

# Impact of Coronavirus (COVID-19) outbreak on society, air quality, and economy in India: A study of three “P”s of sustainability in India

## Supplementary Materials

**Table S1. Possible sources and consequences of major air quality parameters in India [21-24]**

Name of Pollutant	Possible Sources	Consequences
PM <sub>2.5</sub>	Road construction, road traffic, fossil fuel combustion, agricultural burning, cooking, water heating, kerosene usage, industrial releases	Decreasing lung function, asthma, coughing & difficulty in breathing, irregular heartbeat, increasing age-specific mortality rate
PM <sub>10</sub>	Road dust, construction materials, fossil fuel combustion, solid waste dumping materials, industrial releases	Coughing and wheezing to asthma attack, Bronchitis to high pressure, Heart attack, Strokes, Premature death
NO <sub>2</sub>	Vehicular emissions, fossil fuel combustion, industrial releases, releases from power generation stations	Respiratory diseases (asthma), Coughing, difficulty breathing, Respiratory infection, Irritation of eye, nose and throat
NH <sub>3</sub>	Agriculture including animal husbandry, industrial releases, vehicular emissions, drainage system	Nose and throat irritation, increasing blood pressure, pulse rate, Respiratory spasms, rapid suffocation, Pulmonary oedema, potentially fatal accumulation of fluid in lungs and leads to death
SO <sub>2</sub>	Combustion of fossil fuels, vehicular emissions, industrial releases	Asthma, Coughing, difficulty in breathing, respiratory infection, irritation of eye, nose and throat
CO	Vehicular discharges, burning of biomass (wood, cow dung, etc.) and industrial releases	Eye irritation, breathing difficulties, lung inflammation, reacts with haemoglobin to restrict blood transport
O <sub>3</sub>	Vehicular emissions, releases from power generation stations, industrial releases	Chest pain, coughing, throat irritation and congestion, worsen bronchitis, emphysema and asthma, sometimes permanent lung damage

**Table S2. National ambient air quality standards in India [49]**

Air pollutants	Time weighted average	Concentration in ambient air (in $\mu\text{g}/\text{m}^3$ )	
		Industrial Area Residential, Rural & other Areas	Ecologically sensitive area (Notified by Central Govt)
PM <sub>2.5</sub>	24 hours Average	60.0	60.0
PM <sub>10</sub>	24 hours Average	100.0	100.0
NO <sub>2</sub>	24 hours Average	80.0	80.0
NH <sub>3</sub>	24 hours Average	400.0	400.0
SO <sub>2</sub>	24 hours Average	80.0	80.0
CO	8 hours Average	2000.0	2000.0
O <sub>3</sub>	24 hours Average	60.0	60.0

### Highlights of Announcement in India to cope up with COVID-19

- Insurance coverage of INR 50 lakh (USD 66955) for public health workers who are taking care of Covid-19 patients.
- Five kg of wheat or rice and one kg of preferred pulses to poor families for every month spreading over three months.
- INR 500 (USD 6.69) per month for next three months to be credited to 20.4 crore (204 Million) woman account holder under Pradhan Mantri Jan Dhan Yojana (Prime Minister's Poor welfare scheme).
- Central government will contribute 24% of monthly wage for the next three months into provident fund account for workers earning less than INR 15000 (USD 200.86) per month in businesses having less than 100 workers.
- Wages to be increased from INR 182 (USD 2.43) to INR 202 (USD 2.70) per day under Mahatma Gandhi Rural Employment Guarantee Scheme.
- Ex-gartia of INR 1000 (USD 13.39) to poor senior citizens, widows and disabled.
- Free LPG for 'Pradhan Mantri Ujjwala Yojana' (Prime Minister's Lighting Scheme) beneficiaries for 3 months.
- Now States can use INR 31 crore (USD 4151210) from construction workers welfare fund.
- States have been given permission to use district mineral fund for medical activities.

**Figure S1. Highlights of Announcement by Indian Government to fight against COVID-19 pandemic [55]**

### Reserve Bank of India's (RBI) Policy Actions to Fight Against COVID-19

- The repo rate was reduced from 5.15 % to 4.4% and reverse repo rate from 4.9% to 4%. Commodities will be cheaper due to this reduction in reports and ultimately end customers will be benefited. On the other hand, reduction of reverse repo rate will increase the overall liquidity in the economic.
- Cash Reserve Ratio (CRR) for all banks was dropped to 3% from 4%. The lesser the CRR, the higher is the liquidity to banks ensuring proper functioning of financial markets and institutions. The CRR has been reduced after a long-time gap of 8 years since 9 the February 2013.
- Now banks can borrow 3% of NDTL (Net Demand of Time Liability) till 30<sup>th</sup> June 2020. Previously it was 2%. This step will also ensure the greater liquidity in the economy.
- According to the Reserve Bank of India (Prudential Framework for Resolution of Stressed Assets) Directions, 2019, the banks should categorize loan accounts under Special Mention Categories (SMC) as SMA-0, SMA-1 and SMA-2. SMA-0, SMA-1 and SMA-2 refer to those loan accounts where principal or interest payment or any other amount wholly or partly overdue for 1-30days, 31-60 days and 61-90 days respectively. RBI has now changed this regulation where all banks and Non-banking financial corporations (NBFC) can grant a moratorium of three months for all term loan instalments and interest on working capital loans which are payable between 1<sup>st</sup> March 2020 and 31<sup>st</sup> May 2020.

**Figure S2. Policy Actions by RBI to fight against COVID-19 pandemic [57]**

### Sectoral Impact

**Agriculture:** Even though the government exempted agriculture sector and essential commodities from lockdown but the sector is facing a massive hit due to disruption of supply chain and unavailability of migrant workers. During this peak harvest season, products could not be harvested properly and reach retail 'mandis' (large market). As per PM- KISAN scheme, 14.5 crore (145 Million) farmer families belong to this sector and contribute around 14% of India's GDP. Export of agricultural products i.e. rice, Darjeeling tea, ground nut, dairy products, cocoa products stopped due to inter country restrictions during first phase lockdown. Government has adopted a flexible approach during second phase lockdown and started export of major products. The industry is expected to come back in track with this relaxation policy.

**Domestic and International Travel:** During first and second phase lockdown, The Director General of Civil Aviation has banned all domestic passenger travel and international commercial passenger travel. According to International Air Transport Association, this lockdown will impact over twenty-nine lakh jobs in aviation sector. Centre for Asia Pacific Aviation (CAPA) India estimated INR 27000 crore (USD 3.61Billion) loss in the first quarter of next financial year. Indian Railways has also suspended all passenger trains during first phase lockdown. According to All India Motor Transport Congress (AIMTC), daily movement of trucks reduced to less than 10% of normal levels. However, the ministry of Road Transport and Highways extended the expired driving licences and vehicle registration validity till June 30, 2020. To deal with Covid-19, The Director General of Shipping issued guidelines to all ports. Indian economy is not expected to fall due to reduction in crude oil price in international market but revenue from petroleum products and crude oil is expected to fall due to this travel restrictions.

**Sports and Entertainment:** All domestic and international level tournaments also suspended in India. The biggest and most popular tournament "Indian Premier League" suspended by BCCI till further notice. Several movie releases of March, April and May have been postponed due to delay in production and shooting.

**Tourism:** The entire tourism industry including hotels and restaurants, attractions, tourist agents and organisations is facing huge amount of losses. During April-June, the industry will witness a revenue loss of INR 69400 crore<sup>1</sup> (USD 9.369 Billion).

**Figure S3. An analysis of Sectoral Impact for COVID-19 pandemic [60-62]**

### Policy Recommendations

**Agriculture:** This sector always plays an important role for adding value to economy. To ensure quick recovery of this sector, Farmers should be provided with seeds and other agricultural necessities along with financial benefit in the coming crop season. Farmers involved in poultry firms need more relief package as they are facing severe financial crisis due to decrease in demand and consumption of poultry products.

**Public Distribution:** Public Distribution system should be strengthened. The distribution channels have been affected during this lockdown. State government should provide proper warehousing and go down facility to farmers, dealers and wholesalers in order to prevent wastage of perishable food items. It will also prevent black marketing.

**Informal Sector:** Under 'Jan Dhan Yojana' (People's Wealth Scheme), government has provided INR 500 (USD 6.69) per month for the next three months to 20.4 crore (204 Million) woman account holders. Given the present inflation level, a higher amount of cash should be provided. The needy people who do not have 'Jan Dhan' (Wealth Scheme) account also need financial assistance. The existing system should be modified and relief package should be ensured for all needy and unemployed poor.

**Banking Sector:** Reserve Bank of India announced policy actions to fight against Covid-19. More measures should be adopted for making the banking system strong and flexible in this crisis period. Given the present crisis, the necessary credit should be provided to small businesses, firms as well as individuals. New credit schemes should be introduced for them.

**Aviation and Tourism:** Financial aid should be provided for dealing higher expenses and losses. Existing tax rates should be minimised levied on these sectors. Once this crisis is over, medical tourism should be prompted across the country. This step will boost both aviation and tourism industry.

**Entertainment:** Movies can be released online on various social platforms like you tube. This may add some revenue and relief. State Government should exempt show taxes, electricity duty and license fees of multiplexes.

**E-commerce:** Government should ensure that essential and medical online orders do not get affected during this lockdown phase.

**Education:** Online education system is becoming popular now days. Service providers should introduce free data plans for both teachers and students. Effective measures should be adopted by government for Indian student population who are living in villages and remote areas with no online education facilities.

These policy measures may restore the growth and performance of our economy. On the other hand, Central and State government should work jointly to minimise the effects this pandemic.

**Figure S4. Policy Recommendation for COVID-19 pandemic**