



Research Article

# Challenges and Threats due to Deadly Corona Virus in India and Dealing it with Social Vaccine (distancing) - the Only Weapon

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## I N F O

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## A B S T R A C T

The whole world is, presently, reeling under a serious crisis due to wide spread of a very unique and deadly corona virus. It is said to have originated from China and spread over more than 200 countries across the world. There have been reports of high mortality and morbidity in China, Spain, Italy, USA, UK and France due to wide spread of this dangerous and contagious disease. Unfortunately, this war is being fought by the frontline warriors i.e. doctors, nurses, health workers, sanitary staff but, with no real weapon presently, as no drug or vaccine has been found effective to deal with this deadly virus. The spread/transmission cycle is very fast due to its very highly contagious nature and fast multiplication. Though, India has made all concerted efforts from the very beginning with all proactive actions and preparedness to deal with the situation due to coronavirus, yet it is becoming a Challenging task in some hotspots due to lack of social distancing or lockdown by some people in the community. The first phase of lockdown in the whole country started on 25<sup>th</sup> March for 21 days in order to break down the chain of transmission. However, due to its spread in some hotspots, it has been extended for another 19 days so as to well control the clusters and to prevent further spread. In an address to the Nation, Dr. Harsh Vardhan, Hon. Health Minister of India stressed the need of social distancing and lockdown as comprehensive strategy for prevention and break the chain of transmission for coronavirus and term social distancing as "social vaccine" besides other measures being taken for diagnosis and treatment. An attempt has been made in this manuscript to describe the challenges and threats caused by deadly corona virus in India with the benefits of social vaccine (distancing)-the only weapon to prevent and break the transmission.

**Keywords:** Social Distancing (Vaccine), Covid-19, Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), Syndrome-related Corona Viruses (SARSr-CoV)



## Introduction

COVID-19 is a new disease, distinct from other diseases caused by coronaviruses, such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). The virus spreads rapidly, and outbreaks can grow at an exponential rate. The crude mortality rate varies substantially by country depending on the populations affected, the point a country is at in the trajectory of its outbreak, and the availability and application of testing (countries that only test hospitalized cases will have a higher reported crude mortality rate than countries with more widespread testing). The crude clinical case fatality is currently over 3%, increasing with age and rising to approximately 15% or higher in patients over 80 years of age. Morbidity associated with COVID-19 is also very high. Underlying health conditions that affect the cardiovascular, respiratory, and immune systems confer an increased risk of severe illness and death. Global strategy to respond to COVID-19 includes mobilizing all sectors and communities, controlling and preventing cluster transmission, making efforts to reduce mortality and development of effective vaccine.<sup>1</sup>

According to the South Morning China Post dated Nov. 17, 2019, a 55-year-old individual from Hubei province in China was reported to be the first person to have contracted COVID-19, the disease caused by the new coronavirus spreading across the globe. Local country office of World Health Organization (WHO) was informed on 31.12.2019 about the cases of pneumonia of unknown etiology (unknown cause) detected in Wuhan City, Hubei Province of China. Chinese authorities identified a new strain of Coronavirus as the causative agent for the disease on 7.1.2020. The virus has been renamed by WHO as SARS-CoV-2 and the disease caused by it as COVID-19. At the time, authorities suspected the virus stemmed from something sold at a wet market in the city. However, it's now clear that early in what is now a pandemic, some infected people had no connection to the market. That included one of the earliest cases from Dec. 1, 2019 in an individual who had no link to that seafood market, researchers reported Jan. 20 in the journal *The Lancet*. Scientists now suspect this coronavirus, SARS-CoV-2, originated in a bat and somehow hopped to another animal, possibly the pangolin, which then passed it on to humans. The disease is now spreading between people without any animal intermediary.

COVID-19 was declared a pandemic by WHO on 11th March, 2020. The disease since its first detection in China has now spread to over 200 countries/territories, with reports of local transmission happening in more than 160 of these countries/territories. As per WHO (as of 15 April, 2020), there have been a total of 20,16,830 confirmed cases and 1,27,995 deaths due to COVID-19 worldwide and 4,91,951

recovered. After China, USA, Spain, Italy, France and UK have reported maximum deaths ranging from 12,000 to 26,000. In India, as on 15 April, 2020, 11, 55 confirmed cases and 396 deaths reported from 29 States/UTs. A total of 1362 cases have been recovered so far. Large number of cases has been reported from Delhi, Karnataka, Kerala, Maharashtra, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh.

## Possible Origin of COVID-19?

Since the SARS outbreak 18 years ago, a large number of severe acute respiratory syndrome-related corona viruses (SARSr-CoV) has been discovered in their natural reservoir host, bats. Previous studies indicated that some of those bat SARSr-CoVs have the potential to infect humans. In the last two decades, many viruses have been identified from bat species.<sup>2</sup> Bats have been recognized as the natural reservoirs of a variety of pathogenic viruses such as rabies, Hendra, Marburg, Nipah and Ebola virus.<sup>3</sup> In the recent study conducted by ICMR, bat samples from the seven states were screened, and the RS specimens of eight *Rousettus* spp. and 21 *Pteropus* spp. were found positive for CoV RdRp gene.<sup>4</sup>

## Contagious Nature of the Corona virus

The following three parameters need to be understood in order to assess the magnitude of the risk posed by this novel coronavirus:

- Transmission Rate (Ro): number of newly infected people from a single case
- Case Fatality Rate (CFR): percent of cases that result in death
- Determine whether asymptomatic transmission is possible

## Transmission Rate (Ro) of Coronavirus?

The *attack rate* or *transmissibility* (how rapidly the disease spreads) of a virus is indicated by its reproductive number (Ro, pronounced *R-nought* or *r-zero*), which represents the average number of people to which a single infected person will transmit the virus.

WHO's estimated (on Jan. 23) Ro to be between 1.4 and 2.<sup>5</sup> Other studies have estimated a Ro between 3.6 and 4.0, and between 2.24 to 3.58.<sup>6</sup> Preliminary studies had estimated Ro to be between 1.5 and 3.5.<sup>7-9</sup> An outbreak with a reproductive number of below 1 will gradually disappear. For comparison, the Ro for the common flu is 1.3 and, for SARS, it was 2.0.

## Fatality Rate (Case Fatality Ratio or CFR) of the Wuhan Coronavirus

The novel coronavirus' case fatality rate has been estimated at around 2%, in the WHO press conference held on January 29, 2020.<sup>10</sup> However, it noted that, without knowing how many were infected, it was too early to be able to put a percentage on the mortality rate figure. A prior estimate had

put that number at 3%. Fatality rate can change as a virus can mutate, according to epidemiologists.<sup>11</sup>

For comparison, the case fatality rate for SARS was 10% and, for MERS, 34%.

### Incubation Period

Symptoms of COVID-19 may appear in as few as 2 days or as long as 14 (estimated ranges vary from 2-10 days, 2-14 days, and 10-14 days), during which the virus is contagious but the patient does not display any symptom (*asymptomatic transmission*).

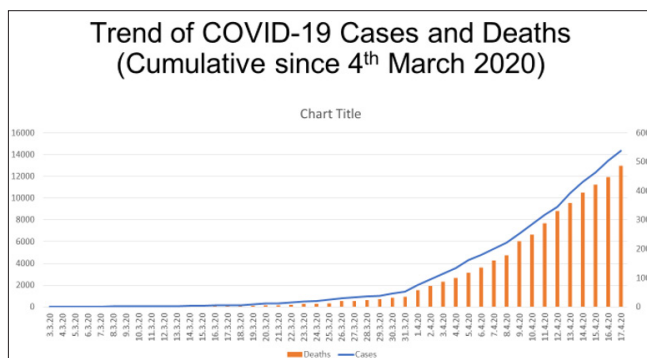
### Age and Conditions of Coronavirus Cases

According to early estimates by China's National Health Commission (NHC), about 80% of those who died were over the age of 60 and 75% of them had pre-existing health conditions such as cardiovascular diseases and diabetes.<sup>12</sup>

### Situation of COVID-19 in India So Far

There has been substantial increase in the number of cases and deaths due to corona since its inception and attributed to the migrants from China or other affected countries and their contacts in the family. However, there has been encouraging and timely efforts to contain the disease as compared to other developed countries like USA, Spain, France, Italy, UK and China in spite of limited resources, health infra-structure in view of 135 crore population of the country.

The number of cases and deaths reported due to corona till 17.4.2020 is as under:

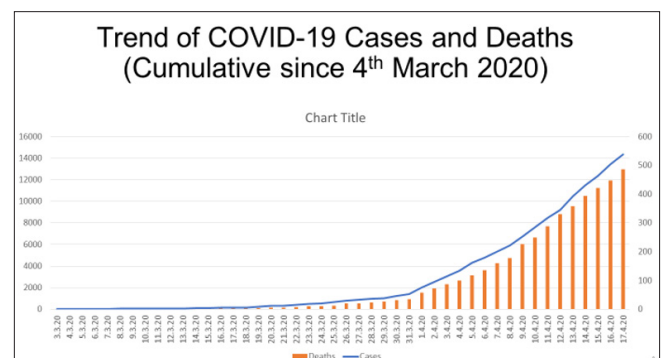


In India, as on 17 April 2020, 14,352 confirmed cases and 486 deaths reported from 29 States/UTs. A total of 1362 cases have been recovered so far. There have been reports of corona epicentres at Bhilwara, Jaipur (Rajasthan), Tharavi (Mumbai), Nizamuddin (Delhi), Indore (Madhya Pradesh), Kasargod (Kerala) and Noida, Agra and Lucknow (UP) with the maximum reports from Tamil Nadu, Maharashtra, Kerala, Rajasthan and Delhi. The Jamati episode at Nizamuddin is also said be main cause of such upsurge of the cases across the country and said to have attributed/ linked to about 30% of the total confirmed cases. Many cases occurred

due to negligence of the people hiding their past travel history and hiding themselves thereby contributing in the transmission of corona virus.

It was envisaged by Govt. of India on the criticality of lockdown and containment that there have been only 7,447 confirmed cases till 14.4.2020 after lockdown on 25.3.2020 in the country. It would have been raised to 1.2 lakh cases of corona, if only containment measures without lockdown keeping in view the projected with peak growth rate. But, the number of cases could have been substantially increased to the tune of 8.2 lakhs without containment and lockdown.

The day-wise details of the reported corona cases and death is as follows:



From 1 to 8 April, the cases starting increasing and there have been daily reporting of corona confirmed cases between 600-700 cases. The day of 9<sup>th</sup> April onward, there has been reporting of more than 800 cases till 17.4.2020 and has been more or less static. However, it has been upward or downward trend after going to state/district-wise and even hotspot-wise analysis. The mortality trend has been also similar corresponding with the reporting of corona cases and has been reporting of more than 20 deaths after 1<sup>st</sup> April till 17<sup>th</sup> April 2020.

However, the trend is upward due to ongoing transmission in the epicentres and large screening of the suspected cases.

### Diagnostic Tools

Initially, it started with the NCDC and ICMR network and then expended through some medical colleges with proper capacity building and commercially available testing kits. The number of diagnostic labs in the country has been now increased to 220 including private labs approved by ICMR for undertaking RNA-based RT-PCR test. Presently, an average of 15,000 to 20,000 tests are being performed for detection of COVID-19. Now, ICMR has approved the use of the rapid anti-body test at the field level. Presently, there is capacity to undertake 48,000 tests in a day in a single shift with the augmentation of diagnostic facilities.

Currently, on the basis of latest evidence, WHO recommends

the use of new point-of-care immunodiagnostic tests only in research settings.<sup>13</sup>

The presence of viral proteins (antigens) expressed by the COVID-19 virus is detected by a rapid diagnostic test (RDT) in a sample taken from the respiratory tract of a person. On the basis of experience with antigen-based RDTs for other respiratory diseases such as influenza, in which affected patients have comparable concentrations of influenza virus in respiratory samples as seen in COVID-19, the sensitivity of these tests might be expected to vary from 34% to 80%.<sup>14</sup> Utilization of antigen-detecting rapid diagnostic tests for patient care is not endorsed by WHO at present, although research into their performance and potential diagnostic utility is highly encouraged. A test meant for detecting the presence of antibodies in the blood of people supposed to have been infected with COVID-19 is more common type of rapid diagnostic test marketed for COVID-19.<sup>15-18</sup> WHO does not endorse the use of antibody-detecting rapid diagnostic tests for patient care but supports the continuation of research to demonstrate their adequacy in disease surveillance and epidemiologic research.

ICMR has recommended the use of rapid antibody test in the clusters / quarantine areas, for the load of antibodies in the persons if exposed to COVID-19 infection.

The protocol of ICMR for diagnosis of COVID-19 with symptoms of SARI / ILI is to be followed up in principle.

Recently, ICMR has recommended for sample pooling for real-time RT-PCR screening for covid-19.<sup>19</sup>

### Treatment

Presently, there is no specific recommended treatment protocol for the treatment of COVID-19 patients. Several combinations are used in some situations with Azithromycin and hydroxychloroquine. Mostly, treatment is symptomatic though chloroquine, anti-viral and anti-HIV drugs, which have shown some efficacy. There is lot of debate and discussions going on by the treating physicians and no conclusive recommendations or common protocol so far arrived in the world. However, hydroxychloroquine has been recommended as prophylactic dose for medical doctors and health workers dealing with the COVID-19 patients. In a limited study, Ivermectin-an anti-parasitic drug has been found to inhibit the replication of SARS-CoV-2 in vitro.<sup>20</sup>

Convalescent Plasma comprised of IgG and IgM COVID-19 antibodies and is drawn from the cured positive patients. Plasma therapy is known to be the cure the most critical cases, when infused in their blood following all safety procedures. This matter is under consideration of GoI and may be approved in some specific situations at selected hospitals for the treatment of critical patients. COVID-19 anti-bodies thereby released in the patients through plasma infusion may save some lives.

**Vaccine:** Presently, there is no vaccine against COVID-19 in near future. However, some studies have been initiated in China, USA and even in India to make an attempt to prepare the vaccine candidate, but it may take long period of 10-12 months.

Six Indian companies are presently leading the research for coronavirus vaccine. It is learnt that Zydus Cadila is working on two vaccines, Serum Institute, Biological E, Bharat Biotech, Indian Immunologicals and Mynvax are developing one vaccine each.

However, the most advanced candidates have recently moved into clinical development, including mRNA-1273 from US-based biotechnology company Moderna, Ad5-nCoV from Chinese biopharma company CanSino Biologicals, and INO-4800 from American pharmaceuticals company Inovio. Others in the list include LV-SMENP-DC and pathogen-specific aAPC from Shenzhen Geno-Immune Medical Institute in China.

### Disinfection of Common Public Places including Offices

Coronavirus Disease 2019 (COVID -19) is an acute respiratory disease caused by a novel Coronavirus (SARS-CoV-2), transmitted in most instances through respiratory droplets, direct contact with cases and also through contaminated surfaces/objects. Though the virus survives on environmental surfaces for varied period of time, it gets easily inactivated by chemical disinfectants. In view of the above, the following guidelines are to be followed, especially in areas reporting COVID-19. For ease of implementation the guideline divided these areas into (i) indoor areas, (ii) outdoor areas and (iii) public toilets. The following are the products recommended for sensitizations of hard surfaces to get rid of any chance of corona virus, if it happens to be there through some source.

Product	Available Chlorine	1 Percent
Sodium hypochlorite-liquid bleach	3.5%	1 part bleach to 2.5 parts water
Sodium hypochlorite-liquid	5%	1 part bleach to 4 parts water
NaDCC (sodium dichloro-isocyanurate powder)	60%	17 grams to 1 litre water
NaDCC (1.5 g/ tablet) - tablets	60%	11 tablets to 1 litre water
Chloramine - powder	25%	80 g to 1 litre water
Bleaching powder	70%	7g to 1 litre water
Any other	As per manufacturer's Instructions	



## Strategy for Prevention and Control of COVID-19

The main strategic components of any communicable diseases include proactive surveillance, early diagnosis, complete treatment and prevention and control. However, in view of the contagious nature and fatality of this disease, several timely proactive measures and immediate actions have been undertaken in the country to contain the spread of corona virus in the country. The main strategic components in India included the following:

### Phase I: (Pre-lockdown)

- Thermal screening of all international passengers including national arriving from China and other corona-affected countries at all airports/ ports.
- Diagnosis of the suspected persons with cold, dry cough, throat pain and fever and thereby, isolation for further investigations and treatment.
- Quarantine for others contacts for 14 days to monitor and re-testing of those having any clinical signs and symptoms of covid-19.
- Establishment of Control room as helpline by the Health Ministry at NCDC Delhi.
- Technical guidelines on the prevention and control of corona.

### Phase II: (Lockdown-1)

- Main emphasis on social distancing, personal hygiene (hand washing, mask, staying home).
- Mapping the clusters (hot spots) with local transmission having following steps:
  - Extensive contact tracing and active search for cases
  - Screening and testing all suspect cases.
  - Isolation and quarantine for all suspect / confirmed cases.
  - Providing treatment to confirmed cases.
  - Social distancing measures.
- Risk Assessment for transmission of corona at the field level due to the migrants.
- Strengthening of testing laboratories to increase diagnosis.
- Approval of private laboratories by ICMR approvals.
- Strengthening of quarantine centres, isolation wards and COVID-19 hospitals.
- Procurements of PPEs, Masks, diagnostic kits, Ventilators, ICUs and drugs.
- Advisories and technical guidelines to all the states by GoI in consultation with ICMR, NICD, AIIMS and other medical institutes.
- Coordination with other ministries, i.e., home, agriculture, food and supply, chemical and fertilizers, defense, finance and others.

### Phase III: (Lockdown-2)

- Preparedness for local outbreaks, if any and ensuring containment measures.
- Augmentation of quarantine centers, isolation facilities and covid hospitals.
- Procurement of supply of diagnostic kits, PPEs and medicines to the states/UTs.
- Capacity building of medical and paramedical staff across the country.
- Cluster based approach and immediate rapid response to hot spots.
- Sealing the hot spots and screening of whole population for isolation of confirmed cases and quarantine for the others.
- Mapping of the areas of corona affected spots, i.e., red zone, orange zone and green zone based on the reporting of confirmed corona cases.
- In case of large outbreak, the following containment plans is envisaged:
  - Defining the area of operation (Containment Zone)
  - Active surveillance for cases and contacts in that area
  - Expanding laboratory capacity for testing
  - Sufficient case management COVID-19 hospitals/ COVID-19 dedicated blocks
  - Implementation of social distancing measures
  - Chemoprophylaxis with hydroxychloroquine to all asymptomatic healthcare workers and asymptomatic household contacts of laboratory confirmed cases

## Challenges

1. Community response and cooperation
2. Search and outreach to the active cases and their contacts
3. Sufficient stock of diagnostic kits and involvement of private sectors
4. Provision of quarantine, isolation and treatment facilities
5. Procurement of masks and PPEs in required numbers
6. Augmentation of ICUs and ventilators
7. Ensuring food and vegetable supply chain to all population
8. Ensuring food and shelter homes for migrants
9. Emergency services
10. Social and mental stress in the people
11. Law and order

**Threats:** There are so many threats foreseen with the corona pandemic in India and with lockdown. Some of these are listed below:

1. Economic loss in Industries, mainly transport, aviation, tourism, hotel and restaurants, construction, agriculture, small and big scale industries
2. Life loss to elderly persons especially with comorbid

conditions.

3. Unemployment in all sectors
4. Agriculture loss
5. Security of frontline health personnel in the field
6. Chances of exposure to COVID-19 patients
7. Hidden unreported cases or asymptomatic carriers
8. Admissions to school and colleges

## Conclusion

There have been several proactive actions to deal with the deadly corona transmission in the country at the governmental level. Some of the key actions with regard to prevention and control has been well depicted in some recent publications.<sup>21</sup> There have been good examples of Bhilwada model, Agra model, Kasargod model to contain the spread of corona virus. However, the basic concept of the strategy remains to proactively identify/ define the containment zone in view of hotspots and undertake all stringent actions required with regard to break the chain of its transmission.

The health machinery has been quite proactive in terms of gearing up surveillance at point of entries, testing, isolation and quarantine at the international airports and seaports. Round the clock monitoring, guidance and support to the states is being provided in terms of testing facilities, essential medicines, masks, sanitizers, ventilators etc. with timely protocols and advisories was going on during lockdown 1 period. Under the emerging situation, social distancing and quarantine are the only viable approaches/ strategies to contain this contagious disease in the community.

In lockdown 2, the emphasis has been given with the classification of red, orange and green zones based on the reporting of corona cases. As per the reports till 16.4.2020, a total of 170 districts in 25 states have been identified as COVID-19 hotspots. These are the highest caseload districts contributing to more than 80 per cent of cases in India or highest caseload districts contributing to more than 80 per cent of cases for each state in India. 207 districts in 27 states have been delineated as non-hotspots. India proactively responded to the news of first coronavirus cases diagnosed in China on Jan 7, 2020.

The following cluster containment strategies have been suggested to be undertaken in the respective areas (This encompasses complete sealing of the hotspot with geographic quarantine, house to house search, stern social distancing rules, testing all suspected cases, isolation of cases, quarantine of contacts/ associations and risk disclosure to create awareness among people regarding preventive public health measures):

- Collaborative efforts to interrupt the chain of human to human transmission of corona virus in the red zone (hotspots) by reducing the zone with house to house

search, detection, isolation and quarantine following the principle of social distancing (vaccine).

- Having surveillance on the orange zone and not permitting the same to transfer to red zone.
- Appropriate tracking and supervision of the green zone with surveillance on suspected cases.

It would be very appropriate to conclude that presently, in the absence of any proper medicines or vaccine for the treatment of this deadly virus, the social distancing (vaccine) is the only possible weapon to fight with this war of COVID-19. This is the combined package of social distancing and lockdown with proper hygiene (Hand washing, using masks, proper sanitization practices) which will not only act as a weapon to fight this deadly virus under present circumstances but also break the chain of transmission and control further spread of coronavirus in the community.

**Conflict of Interest:** None

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