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BLOW-BY-BLOW INVESTIGATION AND ANALYSIS OF CORONA VIRUS IN INDIA

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Abstract

Coronaviruses are a large family of single-stranded RNA viruses that cause diseases in animals and humans. Broadly, corona viruses (CoV) are the largest group of viruses that belong to the Nidovirales order, which includes Coronaviruses among three others. Coronaviruses are one of the two subfamilies of Coronaviridea, with the other being Torovirinae. Coronavirinae can be further subdivided into alpha, beta, gamma and delta coronaviruses.These viruses are named so because of spikes found on their surface that give them the appearance of a crown when looked through an electron microscope. The first coronaviruses was isolated in 1937 and it was the infectious bronchitis virus (IBV) that caused respiratory disease in chickens. Corona virus is generally found in animals. According to experts this virus came from bats, initially a single person was infected then spreading of this virus started human to human and a chain is created. On 1st January 2020 Chinese government shutdown the market completely .when Chinese scientists study the genetic code of this virus which is present inside this virus it was similar with Bats genetic code. So they said this virus came from bat. This virus is transmitted as commonly and rapidly as the virus causing the common cold (rhinovirus). The symptoms of COVID 19 bear close resemblance with cold or flu, which include fever, cough and shortness of breath.

Keywords: *Coronaviruses, Covid-19, Pandemic, Symptoms, India, Lessons, Labours, Women.*

1. INTRODUCTION

The beginning of the present 'novel coronavirus' crisis can be traced to Wuhan, a city in China where the virus originated and soon spread across the country as people moved from one part of the country to another. The response of the Chinese government ranged from denial and hiding the information, to eventual lockdowns, curfews and ramping up their healthcare to treat the patients. Gradually, it spread globally to almost all the countries with varied responses of the respective national governments. In the case of India, the country is at a critical

juncture presently where there is a massive scare of possible deadly effects of coronavirus, if we are not able to limit its spread.

At this critical juncture, when we are at the mercy of a microscopic biological agent, solidarity, awareness and preparedness are the pressing needs of the hour. Although 'social distancing' is the buzzword, the world is now closer and more connected than ever before. Tackling COVID-19 needs a warlike response against a common enemy. Doctors and nurses have turned into soldiers overnight. Political leaders are preoccupied with planning and strategizing against the enemy. But most importantly, the role people play will be immense in defeating this enemy.

Important terms related to this Virus-

1. **COVID-19**: A new type of coronavirus known as COVID-19. The technical term of the virus is SARS-CoV-2

2. **Coronavirus:** Coronavirus is actually a family of virus which already exists in the world and is known to cause diseases in humans. The entire family of coronaviruses is called Coronaviridae and some of them also cause minor diseases, such as common cold.

3. **Incubation period:** Incubation period refers to the time period required for the virus to develop symptoms in the body. In simpler terms, it is the time period between contracting a virus and emergence of its symptoms. The incubation period of COVID-19 is somewhere between 2-14 days.

4. **Pandemic:** A disease is termed as a pandemic when it spreads all over the globe and in most countries of the world. COVID-19 was declared as a pandemic by WHO (World Health Organization) after its spread was confirmed in more than 100 countries.

5. **Community spread:** Community spread refers to a process when the virus starts spreading in the general masses. Community spread is detected when a confirmed case of the virus is found without having a known origin. It happens when a person without any travel history or interaction with any infected person contracts the virus.

6. **Quarantine and isolation:** It refers to the form of precaution of isolating yourself in case you detect symptoms or have returned from a trip abroad. While isolation is when someone who has been tested positive for COVID-19 is separated from other people in order to stop the spread of the virus.

7. **Comorbidity:** It refers to a medical condition, in which a person has more than one disease at the same time. Cases of comorbidity have a higher risk of turning sensitive in case of COVID-19. For example, if someone has high blood pressure and is also diabetic, they have comorbidities and have a higher risk of developing complications.

8. **Social distancing:** Everyone is talking about social distancing currently and how it can prevent the spread of the disease. It basically means keeping a safe distance of about three to six feet from others. This distance will not only prevent you from contracting any kind of infection but will also break the chain of the disease.

9. **Flattening the curve:** Flattening the curve simply means slowing down the rate at which the disease is spreading. It can only be done by taking necessary precautions, practicing hand hygiene and maintaining social distancing.

2. ABOUT THE CORONAVIRUS

Coronaviruses are a large family of viruses that cause illness ranging from the common cold to the more severe diseases such as the Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) and the current COVID-19. These viruses consist of a core of genetic material surrounded by an envelope with protein spikes, which gives it an appearance of a

crown. Coronaviruses are zoonotic, meaning they are "transmitted from animals to humans." In the current outbreak, it was found by the scientists that this Coronavirus was a new strain. Thus, it was named 'novel' or new Corona with the appellation of 'n-Corona'. It was later renamed as SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) by the International Committee on Taxonomy of Viruses, owing its similarities in genome structure with that of SARS virus. The SARS-CoV-2 is believed to have taken the following sequence- It originated from bats, and then transmitted to pangolins to humans. The sequence is yet to be confirmed. Until the source of this virus is identified and controlled, there is a risk of reintroduction of the virus in the human population and the risk of new outbreaks like the ones we are currently experiencing. It was the wet markets (selling live meat, fish, reptiles and wild animals) in Wuhan, where the virus It was believed to have spawned, precisely the Wuhan Seafood Wholesale Market. The problem with these Chinese wet markets was that all sorts of animals, ranging from fowl to wild animals, were sold there for their meat (for example monkeys, python, dogs, hares and pangolin etc.) without due care of hygiene. Previously, On rare occasions, a coronavirus may spread through contact with faeces. In these wet markets,

Which Coronaviruses affect Humans:

- While there are hundreds of coronaviruses that cause diseases in animals such as pigs, camels, bats and cats, till date seven different types of coronaviruses have been identified that infect humans.
- In the last two decades, more aggressive coronaviruses have emerged that are capable of causing serious illness and even death in humans. These include SARS-CoV, MERS and now SARS-CoV-2.
- In 1965, scientists DJ Tyrrell and ML Bynoe were the first ones to identify a human coronavirus,
- Seven types that infect humans: Includes two alpha coronaviruses (229E and NL63) and four beta coronaviruses (OC43, HKU1, MERS and SARS-CoV).

Table 1

Name of coronaviruses	Human first identified In
229E	Discovered in 1967
NL63 and HKU1	First identified in the Netherlands in 2004
SARS-CoV	2003 in China.
MERS	2012 in Saudi Arabia (transmitted by dromedary camels).
SARS-CoV-2	2019 in Wuhan.

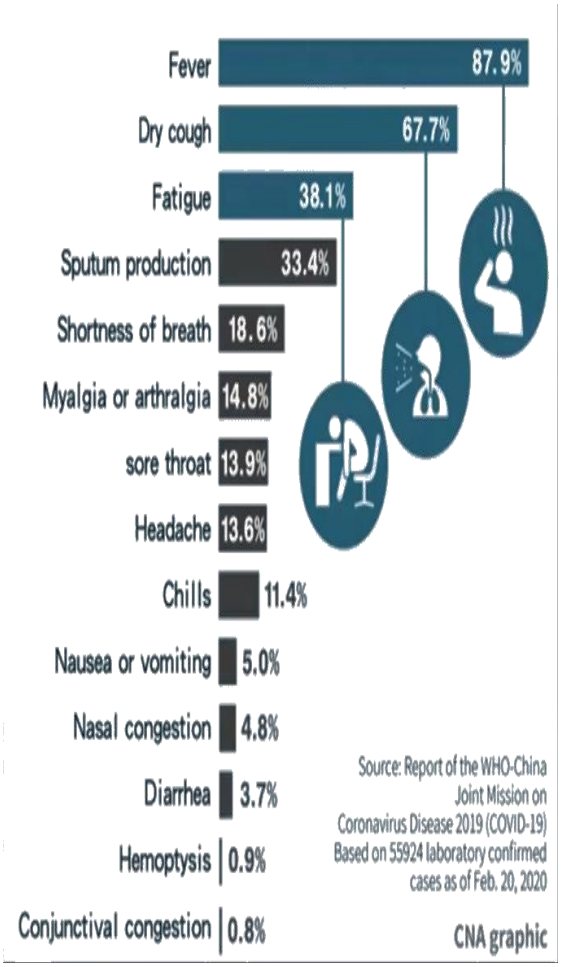
Mode of transmission: It is believed that the virus was transmitted to humans through the fluid secreted from the respiratory system of the wild animals. Further, it spread from humans to humans while coughing and sneezing, shaking of hands, making contact with a surface or object that has the virus etc.

Spread: The Incubation Period (the time between catching the virus and the beginning of symptoms of the disease) for COVID-19 range from 1-14 days, with the median incubation period of just over five days. The R_0 (pronounced R-nought) (average number of people who will catch the disease from one contagious person) of the virus is estimated to be between 2 and 3, and the mortality rate is of around 3% but the rate varies and is amenable to change due to different factors such as spread in different locations, response mechanisms and age profile of the infected.

Prevention: Wash your hands regularly for 20 seconds, with soap and water or

alcohol-based hand rub. Cover your nose and mouth with a disposable tissue or flexed elbow when you cough or sneeze. Avoid close contact (1 meter or 3 feet) with people who are unwell. Stay home and self-isolate from others in the household if you feel unwell. Don't touch your eyes, nose, or mouth if your hands are not clean.

Symptoms of infection by COVID-19:



CORONA-VIRUS VACCINE -

Some of the initiatives taken towards this are-

- The Oxford University vaccine, known as ChAdOx1, is in developing vaccine around the world.
- US biotech Moderna gave its first vaccine shot to a person in Seattle earlier this week.
- In Germany, CureVac is working on a vaccine, while others are in development in China.
- SANOFI and GSK To Develop Adjuvant Vaccine:An adjuvant is an ingredient used in some vaccines that helps create stronger immune response in people receiving vaccine. About Recombinant DNA technology this involves creation of the Recombinant DNA It relates to usage of three main tools:

Enzymes: It will help cut (restriction enzymes), synthesize (polymerases), and bind (ligases) DNA

Vectors: Considered as final vehicles that carry genes of interest into host organism.

Host organism: cell in which recombinant DNA is introduced. To date, host organisms include bacteria, fungi, and animal cells.

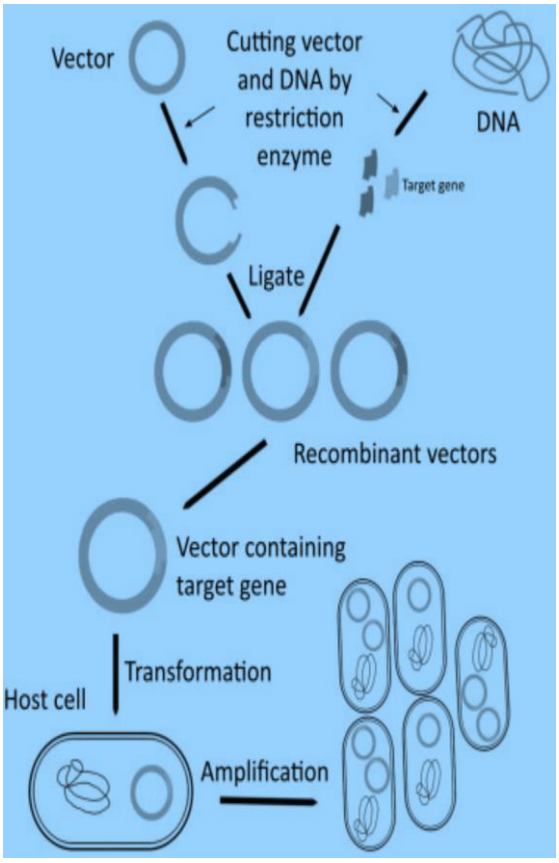


Fig: SANOFI and GSK development

3. FORECASTS FOR INDIA

According to Dr Ramanan Laxminarayan, founder and director of the Center for Disease Dynamics, Economics & Policy (CDDEP) in Washington, D.C., India could also see 20% to 50% of the population getting infected. This means between 300 million to 700 million people may get infected.

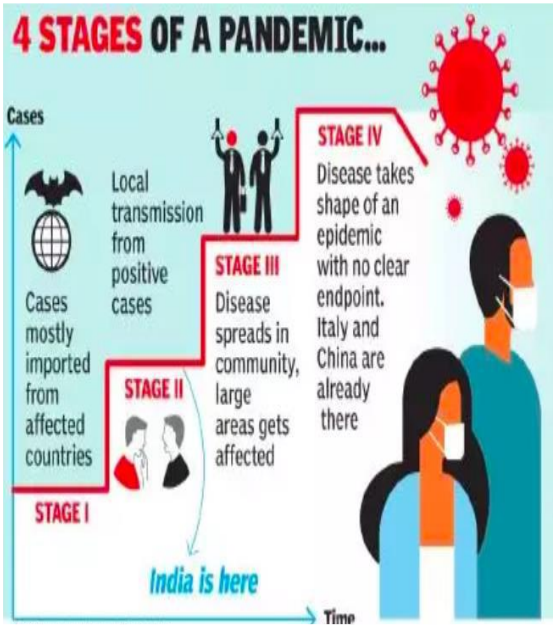


Fig: COVID cases vs. time in India

Timeline for the spread of COVID 19 in India

Table 2

30 January	First case is reported in the Indian state of Kerala
2-3 February	Two more cases are reported in Kerala, again both are students of the Wuhan University.
1-2 March	Two more cases are reported in India, a 45 year old man based in Delhi (with travel history to Italy) and another 24 year old engineer in Hyderabad (with a travel history to UAE)
4 March	14 Italians and one Indian are reported to have tested positive for coronaviruses.
12 March	India reports first death, a 76 year old from Kalaburgi, Karnataka dies. He had a travel history to Saudi Arabia.
13 March	India reports second death. Maharashtra alone reports 17 cases.
15-16 March	Uttar Pradesh confirms 12th case and Odisha reports its first case. The total number of cases in India crosses 100th mark.
21 March	The number of cases rises to 283.
23 March	470 (approx.) cases reported in India, with 9 deaths registered. 30 states and Union Territories have declared lockdowns. Out of the 470, 34 patients are being said to have recovered. So, the active number of cases is 440 (approx.).

4. CONCERNS BEFORE INDIA

Large population: India is the 2nd largest populated country in the world. Therefore, community transmission would lead to an exponential increase in the number of cases of infection.

Literacy Rate: India's literacy rate is 74.04%. This is just the average, with the rates varying from state to state. A vast majority of the population is semi-literate, illiterate or poorly educated. They lack complete knowledge about a Coronavirus like epidemic and the preventive measures to be taken.

Low levels of hygiene- including sanitation and the use of disinfectants.

Health Infrastructure: Italy, USA and China, the worst affected countries, have 3.2, 2.8, and 4.3 hospital beds per 1000 people respectively. Whereas, India just had 0.5 beds per 1,000 people (as of 2017). Also, the total ICU capacity is less than 1, 00,000. This will seriously affect our treatment response to critical patients.

Weak Implementation Capacity: Government agencies responsible for the enforcement and regulation of law and order have had a dismal track record.

Fake news and vague information related to the containment of the virus etc. circulated on social media platforms has the potential to create panic.

Poverty is the major concern for India. India houses the largest number of poor people in the world after Nigeria. There are a large number of informal workers like housemaids, wage labourers etc. who might find it difficult to cope up with the situation like a lockdown without support from the government or civil society organisations

Economic Slowdown: The economy is already under a slowdown which has been accentuated by restrictions imposed due to COVID-19. Since unemployment increases during a slowdown or recession, job losses, particularly in the unorganized sector are likely to be acute.

5. STEPS TAKEN BY INDIA

Lockdown and Quarantine: On 11th March, the WHO declared COVID 19 outbreak to be a pandemic, India take the first step to quarantine it. The Central Government advised all the states and the Union Territories to invoke the provisions of the Epidemic Diseases Act, 1897, which would enable them to enforce advisories as and when needed. Government banned all international commercials flights into India from the 22nd of March 2020 for a week. Universal health screening continues at all points of entry- Thermal Scans of the international passengers at Airports and of border-crossings is being done.

Addressing the nation on the 19th of March 2020, the Prime Minister, Mr. Narendra Modi urged the people to practice self-restraint, and adopt social distancing, including 'Janta curfew' (voluntary self-isolation) on Sunday, the 22 March 2020 from 7:00 AM to 9:00 PM. On 24th March, the Prime Minister announced a 21-day nationwide lockdown across the country. The announced lockdowns, and suspension of public transport, closure of public places and offices were aimed at reducing the growth rate of the virus, and help 'flatten the (transmission) curve'.

Financial Package: The government of India announced a 1.7 Lakh crore financial package in order to protect the weaker sections of the society .The Pradhan Mantri Gharib Kalyan Yojana had been announced within 36 hours of the lockdown and it would take care of the needs of poor and migrant workers, farmers, women, pensioners, widows and the disabled. Insurance cover- rs. 50 lakh per person for doctors and medical workers fighting covid-19. 80 crore poor people will receive 5 kg of wheat or rice and 1 kg of preferred pulses for free every month for the next three months. 20.4 crore Jan Dhan Women account holders would get rs. 500 per month for the next three months. 8.3 crore families living below the poverty line will be eligible for receiving free cylinders during the next three months. Wage-earners earning below rs. 15,000 per month who work in businesses having fewer than 100 workers would receive 24% of their monthly wages into their PF accounts for the next three months.

6. LESSONS FROM OTHER COUNTRIES

SOUTH KOREA:

- It has one of the lowest mortality rates at 0.77%, against the global average of

3.4%. Early measures and pro-activeness. When the Chinese scientists first published the n-Coronavirus virus genetic sequence for the first time in January, at least four South Korean firms quietly began developing and stockpiling test kits alongside the government well before the country had its first outbreak.

- Widespread Testing, Emergency Use Authorization (EUA), Prioritizing hospitalization, Use of Technology.

JAPAN:

- Firewall Strategy: As per this strategy, it bans the entry of travellers from hard-hit regions of China and quarantines the suspects.
- "Face mask culture": Wearing masks is a routine for every Japanese citizen– 3 in 10 people are seen wearing masks, even on days of no outbreaks. When the news of the spread of Corona virus was received, nearly 80% of the population was seen wearing masks.

CHINA:

- Strict Lockdown , Social Distancing measures, Extensive Public monitoring of citizens
- Extensive Quarantines: In Wuhan, the authorities converted stadiums and other facilities into mass quarantine centres and built more than a dozen temporary hospitals to house patients with less severe symptoms.
- Use of Technology: Social media platforms like WeChat and Weibo have hotlines for people to report others who may be sick. Chinese companies are, meanwhile, rolling out facial recognition technology that can detect elevated temperatures in a crowd or flag citizens not wearing a face mask.
- Moral Policing: Some cities are offering people rewards for informing on sick neighbours. Construction of a hospital in 10 days and additional deployment of health workers in Wuhan to tackle the situation proactively.
- Volunteers: The government declared a "people's war" and rolled out a "Fight On, Wuhan! Fight On, China!" campaign.

TAIWAN:

- Stopped export of surgical masks, Implemented purchasing policy, Online mask delivery.
- A unified command centre was set up to ensure the coordination between those managing resources, holding daily briefings and those controlling public messages.
- Big data analytics, Integration of travel history, Taiwan's health system.

SINGAPORE:

- Singapore reported fewer than 390 cases and has had only 2 deaths which are amongst the lowest in the world.
- It set up a virus-fighting task force, promptly imposed strict hospital and home quarantine measures, and banned large-scale gatherings. Proactive, not reactive: Within 24 hours of a new infection, Singapore raced to stitch together a holistic picture of an infected person's movements.
- Singapore took a step further with its contact tracing process, rolling out a Smartphone app called 'Trace Together', regarding which they encouraged all the Singaporeans to download.
- Lessons learned from SARS: After SARS and H1N1, Singapore built a robust system for tracking and containing such epidemics.

OTHER LEARNINGS:

A small town in Italy managed to stop a corona virus outbreak in its tracks after authorities tested the whole

population more than once in late February. Anyone who tested positive was immediately quarantined to stem the spread of the disease even if they weren't showing symptoms. Two weeks later, mass testing showed the infection rate had dropped by 12 times from three per cent of the population to just 0.25 per cent.

Temperature can stop corona virus: Some early research had revealed that higher temperatures and humidity could lower the rate of COVID-19's spread. The major reason behind this is that warm, humid weather can make it harder for respiratory droplets to spread viruses. The droplets that carry viruses do not stay suspended in humid air as long, and the warmer temperatures lead to more rapid virus degradation However, the spread of corona virus has shown around the world, that hot and humid weather will not stop coronaviruses infections entirely. E.g. Singapore, where the average temperature is around 80°F year-round, more than 500 cases of the virus have been confirmed, despite rigorous detection methods and strict quarantine rules.

7. THE INVISIBLE ISSUE

- **Women:** In the 2004 Indian Ocean tsunami, more than 2,00,000 people were killed or listed missing; a 52% of them were women. Women lack many life skills such as swimming and climbing. During tsunami recovery women face many difficulties including abuse by men.

  Coming to the current Pandemic, its impact on both genders But According to World Health Organization data, around 70% of the world's health workers are women, 79% of nurses are women. Health workers in general are highly vulnerable and not ensuring their safety is a high risk that can severely impact the health system. The entire family is now together within the limited space of their dwellings. As traditional role-play is still prevalent in most sections of Indian society, the equal division of household responsibilities among couples is still distant. Women from all strata face substantial additional household work. The lower income groups are already facing job losses and anxiety is leading to domestic tensions and violence against women. A large number of daily wageworkers resort to alcohol consumption. The ban on alcohol sales, as a part of the national lockdown, is contributing to domestic tensions, leading to women abuse. Women are twice as likely to face depression when compared to men. According to 2015-16 National Family Health Survey, around 30% of women in the age group 15 to 49 years face domestic violence.

- **Lost voices of the weaker section:** COVID19 threatens to push the world into a deep recession. If the lockdown continues, the world economy will contract by as much as 6% according to the International Monetary Fund. If it is not extended, the loss of human lives could be of unacceptable proportions. Therefore, those with no social media handles, who cannot incapable of highlighting their problems with impressive presentations in social media. Today, those who bear the brunt of this lockdown are the farmer and farm labour, the migrant worker, the unemployed, those in the unorganized sector, the rural poor, bus driver, bus conductor, auto driver and the small entrepreneur. They are paying the highest price for the necessary but unbearable lockdown. They are either stranded far away from home or confined to their homes with no work and incomes. All the Tips which are suggested by everyone on how to beat lockdown time, how to work from home, use Zoom, spend quality time with family. This time is Worse for the weaker section in our society how

labours can run their home if they have no work and no money to survive how they can feed their family , how they can stay happy with their family without money and food.

8. INTERVENTIONS REQUIRED AT DIFFERENT LEVELS.

AT ADMINISTRATION LEVEL

1. Testing Capability: Drastically increase the number of tests administered daily as there are often asymptomatic cases that go on to infect others and so early diagnosis is extremely important.

Perform Mass Testing: Develop multiple teams of 2-3 people each tracking every infected person, everybody they interacted with, then everybody those people interacted with, and isolating the bunch. The government should join hands with the private sector to increase testing capacity.

2. Awareness and Education: Regular announcements in villages, towns, and city wards about correct information regarding COVID-19 should be made to spread awareness and educate people. Encouraging people to potentially avoid non-essential visits during festive season (Eg: Ugadi for Andhra Pradesh, Telangana and Karnataka, and Gudi-Padwa in Maharashtra).

3. Monitoring: Every district should be treated as a separate unit to reduce the transmissibility of the virus, as some districts are more severely affected than the others. Use technology to track- devising apps that can track the quarantined, and collect data on symptomatic suspected people. Develop apps and websites for sharing and collating detailed information on the spread of the disease. Installing CCTV cameras and tracking the movement of vulnerable citizens.

4. Essential Supplies: Arrangement of adequate food supplies through the Food and Civil Supplies department should be made. A check on the black marketing of essential items like food items, masks and sanitizers, and other products of daily use should be ensured. All civilian supplies should be supervised by a civilian and not by police men.

5. Transportation of Migrants: The rush of migrants to their home towns and villages has the potential to transport the virus to the villages as well. Sufficient Government arrangements should be made to transport these people safely to their destinations or kept in guest houses in their current location.

6. Sanitize public facilities: We can take example from Istanbul, which has deployed a hygiene fleet of 40 vehicles and hundreds of personnel to sanitize and re-sanitize public and municipal facilities. Disinfectants should be installed at various bus rapid transit stations. For example, Kigali (Rwanda), has installed portable hand-washing stations across the city at bus stops, taxi queues and car parks.

LOCAL BODIES AND CIVIL SOCIETY AT LARGE

1. Role of Gram Panchayat: They should be asked to provide a list of persons who came to the villages before the lockdown was implemented. Community watch can be initiated on those individuals identified. A Gram Panchayat quarantine centre can be opened up at each and every Gram Panchayat. Migrants coming back could be quarantined for fourteen days there.

2. ASHA Workers and Anganwadi Centres: We need to provide them with the basic training and awareness of the disease. Provide them with the protective gears and remunerate them

handsomely to keep their motivation up. Anganwadi centres can help in the distribution of the food. The anganwadi workers should be sensitised and provided with protective gears. Door to door delivery of 'Mid-Day meals' is an important step to keep children healthy.

3. Wealthy Families: If anyone is having empty farm houses away from cities, they can contribute by providing their farmhouses as quarantine centres to the Health Authorities. Wealthy households must come together to develop a fund which can be used to fight this menace.

CORPORATES

1. **Work at developing health equipment:** These include masks, oxygen cylinders, negative-pressure isolation rooms etc. IKEA is helping to kit-out hospitals in affected areas.
2. **Protect the employees:** Responsible firms should do everything possible to protect their people and employees. These companies will build more resilient and more loyal workforces, better positioned to weather a prolonged economic storm.
3. **Develop good communication with employees:** When the boss speaks, people listen and the tone, accuracy and relevance of the employers' advice can make all the difference between a calm and panic.
4. **Learning's from other companies:** companies such as Microsoft, Amazon etc. collaborated to create a COVID-19 Response Fund, targeting the hard-hit Washington State. Alibaba foundation is donating 1.1 million testing kits, 6 million masks, and 60,000 protective suits and face shields.
5. Diageo India has pledged to produce around 3,00,000 litres of bulk hand sanitizers across 15 of its manufacturing units in the country to help cope with the demand for the product.

ENTREPRENEURS

1. Develop equipment at mass scale: IIT Delhi researchers have developed affordable tests for diagnosis. These need to be accredited after which private pharmaceutical companies need to be roped in to indigenously produce such kits within the country on a large scale. India is acutely short of ventilators. No other country is allowing export of ventilators. Government must support local companies to manufacture ventilators on a war footing.

2. Develop Technologies: Online data platforms can be used to predict the future by combining local infections and population moves, and therefore optimize the allocation of public resources. AI technologies can be integrated with infrared imaging for rapid and multiple body temperature monitoring. This technology can quickly screen crowds to improve detection efficiency and reach an accuracy rate of over 90%, which also prevents virus transmission.

3. Opportunity for Change: For entrepreneurs, coronaviruses present the following opportunities and insights:. Digitalization is the future**.** Risk management needs to be re-evaluated

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