exposure to air pollution can increase vulnerability and have adetrimental impact on the prognosis of patients affectedby COVID19 infections.[18,19] A link between air pollution andinfectious disease transmission has been suggested[49, 18, 19]. For example, poor air quality was associated with ahigher death rate from SARS [50] and a higher incidenceof influenza [51]. In the laboratory setting, SARSCoV2has demonstrated stability in environmental aerosols,which can be a major source of COVID19 transmission.

4.2 On Plant Life:

Air pollutants have an unfavourable effect on plants; They can have toxic effects directly or indirectly by changing the pH of the soil, followed by the solubilization of toxic salts of metals such as aluminium. Particles have a negative mechanical effect. They cover the leaf blade,diminishing the penetration of light and blocking the entrance of the stomata. These obstacles greatly affect the photosynthesis

process, the speed of which decreases dramatically.

Tree leaves also play an important role in particle retention; they are more affected as wet and dry atmospheric deposition increases. [60]

For example: in presence of surplus ammonia, plantsmay exhibit symptoms such as burnt leaves, blackenedroots, and death of the plant. Chlorine is one of the majorcomponents causing acid rain, thus damaging the plantsto a huge extent. At high concentration, nitrogen dioxideis toxic to plants and can reduce their yield. When incombination with other gases such as ozone, sulphurdioxide, it may cause plant injury at lower concentrationlevels too.

5. Environmental Impacts:

5.1 Pre Covid:

- **Global Warming:**

  According to estimates, at thecurrent rate of increase, the average globaltemperature up by 3°C to 8°C in the next 100 years.This will affect the climate of different regions,distribution of plants and animals, disturbance inagriculture and food production, melting of snowcaps and resultant increase in sea levels. This willsubmerge parts of coastal cities of Calcutta, NewYork, London and other major cities. [57]

  Till 2017 the global surface temperature has reachedthe second highest after 1880 according to theweather reports of NASA. With a temperature of 1.62Fahrenheit which is warmer than the globaltemperature 2016 which is recorded the highest thusthe graph of global temperature never decreasedbefore Covid-19 pandemic. [57]

- **Formation of photochemical smog:**

When pollutants like hydrocarbons and nitrogen oxidescombine in the presence of sunlight, smog is formed.[17]This is a mixture of gases and since it is formed byphotochemical reactions, it is called thephotochemical smog[17]. 'smog' – smoke plus fog thusforms the word smog. It forms a yellowish - brown haze especially during winter andhampers visibility.[14] It also causes many respiratorydisorders and allergies as it contains polluting gases.

Post 'The Big Smoke' in December 1952 India encountered one of the densest smog at Delhi in the year 2017 thus furnishing to the sharp increase in theemission rates of PM 2.5 and PM 10 resulting in the downgrade in air quality - the PM2.5 exceeding the recommended 60 micrograms mostly out of the casual usage of fireworks during Diwali.Pre-Covid period thus showed the world themassacre due to smog in Delhi in India withuncountable deaths and illnesses.

- **Formation of acid rain:**

Sulphur dioxide and nitrogen oxides react with water in the atmosphereproducing sulphuric acid and nitric acid.[16] These acidscome down along with the rain. This phenomenon iscalled acid rain. The pH of acid rain varies from 3-6.[14]The composition of acid rain is sulphuric acid, nitricacid and weak carbonic acid. Its adverse effects onthe environment include: causes respiratory and skindisorders, affects productivity of plants by damagingthe leaves, enters the soil and affects the soil, pHand causes leaching, enters the ground and riverwaters which causes harm to the aquatic life,

causesdamage to marble and thus damages buildings andmonuments (like Taj Mahal). [15]

Taj Mahal and its surrounding area surrounded theYamuna River valleys had many factories set up overthe years thus contributing to the Sulphur dioxideand nitrogen dioxide in those areas , because ofwhich they suffered acid rain thus reacting withmarble structure i.e. the calcium carbonate leadingthe yellowing of the structure . Therefore in 2017acid rain was still problem that ruined the soil qualityand thus the crops. The pre-covid was very harsh tothe world health in all aspects which was a bitreplenished in the post-covid period.

- **Depletion of Ozone:**

The stratosphere of the atmosphere has ozone (O3). The stratosphere of the atmosphere has ozone (O3). Ozone protects us from the harmful effects of the UV rays by absorbing theultraviolet (UV) rays present in the sun's radiation. However, the pollutants, hydrocarbons such as the chlorofluorocarbons (CFCs) destroy the ozone molecules, which deplete the ozone layer. Ozone holes have been detected in the atmosphere, which permit the UV rays to reach the earth's surface. The harmful effects of the UV rays are visible in the countries such as Australia and New Zealand where the rate of skin cancer is higher than the other regions of the world [14].The detrimental consequence of the UV rays are blatant in the countries like Australia and New Zealand where the rate of melanoma is higher than the persisting global citizenry.

The ozone hole saw its peak at September 2017 thus

marking an area of the two and a half times of thecontinent of USA. Thus, an environmental issue thatnever healed or was stagnant in its size. It hasalways increased annually thus risking the worldhealth and the global temperature for survival ofhumankind.

5.2 Post Covid:

- **Global warming:**

The global response to the COVID-19 pandemic has led to a sudden reduction of bothGHG emissions and air pollutants [70]. There has been reduction of global emissions for the timespan of the first half of the year 2020 which was detected using mobility data.

- **Formation of photochemical smog:**

The winter period of 2020-21 witnessed the bit by bit resumption of economic activities following the pandemic of the new coronavirus disease (COVID19). Smog episodes, if PM2.5 levels stay in the severe category for three consecutive days, in the Delhi capital region were fewer and shorter this winter compared to the previous two years, the study revealed. The previous winter had three smogEpisodeseight, six and five days. The winterof 2018-19 had four smog episodes of 10 days, twoepisodes of six days and one lasting three days. Theregion witnessed two such episodes this winter [11] —thefirst started on November 3 and lasted seven daysand the second started on December 22 and lastedthree days. [10, 11, 12, 13, 72]

- **Formation of acid rain:**

Over the time span of 25 years, reports suggest that acid precipitation, rain orsnowfall with a pH value equal to 5 or less, reducedin terms of frequency and

concentration.Between theperiods 1989-1991 and 2017onwards, the depositionof wet sulphate, which is a common acid rainindicator, dropped by 68%.In 2019, annual SO2emissions were just 0.97 million tonnes, a 94%reduction compared to 1990.The benefits to humanhealth were equally significant.[9]. An analysis of thebenefits and costs of the 1990 Clean Air Act done in2011, estimated that the adult mortality riskdecreased significantly due to improved air quality,with up to 230,000 premature deaths prevented in2020 due to less exposure to SO2 and NOx levels.[59]

- **Depletion of Ozone:**

The positive effect of global lockdown has been observed in the last months. The shrinking pollution due to the lockdown aided the Earth's Ozone layer to heal itself.

6. Current scenario:

Through this review paper of

Imparity in air quality index (Pre-Covid vs Post-Covid): Ahead-turning review

we have covered the whole situation of air pollution before the novel coronavirus pandemic and after the same. The unprecedented occurrence of the pandemic throughout the world which started asan endemic from Wuhan, China had grasped the whole world into a collapse and a total shut-down for a remarkable period of time affecting the global economy, world health and demises. Theonly light of hope and improvement that mother earth saw was the improvement in the environment and the biodiversity of the earth thus truly a blessing in disguise.

Air pollution being one of the paramount reason of the global warmingand the escalate in the global temperature has shown the fugly sideof the industrialization and modernization in technologies with a surfeit amount of chemical waste as we see in developing countries likeBosnia and China marking the highest air quality index dated 18thOctober, 2021 at 18:50. [59]

The major air pollutants that we covered in this review namely: CO2,NOx, SO2 and PM2.5 with their latest data and comparison for thepre -pandemic and post-pandemic situations. These studies have shown how drastic decrease in air pollutants emission happened due to less to no burning of fossil fuels and processing of industries and the vehicles as if Mother Earth was taking time to heal herself. The main environmental impacts of the air pollution as seen throughout the years, were -global warming, photochemical smog, formation of acid rain and depletion of ozone layer thus leading to rise in global temperature, faced a severe blow of decrease as the pandemic rose and bluntly took lives of people the main cause of these ill-effects of industrialization thus pollution and damage to global health and biodiversity.

For our country India, The biggest concern at a time was acid rainthus yellowing of one of the seven wonders of the world-The TajMahal and the Delhi smog in 2017 after the Diwali season as thecities had PM2.5 rates as high as 173 microgram per cubic metre inKanpur which was the highest among all the cities in the world. Thecombustion of fossil fuels emitting gases like NO2, SO2 and oxides of carbon which turned into the secondary pollutants thus the formation of smog and thus the thick layers of aerosols in the troposphere thus affecting the overall atmosphere ,the cushion protecting the earth.[Table 1]

As for developing countries, population, poverty and rapidurbanization being the main concern it is difficult for them to investenough for the climate change concerns as they are too muchoccupied to serve food and sanitization to the people below thepoverty line and the poor.

As for developed countries with better economic status faces majorproblem in health sectors related to luxury and expenditure, theirmain struggles being controlling their greed for abundance andmore leads to a lot of wastage and illogical standards thuscompleting erasing the serious concerns for the climate change.Their lifestyle and expenditures do attract attention but they beingon the higher rungs of the economic ladder are barely responsible enough to heal the world. But this major pandemic that showed no mercy to anyone was an eye opener for them too as it made everyone think twice about the basic requirement for living andbeing healthy. As seen in the Tables-2,3,4,5 the air pollutantsemission had drastic change down the curve was a relief that itmight make people realize that a restricted use of technology

andindustrialization can make the world more sustainable and definitelyless.

The main agenda for our review was to surface the reality that thispandemic has shown us and also how we can eradicate pollutionfrom the face of the world gradually and heal it so that oursuccessors get to live their life sustainably and no more recklessly.

Fig. 1. Post and Pre covid Himalayan Range visibility from Punjab

Fig. 2. Atmosphere of New Delhi Pre and Post Covid - 19

7. Conclusion:

This comparison analysis and the outcomes states thatthe pandemic of

Covid-19 might be considered a blessing in adisguise for the pollution decrease around the world. Pre covidperiod indicates that surplus use of modernization or technology didease the human lives but witnessed uncontrolled pollution over theglobe. Post covid has shown the minimalistic usage of technology asa necessity thus healingthe world - decreasing the air pollution asseen from the air index count. The new normal can thus beconsidered as the new and healthier lifestyle of human kind withoutim-balancing the global ecology.

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    Automobile Air pollution in Hyderabad City,Andhra Pradesh, India during the year 2009Ch.V.Krishna Rao1, Siva Prasad Arikatla 2, Dr M.Viswanadham 3Head of Automobile Engineering Section, Government Polytechnic, Hyderabad, India1Lecturer in Automobile Engineering, Government Polytechnic, Hyderabad, India2, Professor of Civil Engineering & Director (BICS), JNTU, Hyderabad, India.

15. ENVIRONMENTAL EFFECTS OF AIR POLLUTION AND APPLICATION OF ENGINEERED METHODS TO COMBAT THE PROBLEM

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