

POSS Project
Country chosen: India

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Introduction

COVID-19 also known as SARS-COV2 is an infectious respiratory disease caused by the Coronavirus. The most common symptoms of the COVID-19 are a fever, a cold, a dry cough and tiredness. The virus that causes COVID-19 is mainly transmitted through respiratory droplets generated when an infected person coughs, sneezes, or exhales. These droplets are too heavy to hang in the air, and quickly fall on floors or surfaces therefore have a small radius of infections. You can be infected by breathing in the droplets released by an infected person. If you are within close proximity of someone who has COVID-19, or by touching a contaminated surface and then your eyes, nose or mouth, you have a high probability of contracting the virus. The COVID-19 is an enveloped virus as in a viral envelope is the outermost layer of many types of viruses. It protects the genetic material in their life-cycle when traveling between host cells. The virus is of Zoonotic origin because the virus has evolved from animals to humans. The first case of COVID-19 was reported in Wuhan City, China, in December 2019. The virus was named by WHO in January 2020. The virus has since spread to almost all the countries around the world except 14 countries. The global infected rate of COVID-19 is 24 million. The first case in India was reported on 30th January, 2020 in Thrissur Kolkata and since Indian has had approximately 3.11 million cases.

There has been a history of Coronaviruses evolving from animals to humans but not at this scale. In 2002, there was an outbreak of SARS-COV (Severe Acute Respiratory Syndrome) which had been reported in 17 countries with just 8 thousand cases occurring in mainland China and Hong Kong. The SARS-COV has evolved from Civet cats. The MERS (Middle East Respiratory Syndrome) outbreak in 2012 had approximately 2,500 reported cases mostly in the Arabian Peninsula. The virus is believed to be evolved from Dromedary camels. The COVID-19 virus is believed to be evolved from Horseshoe bats to humans which is suggested by studies conducted worldwide. The Influenza virus is similar to the Coronavirus but is more common but can be deadly. Similar to COVID-19 influenza affects the lungs, nose and throat. Primary symptoms of influenza include fever, chills, headaches and fatigue. Influenza can also only be spread by

People with the influenza virus. The virus is spread by respiratory droplets made when people with the virus cough, sneeze or talk. But unlike SARS-COV2 there are 2 vaccines available for Influenza which are the inactivated influenza vaccines and the live attenuated influenza vaccines.

COVID-19 has hit the world hard. Whole countries literally shut down, trapping it's citizens in their homes and making them work and study from home. Most of the countries initiated a lock-down to make sure people maintain social distance and reduce the infection rate. There are multiple initiatives around the world to contain the virus, reduce the infection rate and develop a vaccine. There are various alternative methods being researched like herd immunity, which is a form of indirect protection from infectious disease that occurs when a sufficient percentage of a population has become immune to an infection, whether through vaccination or previous infections, thereby reducing the likelihood of infection for individuals who lack immunity. Global Organisations like the European Union have created a \$2.1 Trillion recovery fund and loaned and given grants up to \$750 Billion to countries in need. There are also private initiatives where Universities like Oxford are partnering with pharmaceutical companies to develop a vaccine. Non-Profit organisations like the WHO (World Health Organisation) are coming up with protocols and providing assistance around the globe for countries to deal with the pandemic and be able to recover once the pandemic is over.

The situation in India before the pandemic itself was somewhat dire in the healthcare sector. There are a total of 3,593 government hospitals in India and 11,810 private hospitals. If we are to crunch the numbers, we shall see that the maximum capacity for the sum of all hospitals in India reaches 23,104,500 outpatients in one go. This measly number is only about 2% of India's population and is nowhere near the required amount of hospitals and healthcare facilities. A repercussion of this is seen annually in the capital city, New Delhi, where there is an outbreak of Dengue virus (DEN-V) which causes a sudden surge in the number of patients admitted in the hospitals. Due to this sudden spike, even the hospital with the highest capacity is forced to lay out beds in the corridors. Statistics show that each year during the outbreak of the DEN-V virus, the hospitals overshoot their maximum capacity by an average of 30%. The SARS-COV virus only amplified this impact and has brought in other effects which shall be investigated through the course of this paper.

Infection and Fatality

The latest update of coronavirus cases was on August 26, 2020 there are 3,239,096, 59,645 deaths and there are 2,468,688 people who have recovered. The journey of coronavirus began in India on 30th January, the first case reported in Kerala, was a student returning from Wuhan. Apart from this there was no significant rise in transmissions observed until February. On 4 March 22 new cases were reported, including 14 infected members of an Italian tourist group. On 12th March, a 76-year old man with a travel history to Saudi Arabia, became the first fatality of India because of Covid-19. The virus spread in the country because few events acted as a super spreader for the virus, a Sikh preacher, with a travel history to Italy and Germany turned into a “super spreader” by going to a Sikh festival in Anandpur Sahib during 10–12 March.

Approximately 27 cases were traced back to him and over 40,000 people in 20 villages were quarantined to contain the spread. Another event on 31 March, a Tablighi Jamaat religious congregation event in Delhi, which had taken place earlier in March, emerged as a new virus spreader, after numerous cases across the country were traced back to it. On 18 April, the Health ministry announced that 4,291 cases were directly linked to the event.

By the government of India a 21-day lock-down across the country was imposed from 24 March for 21 days to curb the spread of the coronavirus pandemic, this lockdown limited the movement of the entire 1.3 billion population of India and also a 14-hour voluntary public curfew on 22nd March was enforced in the country’s most affected regions. The lockdown was placed when the number of confirmed positive coronavirus cases in India was approximately 500. As the end of the first lockdown period approached, state governments and other advisory committees recommended extending the lockdown. The governments of Odisha and Punjab extended the state lockdowns to 1 May. Maharashtra, Karnataka, West Bengal and Telangana also followed, then on 14th April, Prime minister Modi extended the nationwide lockdown to 3 May as 10,000 were confirmed with conditional relaxations after 20 April for the regions where the spread had been contained or was minimal. The lockdown was once again extended till 17th May and the government divided all the districts into three zones based on the spread of the virus – green, red and orange- with relaxation to the lockdown applied accordingly. On 17th May, the lockdown was further extended till 30th May. On 30 May, it was announced that lockdown restrictions were to be lifted from then onwards, while the ongoing lockdown would be further extended till 30 June for only the containment zones. Services would be resumed in a phased manner starting from 8 June. It was termed as "Unlock 1.0". Modi later clarified that the lockdown phase in the country was over and that 'unlock' had already begun.

Many of the citizens were airlifted from different countries during the pandemic. The Ministry of Health and Family Welfare shows a majority of those infected since the infection was first detected in India on 30 January had a travel history to countries such as Italy, China and Iran.

Keeping this in mind, the visas were cancelled for Chinese and foreigners who had visited China in the last two weeks. Screening people coming from high risk countries also began.

The Indian government was able to observe what was happening in China and got an early start to put in quarantine measures. Currently the state with the highest cases is Maharashtra (7,03,823) after that follows Tamil Nadu (3,91,303), Andhra Pradesh (3,71,639), Karnataka (2,91,826), Uttar Pradesh (2,03,028) and Delhi (1,64,071).

India's case fatality rate (CFR) - or the proportion of Covid positive people who have died - is around 2.8%. But that number is contentious - as are a lot of the statistics on the contagion. Experts say that looking at the aggregate CFR at this stage of the pandemic can lull governments into complacency. "The CFR is a bit of an optical illusion," Dr Mukherjee said. "Even if I believe the reported cases and death counts, and if you divide the number of deaths by closed cases where we actually know patient outcomes, we get a much larger percentage of fatalities". Even the per capita death rate limits understanding of the spread of disease - there are vast tracts of India still unscathed by the virus.

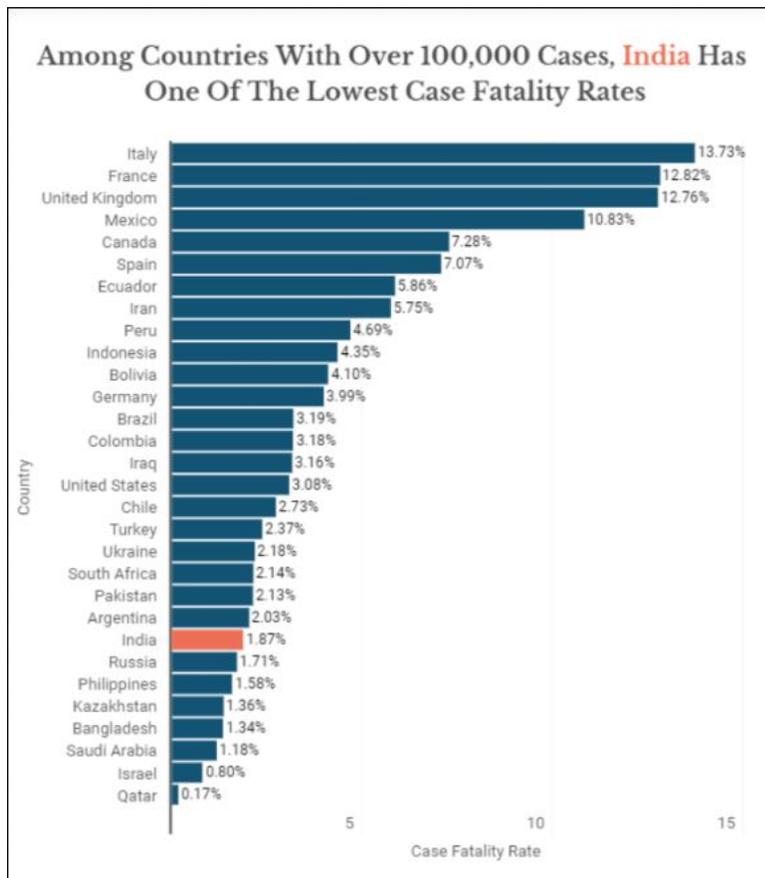


Figure 1: Johns Hopkins University Center for Systems Science and Engineering (JHU CCSE)

Note: Data as of August 23

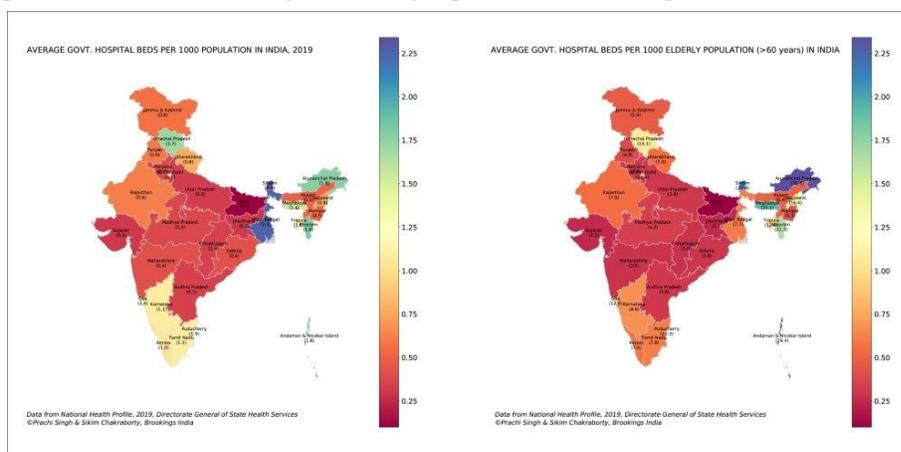
There are contradicting sides; several experts say the low CFR in India is due to many factors. Firstly, India is a relatively young country, the median age is 26.8 years in India and so a vast majority of India's population is relatively young, in 2011 8.6% were above 60 years of age, thus increasing the chances of altering the CFR during the course of the pandemic. The Health ministry early said "47% of total tested cases are below the age of 40, 34% are between the age of 40 and 60 and 19% are above the age of 60. Due to the fact that there is a young population and is testing young people more this might be contributing to keep the CFR low as it has been established that the virus is more deadly for the older generation. Another factor could be the deaths which are not reported or are reported as other kinds of deaths such as influenza. Medical experts from the Covid hospitals said "that when dead patients are brought to the hospital, they are not tested for COVID-19 even if there is a suspicion." Lastly another contributing factor can be the successful strategies applied by the government in the early phases on the spread of the virus. Experts say India was smart enough to lock down early - 25 March - to slow the virus. "No country did it that early. It bought time for the government to make measures. It averted many deaths,".

In India the virus was spreading like patchwork pandemic, which is when the infection spreads through a country, affecting different parts differently. The pandemic is shaped by factors like social distancing, testing capacity, population density, age structure, wealth, societal collectivism, and luck. In India the virus has been spread by millions of informal workers who fled the cities after a botched lockdown abruptly left them jobless and without money. They returned to their villages on foot, and crowded trains and buses. In a press briefing, the head of ICMR's epidemiology division said that "patients suffering from SARS without any history of foreign travel or contact with anybody infected by the COVID-19 have tested positive for the virus. This was the first official confirmation that India has entered the third stage of the pandemic - community transmission."

Hospital resource use and future models

One of the most affected sectors during the SARS-COV2 pandemic has been the healthcare sector. The Covid 19 virus has had major impacts on the healthcare sector, namely the hospitals and the pharmaceutical industries. In order to get a clear and concise understanding of what the term 'resources' refers to, we find it important to define the term. Hospital resources refers to the administration and the personnel, the space and the various toolkits. These resources are essential to the smooth operation of any hospital and therefore the lack of said resources could prove catastrophic in the scenario of a global outbreak. Resource management of hospitals in India has always been a major challenge due to the sheer population of this country. The pandemic exponentially worsened the situation by increasing the demand while keeping the supply constant hence increasing the disparity between these two figures.

The first resource which shall be examined is space. In total, there are 7,13,986 hospital beds in Indian government hospitals. This means that there are 0.55 beds per 1000 people. If we are to look at those who may suffer complications, ie, the population older than 60, there are 5.1 beds per 1000 population. There are certain states that are far below the average with respect to the availability of beds. (Fig 3.1) These include the states of Bihar, Jharkhand, Uttar Pradesh, Maharashtra, Gujarat and many others, Although there are various others that also lie above the average such as West Bengal and Sikkim. The places affected the most by the virus are the major metropolitan cities and their corresponding states as seen through the examples of Mumbai (Maharashtra) and Delhi. Hence after the initial growth of the virus in India, one of the first hospitals to run out of resources were the ones in the aforementioned cities. In Mumbai, the first hospital ran out of space by the 29th of April and in Delhi, the first hospital ran out of space on the 22nd of May. This triggered a cascade event which eventually resulted in a mass shortage of resources. The average hospital in Mumbai has at least 250 beds and can manage 1000 outpatients in one go. If we look at the case study of Lilavati hospital Mumbai, the largest hospital in Mumbai in terms of beds, which has a grand total of 300 beds and can manage a total of 1500 outpatients in one go. This hospital reached maximum capacity 20 days after the first hospital in Mumbai. On the 22nd day, the hospital started laying out beds in the corridors. Similarly in Delhi, If we are to take the case study of the Ganga Ram hospital, it exceeded maximum capacity exactly 19 days after the lockdown was issued in India. There was a sudden boom in the number of cases in Delhi due to the Tablighi Jamaat gathering along with other acts of ignorance on the part of the citizens which resulted in the hospital exceeding maximum capacity and having to lay out beds in the corridors exceptionally fast. So much so that only patients with extremely severe symptoms were being admitted.



(Fig 3.1)

The next resource to be explored are the various medical toolkits required to deal with the adversities of the virus. These toolkits are the virus testing kits, Personal Protective Environment (PPE) kits and the antibody testing kits. The PPE kit has various elements which include gloves,

masks, goggles, full body suits, face shields, respirators, shoe covers and head covers. There is a notable variation in the average number of PPE kits used per patient from hospital to hospital, but on an average 30 day stay the hospitals reportedly use 10 to 15 PPE kits a day per patient. If we are to assume that exactly 20% of patients have been hospitalized, we can say that 7,080,000 to 10,620,000 PPE kits have been used by the hospitals totally. Each of these PPE kits are uninsured as their use has just begun recently due to which the government hospitals are charging an average of Rs 320 per PPE kit. On the other hand, the private hospitals are charging an astonishing Rs 630 per PPE kit which usually ends up adding an extra Rs 7400 in the hospital bill. The final resource which is being observed is the administration and personnel. According to a recent article posted in the famous indian newspaper, The Hindu, there are an average of 60 staff members and 8 administrative staff in every hospital. On average, each hospital can manage 1200 outpatients at once and are currently 30% over maximum capacity which means that there are a total of approximately 1500 patients in one hospital. Through this data we can infer that in each hospital, the staff members are outnumbered 1 for every 25.

The future of this virus is uncertain as the production of the vaccine has started in various countries and few have even had it registered. Hospitals and the pharmaceutical industries shall be responsible for the distribution and administration of this vaccine amongst the masses. Also it is almost certain that sometime in the future there shall be another pandemic, on a similar scale, during which the hospitals shall face the same problems. In order to take on this responsibility and prevent the occurrence of similar problems, the hospitals need to increase their workforce or come up with a solution that provides them with more of the aforementioned resources.

Mitigation Effort

India is the 2nd most populated country in the world with a population of a little over 1.3 billion. With such astonishing high numbers the coronavirus would spread rapidly destroying the lives of millions in the matter of weeks. The graph 1.0 shows a clear comparison in the number of cases in India and the United States of America. The comparison was taken against the USA because it has the highest number of cases currently in the world. The Prime Minister of India Narendra

Modi took 7 Major mitigation efforts against the Coronavirus in order to curb the graph.

Prime Minister Narendra Modi had addressed the nation on the 24th of March 2020 formally declaring the lockdown for 21 day. He discussed that it is imperative to guarantee that the coronavirus does not spread to regions where it hasn't been



Graph 1.0 India Vs USA

infested yet. In addition he emphasized the requirement to follow social distancing and lockdown rules. These lockdown rules consisted of; Avoid mass gathering such as Metro services, Educationally facilities, cinema halls and salons will remain closed. To further avoid mass gathering Noida Authority launched an app called Apurti Suvidha which is used by residents of Noida to order essential items like medicine, vegetables, fruits, grocery which was contactless. Other rules and regulations were stepping out of your house between 7 pm to 7 am will be prohibited. Spitting in public areas is not allowed. Taxis, autos and app-based cabs will be allowed but only 2 passengers at a time and they must have face masks on. There shall be no activity allowed in containment zones. Restaurants will not provide dining facilities but home delivery will be permitted. Religious gatherings are barred in the city till May 31st. Take as much advantage of working from home. You must have masks on for any activity outside of your home. These were a few rules set by the PM in order for the lockdown to run smoothly. There have been up to 4 Phases to the lockdowns till date. Phase 1 was from 25th March to 14th April. During these phases there was absolutely nothing available other than essential items. Due to the lack of medical facilities in the country these 21 days were crucial to be used wisely in order to embrace ourselves for the upcoming catastrophe. Phase 2 was from 15th April to 3 May, Phase 3 was from 4th May to 17th May and Phase 4 was from 18th May to 31 May. After the 31st May the lockdown was open but there were protocols that were mandatory to be followed, which were no mass gathering, no spitting in public areas and you must wear face masks at all times. Due to this extended period of lockdown it has curb the number of cases by 41% less than expected. This was one of the major mitigation measures taken.

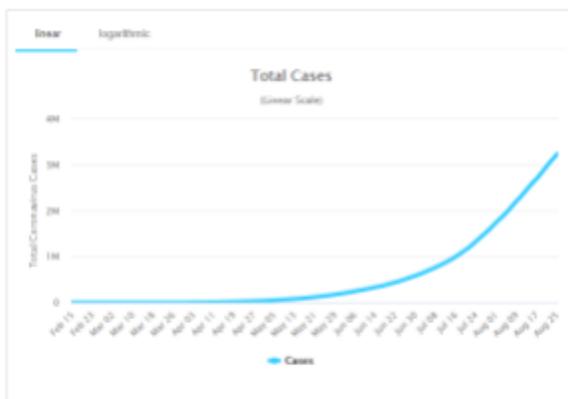
In addition to the lockdown the PM had also requested to follow the measures given by Ayush Ministry to boost immunity. Ayush Ministry is a government ministry led by Shripad Naik. The purpose of this ministry is to develop education, research and propagation of indigenous alternative medicine systems in India. The Ayush Ministry has divided their guidelines to boost immunity into 6 broad categories, ayurveda, Yoga, Naturopathy, Unani, Siddha and Homoeopathy. Each of these manuals contain a detailed methodology on improving your immunity by suggesting medication according to the type of symptom and Specific Recommendations. For Example 'Unani' also known as "Yunani medicine" is a traditional form of medicine that was practiced in Mughal India and in Muslim culture. The manual mentions different types of medicine and what it is useful for such as Khameera Marwareed which is a good Immunity Enhancers but it is not recommended for diabetics. It also mentions different symptoms and their possible medication as well as their dosage as per age group, such as for Dry Cough the medication suggested is Habb-e-Surfa with its dosage for ages below and above 12. It also has Specific Recommendations such as Special Care instruction for Elderly. This completes the maules giving the reader a very detailed understanding into how they can boost their immunity with natural remedies. To make sure that the citizens are aware of how they could

prevent themselves from the virus PM Narendra Modi made it essential that all citizens must read and follow the guidelines given by Ayush Ministry.

To further prevent the virus from spreading, the government launched an app on 2nd April 2020 called Aarogya Setu. This app was designed to track the people you came in contact with. It will alert the app user if anyone they came in contact with was tested positive for COVID-19. The app is available in 12 languages, connects to your Bluetooth and has GPS capabilities. Through this app one is aware of their surroundings and can prevent and protect themselves even more.

A few other mitigation steps against the Coronavirus may not have helped curb the graph but it was mentioned by the PM as the 7 major steps. These include 'Help the poor, and try to take care of their food needs', 'Ensure that you are sympathetic and kind towards your employers' and 'Respect all people who are in the frontline of the pandemic.' Due to this entire pandemic it has taken a big hit on the economy and people's lives. Majorly the daily wage workers and the families that live under the poverty line. Being sympathetic towards people during their struggles is the basic humanly thing to do which was what the PM asked for. To show respect to the frontliner which include doctors, police officers, traffic police, etc. On the 5th of April 2020 the entire country was asked to observe nine minutes without electricity and to light a candle. By doing this the country was showing gratitude towards the frontliner for risking their lives to help the people of the nation and to stand united as a country. Although, it did not help in reducing the cases.

These were the few mitigation efforts that were being taken. The graph 2.0 which represents the number of cases in India, approximately 3.23M cases, 2.47M recovered and 59,449 deaths. The number of cases are increasing on an everyday basis. Therefore, it is imperative that we must keep following the steps to prevent ourselves from acquiring the virus.



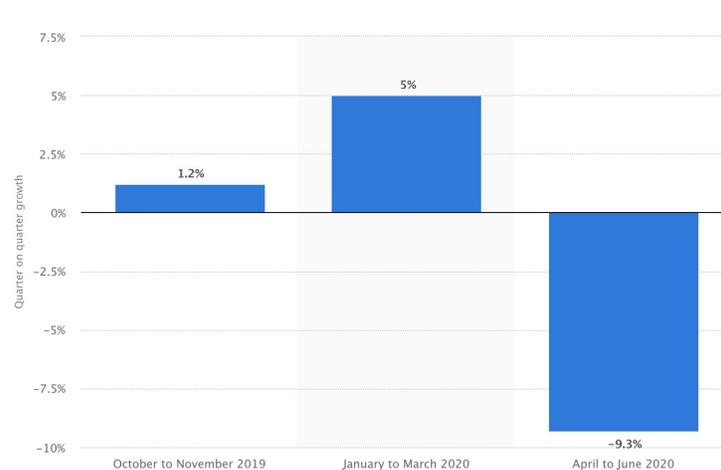
Graph 2.0 Total Cases in India

Economic impacts

The COVID-19 pandemic has been an unprecedented shock to the Indian economy and its impacts have been extremely disruptive. The World Bank also claims that India had been witnessing a pre-pandemic slowdown and the current situation has only magnified the

pre-existing risks to the Indian economy. The Ministry of Statistics has also reported that the growth in the fourth quarter of the fiscal year 2020 has gone down by 3.1%.

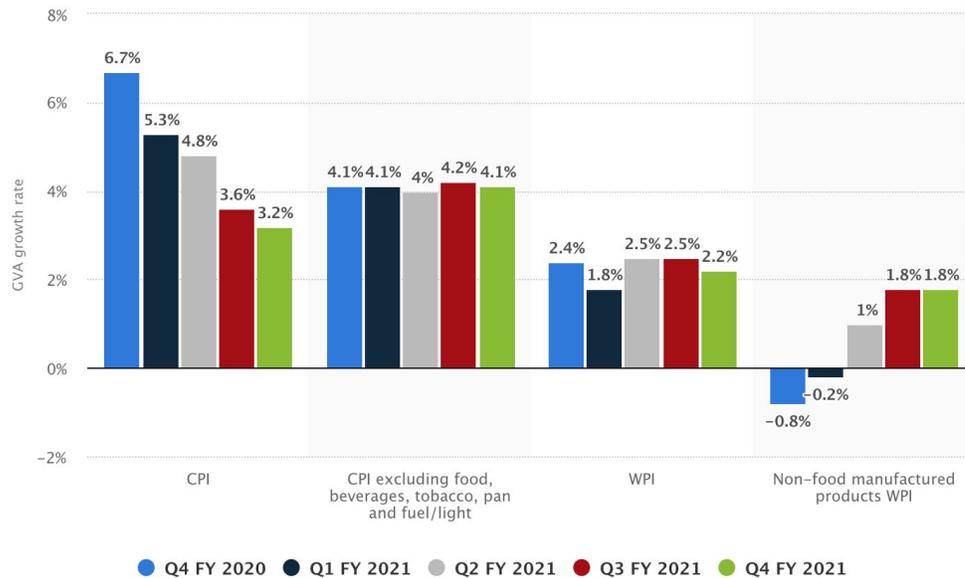
Significant organizations in India, for example, Larsen and Toubro, Bharat Forge, UltraTech Cement, Grasim Industries, Aditya Birla Group, BHEL, and Tata Motors have briefly suspended or fundamentally decreased activities. Youthful new start-ups have been affected as the funding has decreased. Fast-moving buyer organizations in the nation have altogether decreased activities and are concentrating on only essential products. Stock markets in India faced their most exceedingly awful losses in history on 23 March 2020. However, on 25 March, one day following a total 21-day lockdown was declared by the Prime Minister, SENSEX and NIFTY posted their greatest increase in 11 years.



Graph 1

India's quarterly GDP was estimated to a decrease of more than nine percent among April and June 2020. This was a massive drop from a five percent development at the start of 2020. The nation went into lockdown on March 25, 2020, confining 1.3 billion individuals. This was stretched out until May 3, 2020. The Indian government assessed its budgetary, land, and expert administration sectors to be the hardest hit during the time of the lockdown.

Unemployment rose from 6.7% on 15 March to 26% on 19 April and then back down to pre-lockdown levels by mid-June. During the lockdown, approximately 14 crores (140 million) individuals lost work while pay rates were cut for some others. More than 45% of family units in the country have experienced a salary drop when compared with the past year. The Indian economy was expected to lose over ₹32,000 crores (US\$4.5 billion) consistently during the initial 21-days of complete lockdown, which was proclaimed after the COVID-19 outbreak all over India. Those in the informal sectors and daily wage groups have been at the most risk. Countless farmers around the nation who develop perishables additionally confronted uncertainty.



Graph 2

Customer Price Indices were assessed to decay over the quarters of the budgetary year 2021 showing a time of deflation and a potential decline in purchaser requests. Then again, CPI barring food, refreshments, tobacco, and fuel/light was extended to be far steadier at around four percent during a similar timeframe. The sectors that have been affected the most are transportation, construction, manufacturing and production lines, food (delivery and dine-out), hospitality (event management and corporate, tourism and rentals, agriculture, and daily-wage jobs). The sectors that have benefitted the most are healthcare and research, online learning platforms, online communication platforms, and entertainment.

In conclusion, due to the pandemic, there has been an increase in unemployment rates, stress on demand and supply chains, a decrease in government and nation-wide incomes, the collapse of the tourism and hospitality industry, a plunge in fuel consumption, and a fall in trade with China. By the end of the year, the overall GDP is expected to increase, even if it is a minor difference.

Treatment and Vaccine Development

India plays a vital role in the distribution of the vaccine as India houses the world's largest vaccine production unit. The country is responsible for producing over 3 Billion vaccine doses which is more than 65% of all vaccines produced in the world. Once a working vaccine is developed India will play a vital role in producing the vaccine and selling it around the world for use. India plans on keeping the 1 Billion vaccines for the country and exporting the rest of the 2 Billion vaccines. India has been given a \$500 Billion dollar grant by the European Union (EU) for the development and the manufacturing of the vaccine. There are 16 vaccines under

development in India out of which 3 are in the testing phase. This makes India a pretty big contributor to the vaccine development to cure COVID-19.

One of the drugs being used worldwide to treat patients with COVID-19 is Hydroxychloroquine. Hydroxychloroquine is an anti-malaria drug which has proved to be successful in treating COVID-19 patients. Chloroquine is a simple compound that reduces the effects of COVID-19 and reduces infection, which significantly increases the odds of survival. Indian Pharmaceutical Alliance (IPA) are the world's leading producers of Hydroxychloroquine, producing over 60% of the world's drugs. The company has supplied the drug to countries all over the globe including the US, Russia, Britain and other countries. The drug plays a vital role in the battle against COVID-19 and there have been deals signed between countries like India and the US, where India is supposed to ship a certain amount of the drug.

Throughout India hospitals there are hospitals that have been given permission to admit and treat COVID-19 patients to make sure a treatment set by the government is being administered and to ensure proper hygiene and precautions are being taken in the hospitals. The set protocol is that initially 2 COVID-19 tests are taken, the first one is a Nasopharyngeal test after admission into the hospital and the second test is a blood test which is done 24 hours after the Nasopharyngeal test if there are COVID-19 indicators in the first test. Over 20 million COVID-19 tests have been performed in India. If the patient is COVID-19 positive, they are transferred to a COVID-19 specific wing where they are given high flow oxygen if they are having difficulty breathing. The patients have their heart rate, blood oxygen level and blood pressure regularly monitored as they are the key aspects in recognising the advancement of the disease. The primary drug being administered to patients in India is the anti-malaria drug Hydroxychloroquine. Other drugs being administered in case Hydroxychloroquine doesn't work are Remdesivir (Coviflu), Favipiravir and Lopinavir are the alternate options. These drugs are effective in treating COVID-19 as they inhibit the growth of the SARS-COV2 virus to an extent and also help in reducing fever, dry throat and cough.

The Indian Institute of Chemical Technology (CSIR-IICT) has synthesised the key starting materials for Remdesivir, the first step to develop the active pharmaceutical ingredient in a drug. The institute has partnered with the Indian pharmaceutical company Cipla to manufacture the drug once through the testing phase. Companies like Cipla have requested a grant from the company holding the patent for Remdesivir to manufacture the drug in exchange for royalties. This drug that uses Remdesivir's key starting materials that specifically targets the SARS-COV2 virus has been approved for emergency use in India, US and Britain. The drug can be easily

developed in India due to the easily accessible materials and the manufacturing units present in India.

Hospitals in India are also administering Plasma therapy after all other methods have failed and the patient has given consent. In this course of treatment a blood transfusion takes place where the infected patient is given the blood of a recovered COVID-19 patient to improve the infected patient's condition and increase the chances of survival. The basic idea behind the treatment is that the recovered patient will have generated antibodies against the SARS-COV2 virus and after the transfusion the infected patient will also start to generate these antibodies and therefore will be able to fight off the virus. 18 out of the 20 critical patients that went through this course of treatment have recovered. This treatment is the basis of countries reopening, as the concept is of Herd Immunity. The idea is that once a certain amount of population has contracted the virus and recovered, people will exchange everyday bacteria and antibodies eventually reducing the infection rate and giving the people who haven't had COVID-19 a chance of developing antibodies and fighting off the virus. Although a drawback of Indian COVID-19 patient treatment where patients are developing myocarditis (inflammation of the heart tissue), lung fibrosis and Hypoxia. This occurs in 18-20% of the patients. The concept of Herd Immunity is also being used by countries all over the world who are coming out of lockdowns and reopening their respective countries.

The Indian central government has put strict guidelines and protocols in place for house quarantine. Patients who are young and don't have pre existing respiratory conditions are being asked to do a home quarantine as hospitals in India are overflowed with patients and require beds for patients in critical conditions or are less likely to survive. In case of a house quarantine, every member of the house is supposed to stay in the house and not leave under any circumstances. The infected patient is given all the medications at home along with equipment to manage their conditions from home. Online appointments are arranged with doctors who decide the patient's condition and if they should be brought to a hospital. Until the infected patient gets their first negative test, any member of the household isn't allowed to leave the house under any condition. More than 55% of the COVID-19 cases in India are under house quarantine.

India is one of the countries that is continuously researching and implementing new protocols to reduce mortality rate.

Conclusion

The whole world is struggling to cope with the COVID-19 pandemic. Countries like Spain and Italy have lost 1-2% of their population. Companies have shut down, countries are

In an economic downfall and people are losing their houses. The GDP of almost every country in the whole world has come down. The data that has been provided in this paper goes to show that the entire world has currently come to a standstill in terms of any development. Contrarily, there are a few positive impacts of the virus too. Since the lockdown was initiated, global carbon emissions have gone down by 33%. Apart from this, dolphins have returned to the canals of Venice along with other marine life; The city of New Delhi recently recorded the cleanest August in terms of air quality with an AQI of only 39, which is a major improvement compared to the past months where the AQI was averaged at approximately 800-900.

In addition, India is one of the leading producers of vaccines in the world. India produces over 3 Billion vaccines per year. India plays a pretty important role in the recovery as the country plays a vital role in the vaccine distribution because of the manufacturing capabilities, as well as the research aspect of the situation. With a promising program as Cipla and IICT program which are contenders in the production of the cure for the COVID-19 vaccine. India, with an increasing number of cases each day has the motivation as well as the resources to develop the vaccine for COVID-19, along with the Oxford universities promising program to develop the COVID-19 vaccine, the pandemic is predicted to be over by the end of the year.

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