



COVID 19 in India: Challenges to health, food security and nutrition

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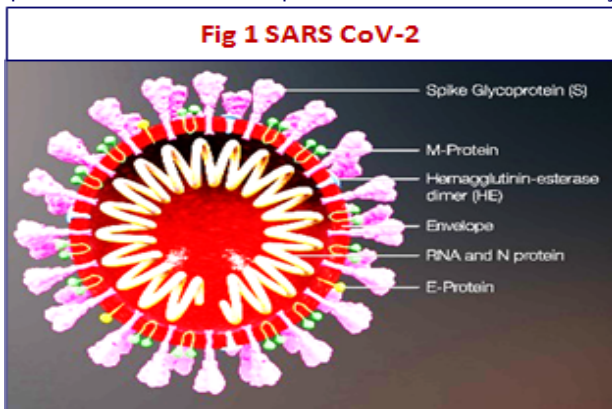
Introduction

A century after the devastating Spanish flu pandemic of 1918, the COVID-19 pandemic rapidly spread across the world during the winter of 2019 - 2020. On December 31, 2019, China reported to the WHO that there was an epidemic in the country caused by a novel corona virus. The virus was named "SARS-CoV-2" and the disease it caused was given the term "corona virus disease 2019" (abbreviated to "COVID 19"). On January 30, 2020, COVID 19 was declared by the WHO as a "public health emergency of international concern" (PHEIC). Later, based on the speed and scale of transmission reported from several countries across the globe, COVID 19 was declared a Pandemic on March 11, 2020.

The globalised world across which millions of people travel every day, coupled with the highly contagious nature of the virus led to the rapid spread of COVID 19. The magnitude of the infection and fatality rates vary considerably across countries and we still do not know the reason for these variations. Within a short period of two months consensus guidelines for preventing spread of infection, clinical management of infected persons and public health guidelines for containing and controlling COVID 19 epidemic were evolved and implemented on a global scale.

In an attempt to limit the spread of infection and save lives, all countries implemented a lock down for varying durations. This resulted in economic slowdown, rise in unemployment, decrease in wages and rise in food insecurity among the poorer segments of population; and unless rapidly corrected there can be some deterioration in nutritional status among vulnerable segments of population. This issue of the NFI bulletin provides a brief overview of the magnitude of the COVID pandemic and ongoing efforts in India to contain the spread and control COVID 19 epidemic in India, and the impact of lock down on food security.

Fig 1 SARS CoV-2



The virus

In Dec 2019 a new corona virus (SARS CoV-2) was identified as the cause of a pneumonia outbreak in Wuhan, China (Fig 1). The virus that causes COVID-19 and the one that caused the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 are related to each other genetically, but SARS was much less infectious but more deadly than COVID-19. All available evidence suggests that SARS-CoV-2 has a natural animal origin and is not a constructed virus. SARS-CoV-2 belongs to a group of genetically related CoVs isolated from bats and most probably has its ecological reservoir in bats. The genome of the virus was sequenced first in China and subsequently in other countries including India (at National Institute of Virology Pune). This step paved the way for manufacture and use of tests for diagnosis of SARS CoV-2.

Phases of the Pandemic

The WHO has defined four stages of the COVID 19 pandemic:

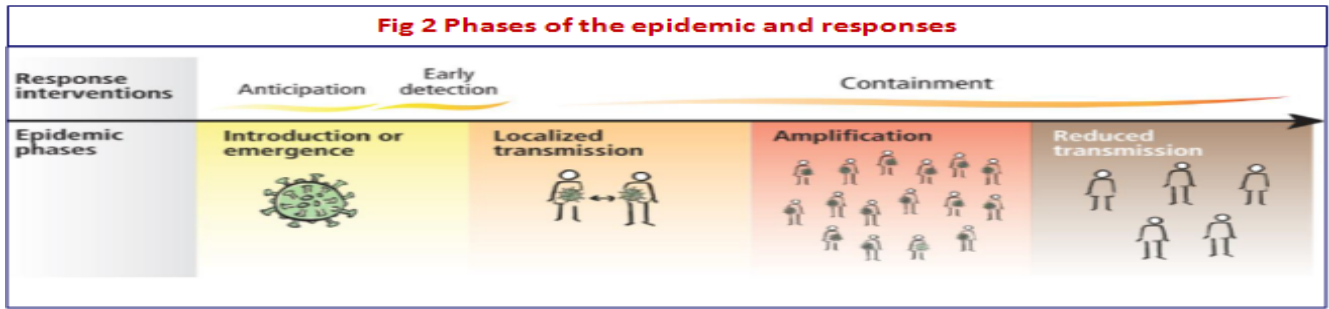
- Stage 1 there is no local infection
- Stage 2 travellers bring the virus into the country and transmit it to people they come in contact with, usually friends and family.
- Stage 3 persons without travel history or known contact with an infected person get infected
- Stage 4, there are many major clusters of infection all over the country

As the pandemic progresses, countries move from one to the next phase of transmission (Fig 2). Irrespective of the phases of the epidemic, the objectives of public health response to COVID 19 are to:

- prevent outbreaks, delay spread, slow and stop transmission;
- provide optimal care for all patients, including the seriously ill; and
- minimize the impact of the epidemic on health systems, social services, and economic activity.

Magnitude of the Pandemic COVID 19 in China

In December 2019 the SARS CoV 2 spread from one city - Wuhan, to the entire Hubei province. January 2020 saw the spread of infection across China and from China across continents (Fig 3). China restricted the congregation of persons for social, economic, educational, entertainment or trade purposes and banned crowding especially in closed environment such as malls and theatres; schools and colleges were closed. Despite this the



spread of COVID 19 in China continued. China imposed and implemented a strict lockdown to limit further spread. After two months, China reported flattening of the epidemic curve and the lockdown was relaxed in a phased manner; this enabled resumption of agricultural, industrial and economic activities. China now reports very few infections due to local transmission but there are new cases among incoming travellers. (Source WHO situation reports)

Global spread of COVID 19

From January 2020 onwards COVID 19 spread across all the continents of the world. The epidemic curve of confirmed COVID cases reported in different WHO regions over the past three months is shown in Fig 4. In March and April 2020, the rate of new infections surged first in Iran, then in Europe, followed closely by USA. For reasons not yet clear the South East Asia region appears be one of the least affected regions in the world with relatively low number of cases. As of 20th April 2020, there are a total 24,16,135 confirmed COVID 19 cases; 6,32,983 had been reported as recovered and there were 1,65,939 deaths. Computation of infected persons per million population across countries showed that Europe and North America are the worst affected continents in this pandemic (Fig 5). The major limitation is that these computations are based on data reported by individual countries. There are vast differences in testing rates and completeness of reporting between countries; the apparent low prevalence in some countries might be, at least in part, because of low screening and delays in reporting.

COVID-19 in India

The first three cases of confirmed COVID-19 cases in India were students who returned to Kerala from Wuhan. The State Health Minister announced that these children will be quarantined at home and tested. When they tested positive, they and their families were kept under home quarantine and provided essential goods and services at home. All the three recovered. In an attempt reduce spread of infection Government of India (GOI) put out an advisory against non-essential travel to China.

Screening of travellers

During February 2020, the screening of incoming passengers in airports for fever was initiated: initially passengers from COVID affected countries and then all passengers coming to India were screened for fever. Those with symptoms were quarantined and tested for infection. Quarantine facilities were established initially in Army establishments and subsequently in sports stadia. Till March 4th 2020, 5,89,000 people had been screened at airports and over one million were screened at borders with Nepal. Around 27,000 were placed on quarantine at home and were followed up. A review of the experience in March 2020 showed that screening of persons for fever is not an effective method of screening for COVID 19. The number of laboratories equipped to undertake testing for virus were increased and testing of persons with symptoms was ramped up.

In the period January to mid March 2020 all the detected COVID cases were persons coming to India from COVID affected countries and their contacts in India (Stage 2 of COVID pandemic). Kerala which had previous experience with quarantining persons during the Nipah virus epidemic preferred home quarantining of persons, local health personnel following them up and referring symptomatic persons to hospital. Compliance with home quarantine was good.

During March a steady stream of travellers (Indians and foreigners from different countries) were screened on arrival in the airports and symptomatic persons were referred to health facilities; asymptomatic persons were quarantined at home. If they were found positive, they, their families and their contacts were quarantined at home for further 15 days. All quarantined persons and their contacts were followed up by health staff and provided with needed advice; if any one developed symptoms of COVID 19 they were given symptomatic treatment and supportive care at home. They were advised to contact health staff (mobile phones, helpline numbers) if they developed high fever and/or difficulty in breathing. Those who developed these symptoms were admitted in the hospital.

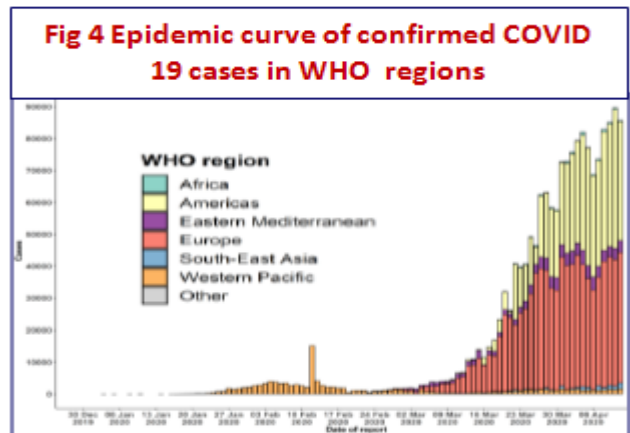
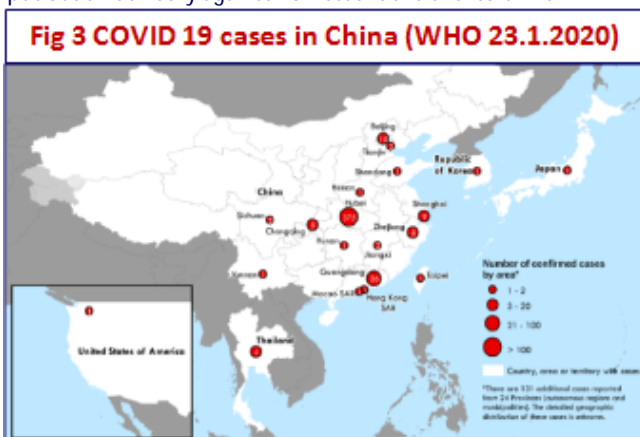
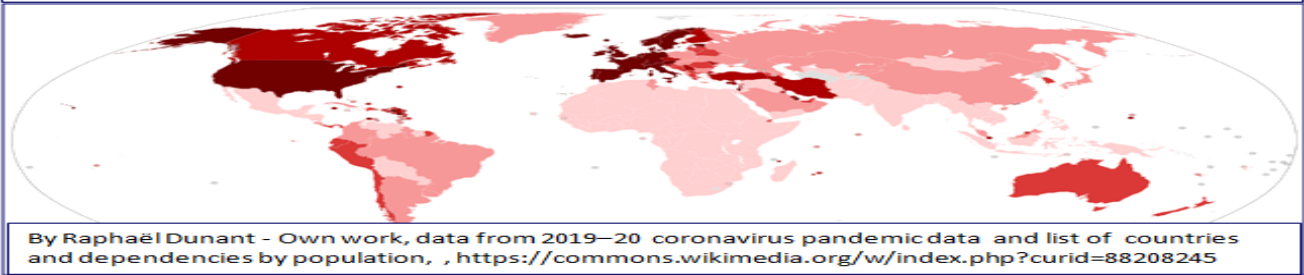


Fig 5 Verified infected persons per million population



Contact tracing, testing and home quarantine

Progressively the testing covered other groups beginning with the household contacts of persons who had travelled from countries with COVID 19, contacts and household persons of confirmed cases and extending thereafter to persons with respiratory symptomatic seeking healthcare. The outbreak was declared an epidemic in India and provisions of the Epidemic Diseases Act, 1897 have been invoked; all educational institutions were shut down. By mid March additional quarantine facilities were setup across the country to handle the massive number of persons who may have to be quarantined.

Early in March 2000 about 9,000 persons (960 foreigners) attended a religious congregation in Delhi. Attempts were made to trace all persons who attended the event and their contacts. As of 19th April, 4291 out of 14,792 confirmed cases in 23 Indian states and Union Territories were linked to this event. The episode emphasised the importance of avoiding congregations to prevent spread of the infection.

Encouraged by the favourable response to home quarantine in Kerala, India invested in providing home based quarantine and care for infected persons and those with mild disease and their family, providing them with essential supplies and services including health and nutrition care. To a large extent this enabled the citizens to comply with the quarantine regulations and mitigated the physical and psychological hardship of quarantine. The quarantined person(s) had home food, comfort and the opportunity to spend quality time with family. If any infected person developed mild symptoms and was advised home care, there were no problems in the family members caring for the infected person because all were at home because of the quarantine. The quarantine facilities developed in trains and stadiums meant to accommodate 3,20,000 persons were kept fully functional but were grossly under-utilised.

Lockdown to prevent spread of COVID 19

On 22nd March 2020, India observed a 14-hour voluntary public curfew. The government followed it up with lockdown in all major cities and 75 districts where COVID cases were reported. Commencing on 24th March, a nationwide lockdown for 21 days was ordered, affecting the entire 1.3 billion population of India. All international, national and inter-state passenger transport

(air, rail, bus and car) were banned. During the lockdown period the Government tried to maintain transport of essential supplies and goods. Railways rakes lying unutilised because of the industrial shutdown were used, in addition to trucks, for transport of food, drugs and other essential consumables. By and large essential goods and services were available across the country though there were issues related to quality, variety, quantity and cost.

Current status of the epidemic in India

The epidemic curve showing the cumulative number of confirmed cases, active cases, recoveries and deaths in the period from 30th January 2020 to 13th April 2020 is given in Fig 6. In April there has been an increase in number of confirmed cases. Part of the increase could be due to increased testing and reporting, identification of hot zones and screening of the residents in these areas. State-wise distribution of confirmed cases and deaths are given in Figs 7 and 8.

The reported cases, cases/million population, recoveries and deaths in the top ten countries with high COVID 19 cases and India are given in the Table 1. There are large differences between countries in terms of both confirmed cases and deaths. India has the lowest case load per million population.

As of April 20th 2020, there were 17,656 confirmed cases and 559 deaths; 2,842 persons had recovered from the infection. Analysis of data showed that:

- a majority of states are showing reduction in the number of new cases
- between 15th and 31st March the average growth factor (one method of measuring spread of infection) was 2.1; since April 1st it had declined to 1.2
- case doubling time (another method of measuring spread of infection) was 3 days prior to lock down; currently it is 6 days.

These data suggest that the lock down and personal protection measures are slowing down the spread of COVID 19. Focussing on home care supported by the primary health care system and backed up by referral of moderate and severely ill persons to hospitals for care has paid dividends in terms of high recovery rates and low case fatality rates. Efforts have to be redoubled to

Fig 6 Epidemic curve of COVID 19 cases and deaths in India

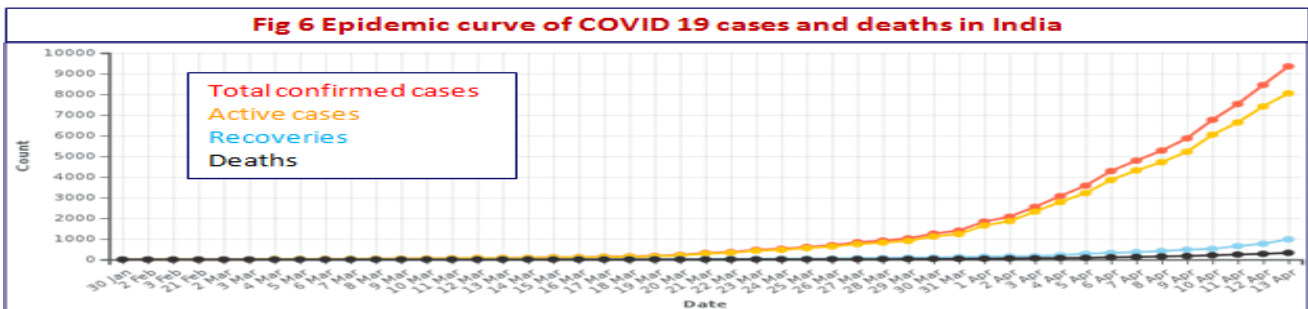


Fig 7 Confirmed cases of COVID 19 in India (13.04.2020)

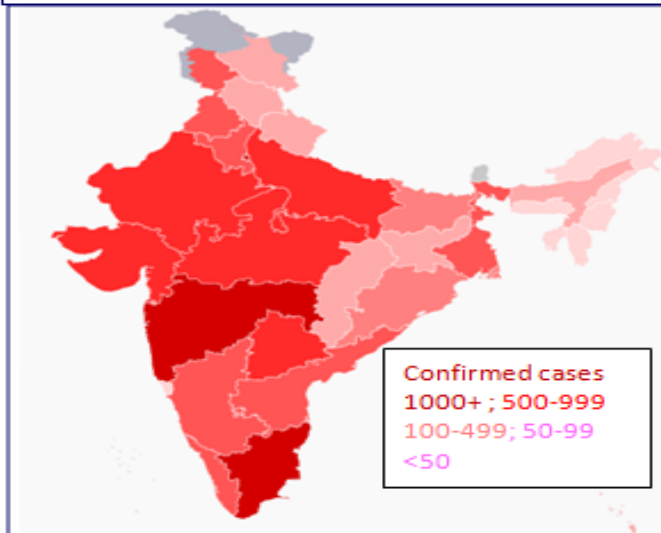
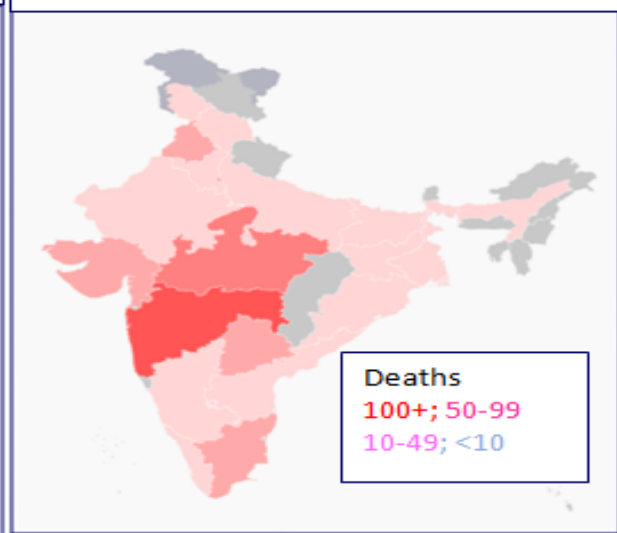


Fig 8 Deaths from COVID 19 in India (13.4.2020)



ensure that the gains in the last two months are sustained over time.

Extension of the lock down period

After an in-depth review of the situation on 14th April, the lockdown was extended till 3rd May with a conditional relaxation from 20 April for the areas that have been able to contain the spread. Based on the data on number of confirmed cases, three categories of zones (red, yellow and green) have been identified. To prevent spread of infection all supplies are provided at home to the households residing in the red zone. As the lockdown gets relaxed in a phased manner, the people residing in green zones will be able to move around, maintaining precautionary measures such as physical distancing and wearing of masks (Source MOHFW).

Strategy for COVID 19 testing in India (ICMR Version 4, dated 09/04/2020)

Rapid and confirmative diagnostic assays are a foundation for timely detection and management of COVID 19. Considering the large population base, cost-effective and rapid tests are required on urgent basis. Amplification of SARS CoV-2 RNA confirms the presence of virus in the suspected samples taken early in infection even during the incubation period. Initially two target genes were used for the detection of SARS CoV-2, envelop (E) gene for screening and RNA dependent RNA polymerase (RdRP gene) for confirmation (Corman et al., 2020). rRT-PCR tests are carried out on throat and nasal swab samples, and require well-equipped laboratory setting. Results may take one or more days. rRT-PCR tests are positive right from the earliest stage of infection. Antibody tests are serological tests, and are easier and quicker to carry out and the results are available in 30 minutes. The tests become positive after antibodies develop (usually in 7 days) in the person. As a negative antibody test does not rule out infection, rRT-PCR has to be done to confirm that the person is not infected.

ICMR guidelines recommend screening for SARSCoV 2 in:

- All asymptomatic individuals who have undertaken international travel in the last 14 days
- Asymptomatic direct and high-risk contacts of a confirmed case (test once between day 5 and day 14 of coming in contact)
- Asymptomatics in hotspots/clusters, (defined by MoHFW) large migration gatherings/evacuee centres

- All symptomatics (fever, cough, sore throat, runny nose),
- All symptomatic contacts of confirmed cases
- All symptomatic health care workers
- All patients with Severe Acute Respiratory Illness (SARI).

Testing of cases has been ramped up over the last one month. Till 19th April 2020 ICMR had reported that 4,01,586 samples from 3,83,985 individuals have been tested; 17,615 were positive. As compared to other countries the positivity rates are relatively low. In the coming months large scale screening of population groups across states are required to assess the true prevalence of infection and the impact of ongoing interventions. For this purpose sero-surveillance using antibody testing may be cost effective.

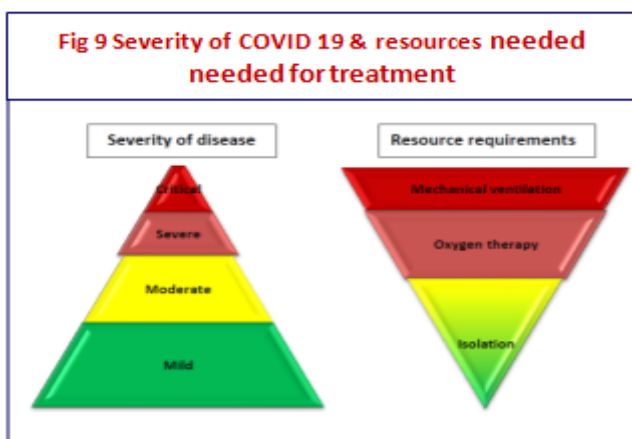
Course and outcome of COVID 19

All infected persons are asymptomatic immediately after infection; they can however transmit the infection even at this stage. Incubation period for COVID-19 is around five days (range 1-14 days). Many infected persons remain asymptomatic and eliminate the virus in about a month. Illness due to COVID-19 infection is generally mild, especially in children and young healthy adults. The most common symptoms of COVID-19 are fever, tiredness, and dry cough. Some patients may have aches and pains, nasal congestion, runny nose, sore throat or diarrhoea. Around 1 out of every 6 persons with COVID 19 develops high fever and difficulty in breathing; such persons require hospitalisation.

Currently, there is no specific antiviral drug to prevent or treat COVID 19. There is no evidence that hydroxychloroquine has any effect on the course and outcome of COVID 19. Currently, the drug is being given under careful medical supervision, on an empirical basis as a prophylactic to health workers providing care to COVID 19 patients. Currently there is no vaccine for prevention of COVID 19.

Providing health care to COVID 19 patients

Guidelines for management of infected person have been drawn up and are available in the web site of MOHFW and the National Centre for Disease Control. For the duration of the pandemic, GOI has designated some hospitals as COVID 19 centres. All hospitals have earmarked adequate proportion of their beds for COVID 19 patients away from wards for treatment of other patients. This is to prevent cross-infection with the general hospital population and to ensure that important non-COVID medical care is not



compromised. Protocols for care of COVID 19 cases have been drawn up and the hospital staff are being trained. So far the number of persons admitted in hospitals and numbers of persons requiring care in ICU have been far below the number of beds allocated. With suspension of passenger rail traffic, Indian Railways had carriages lying idle. Some of these have been modified as temporary mobile hospital wards. This strategy provided not only increase in number of beds but also provided the ability to reach these beds to places as and when needed on real time basis. So far these have not been used.

Guidelines for management of infected persons

Guidelines for management of infected person have been developed by Ministry of Health and Family Welfare (MOHFW) and are available for ready reference in the web site of the MOHFW and National Centre for Disease Control. All persons who develop fever and respiratory symptoms should report to health facility for screening and appropriate care. All patients accessing health system are screened at the first point of contact for symptoms suggestive of COVID 19 using the WHO case definition. If they are suspected to have COVID 19 they are referred to appropriate designated facility. The health care personnel of medical facilities are trained in triage and sending patients to the appropriate wards in the hospital.

Home based care for persons with mild infection

Guidelines on management of positive persons who are asymptomatic or have mild illness had been notified and are widely disseminated. Patients who have no symptoms or only mild symptoms are sent back for home based care. Local health care personnel are informed to ensure that they and their family remain in quarantine and are provided with needed health care

Table 1 COVID 19 Confirmed cases, cases/million population, recovered and deaths

Location	Confirmed	Cases/million people	Recovered	Deaths
World	2310572	297	590682	158691
USA	739988	2245	66357	38928
Spain	194416	4128	74662	20639
Italy	175927	2920	44927	23227
Germany	143475	1726	77147	4477
UK	114217	1719	—	15464
France	111821	1667	35983	19323
China	82735	59	77062	4632
Turkey	82329	990	10453	1890
Iran	80868	970	55987	5031
India	14792	11	2015	488

as well as essential requirements at home.

All such persons can remain at home in quarantine with other family members. All infected persons should wear a mask, observe respiratory etiquette, wash their hand as and when they touch their face, nose or mouth. Family members, who provide care should wear a mask, stay about a metre from the ill person, wash hands with soap and water as and when they touch the surfaces handled by the infected person. With symptomatic treatment and supportive care in home settings, about 85% of infected persons recover from the disease within a week or ten days after the onset of symptoms. This strategy has also minimised pressure on hospital beds, spread of infection in hospital settings to other inpatients and health care providers.

Hospitalisation for moderate and severe cases

About one sixth of the infected persons develops persistent high fever and/or breathlessness and require hospitalisation. Older people and those with underlying medical problems like high blood pressure, heart problems or diabetes, are more likely to develop serious illness. Majority of moderately ill persons recover with supportive treatment and return home.

About 5% of infected persons require intensive care and perhaps ventilator support. Special areas have been demarcated in ICUs in designated hospitals for care of the severely ill persons. So far the ICU beds allocated for COVID 19 patients have been more than sufficient to look after the patients referred to them. During intensive care management of COVID 19, the attending physicians determine on a case by case basis which of the previously prescribed medications these patients were taking earlier should be continued. Proactive communication to reassure patients and provide prognostic information to the relatives is essential.

Care of vulnerable segments of population with COVID 19

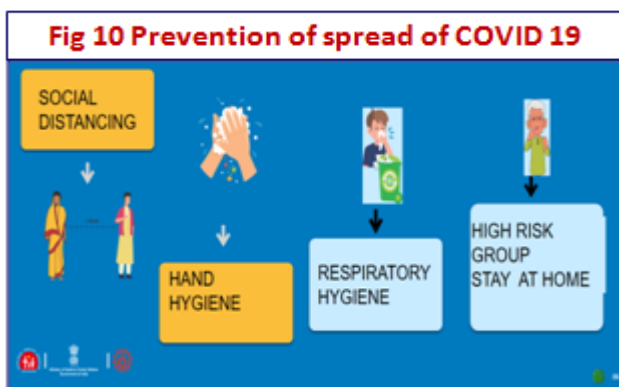
Available data indicate that elderly persons and those with pre-existing non-communicable diseases (NCDs) are at greater risk of developing severe COVID 19; the case fatality rates in these persons are also high. It is often difficult to determine whether it was the COVID 19 infection or the pre-existing condition that caused serious or fatal outcomes. Fear of infection is greater and physical and psychological impact of infection is higher in elderly especially in those who do not have adequate family, economic and emotional support. They require counselling and supportive care.

Persons with NCDs should continue to take their prescribed medication. They should have one month supply of medication and regularly take their medication. They should:

- not go to hospital for routine check-up or follow-up;
- postpone elective surgeries;
- contact nearest health care facility if they develop fever, cough and/or breathing.

Health care for persons not having COVID 19

Every effort is being made to ensure that persons requiring preventive, promotive, curative and rehabilitative services for other ailments do get the needed care without incurring any additional risk, cost or effort. The Health and ICDS systems are making special efforts to ensure that all the preventive and promotive care services are provided to children and women especially pregnant and lactating women. However those requiring elective surgical care are advised to postpone it.



Nutrition support during COVID epidemic
Nutrition support to persons with COVID 19

COVID 19 is a mild respiratory illness in over 80% of persons most of whom are young adults; it is unlikely to cause substantial deterioration in nutritional status of normally nourished persons. Like all viral respiratory infections, it does result in deterioration of micro-nutrient status eg vitamin A. Persons with moderate or severe infection who will take a longer period to recover and are more likely to have severe depletion of micro-nutrients are hospitalised. The treating team in hospitals will be able to assess and provide appropriate nutritional support during the period of hospitalisation and hasten the recovery. Persons with mild infection are at home quarantine with their families and it may not be possible to provide empirical micro-nutrient supplements to all of them. However, this pandemic provides an additional opportunity to emphasise the need for a balanced diet with adequate pulses and vegetables, both for the infected person (to hasten recovery) and to the entire family (optimal nutrition can reduce risk of infection).

Nutrition support to general population during COVID 19 epidemic

Nutrition advice to the general population in lockdown: Eat the habitual food with a lot of available seasonal vegetables to meet the requirements for essential vitamins, minerals, dietary fibre, protein and antioxidants. Use only iodized salt. Do not eat under-cooked foods. Ensure adequate hydration; the summer is just around the corner. Do not consume high-fat high-salt fried foods.

In India under-nutrition continues to be a major problem among general population. Food supplementation programmes aimed to bridge gap between energy requirement and intake are being modified in the COVID epidemic. ICDS has shifted from hot cooked meal to take home rations supplied at home to all ICDS beneficiaries. The Mid Day meal will be provided to all school children during lockdown and vacation. GoI has provided food grains and cooking costs to the states and had given them the option of providing either food grains through PDS to children's families or serving a hot cooked meal to children. Ongoing Iron folic acid, calcium and Vitamin D supplementation to pregnant women is being organised with AWW, ASHA and ANM providing these at the individual's home.

Preventing the rise of over-nutrition during the COVID 19 epidemic

In India, over-nutrition has been emerging as a major problem in all age groups because of very low physical activity. The lockdown has imposed further severe constraints on physical activity. While adults in middle-class families may be doing household chores or going out to get groceries, the children are mostly sedentary. All family members may be spending more time watching TV and

perhaps munching snacks. There are anecdotal reports of weight gain during lockdown. In the post COVID 19 era gyms with their closed environment, group cycling and group walks may no longer be the preferred modes of increasing physical activity. We need to come up with physical activity advice for all segments of the population which is practicable across urban and rural areas in different segments of population. There is need to be innovative and assess the feasibility of sustainable routine discretionary physical activity at home.

COVID 19 and mental health

COVID 19 has led to some anxiety and fear at times leading to psychological problems and irrational behaviour. This is mainly because many persons recall the devastating 1918 flu pandemic, more recent SARS epidemic; other not so knowledgeable persons fear death because they had heard about Ebola and Nipah epidemics. It is therefore essential to reassure the population that currently the risk of Indians getting infected with COVID is one in a million or less. In the unlikely event of their getting infected, over 85% of the infected person have only mild flu like illness and they will recover within 7-10 days; only 15% require hospitalisation and in India the death rate is very low.

Personal protection measures

SARS CoV-2 spreads through airborne respiratory droplets when an infected person coughs sneezes or speaks. Persons close by get infected by inhaling the virus containing droplets or by contact with objects and surfaces contaminated with droplets containing the virus. Practicing respiratory etiquette of covering nose and mouth during sneezing and coughing reduces the droplet spread of infection. Staying away from any potentially infected persons is one of the most important methods for reducing the spread of infection. Global and Indian guidelines have empirically recommended that the minimum distance should be one meter.

Hand washing and sanitising surfaces

Droplets with virus land on objects and surfaces around the infected person. People can be infected by touching a contaminated surface and then touching their eyes, mouth or nose. Washing hands with soap and water for 20-30 seconds whenever persons touch potentially contaminated surfaces is an important method for prevention of infection. All surfaces of furniture and equipment (like weighing scale) in hospitals should be adequately cleaned and sanitized to prevent spread of infection.

Wearing of masks

A multilayer cotton mask offers some protection to the wearer from droplets of infectious material emitted during coughing/sneezing/talking by an infected person but do not offer the high degree of protection provided by N95 masks. To be effective the mask should be covering the nose and mouth, be reasonably fitting and should be kept in place. They should be removed at least once in 6 hours or when they become moist with secretions or sweat. They should be washed well with soap and water and thoroughly dried before reuse. In the early phase of the epidemic masks were provided to and was used by potentially infected quarantined persons and persons with respiratory symptoms to reduce the amount of potentially infected droplets from these persons reaching the environment. Those providing care to quarantine persons and home care providers were advised to wear similar mask to reduce the risk of their inhaling the infected droplets. In the current phase of the

epidemic the use of these masks has been made mandatory whenever anyone leaves home and goes into a public place.

Personal protective equipment for health care workers

Health care providers taking care of COVID 19 patients at all levels are at high risk of getting infected; effective steps have to be taken to minimise the risk. The requirement for Personal Protection Equipment (PPE) (goggles, face-shield, N95 mask, gloves, coverall/gowns (with or without aprons), head cover and shoe covers) has been computed; needed equipment has been procured and made available in hospitals. Guidelines for personal protection procedures to be followed by hospital staff at various levels including the sanitation and security staff have been drawn up and are available in the web site of MOHFW and AIIMS Delhi. All health care providers have been trained in these procedures and have been given access to the appropriate PPE. Correct and consistent use of these will minimise the risk of transmission of SARS CoV-2 to health care workers. It has to be emphasised that for prevention of COVID 19 PPEs are an addition and not a substitute to basic preventive public health measures; physical distancing, hand hygiene, and respiratory etiquette which must be followed by everyone at all times.

Adverse impact of COVID 19 on quality of life

In the last three months, the efforts to prevent spread of infection COVID 19 and save lives have led to disruption of all aspects of life of citizens from all strata of society and considerable deterioration in quality of life. The worst affected have been the poor and marginalised segments of population especially migrant labourers.

Human cost of lockdown

Efforts were made to ensure that the supply of essential goods and services were maintained during lockdown period. Ministry of Consumer Affairs, Food and Public Distribution has been asked to ensure availability of essentials. Railways provided their rakes, which were free because of the industrial shut down, for transport of food, drugs and other essential consumables. There has been no sustained panic buying; this suggests that these efforts have been fairly successful.

With the lockdown the daily wage migrant labourers in many states were in distress. State governments had requested them to stay where they were, assured them that cash grants, food and shelter will be provided. However, many migrant labourers were intent on getting back to their villages and families. This mass movement of migrant labourers is not desirable because:

- returning migrants may spread the infection to villages;
- in many rural areas from where these workers come health care facilities are sub-optimal. They and their families may face higher morbidity and mortality if the infection spreads;
- unemployment rates may be lower if these labourers get re-employed;
- it will be easier and quicker to re-start industrial production if the labour has stayed in the area and not gone away.

In the next few months data on the reverse migration to villages and its impact on COVID 19 spread to rural areas will become available. It is also important to find out and document:

- how many migrated back to urban areas and found employment;
- how the informal sector coped with lack of trained migrant workers; and
- what was the impact on productivity and profit.

Effect on the economy

The COVID 19 lockdown is a unique non-economic, external reason leading to simultaneous decline in demand and supply. Goods and services were not supplied in adequate quantities to meet existing demand. But at the same time, people lost jobs and wages; even those with stable jobs and income hesitate to purchase goods and services beyond a bare minimum. As a result overall demand also fell.

The Indian economy was facing a downturn by the end of 2019. As India moved from regulations and controls to a total lockdown in an attempt to halt transmission of COVID 19, there was a further deterioration in economy. The banking sector maintained services during lockdown. Travel (aviation, railways and road ways), tourism and hospitality industries have suffered; in the post-lockdown phase these sectors may continue to suffer because of economic slump and the fear of resurgence of COVID 19. Sectors of the economy highly dependent on exports, such as the spice and plantation sectors in India, will face a fall in export demand and prices. Sectors of the economy dependent on imports of intermediary goods or raw materials will see decline in imports and production. Fall in foreign remittances will adversely affect the nation's foreign exchange reserves. The fall in oil prices is a cushion, but the fall in domestic demand for oil may counteract this effect. Various agencies have predicted a fall in the projected economic growth in India for 2020-21 by about 2-3%. However all countries are facing a similar decline.

On March 26th India announced an economic stimulus plan totalling Rs 1.7 trillion to help millions of people affected by a nationwide lockdown. The Government of India plans to distribute five kilograms of staple food grains like wheat or rice for each person free of charge in order to feed about 800 million poor people over the next three months. What appears to be a major challenge to the economic sector could be transformed into an opportunity if the Indians rise up to the challenge with their unique combination of innovation and restructuring with elimination of redundancies to reduce cost and improve consumption.

Impact on food supply

Food supply chain involves a complex web of interactions of production, processing, transportation, and marketing. India has adequate food grain stocks; food grain output this year is expected to touch 290 million metric tonnes. So far there has not been reduction in availability of food in India. The GoI had included most agricultural activities under essential services exempted from the lockdown. Efforts are being made to ensure that the lock down does not adversely affect the harvesting, transporting, procurement and storage of the food grains. It is expected that once lockdown is eased there will be a rapid return to normalcy in the supply chains. While rising unemployment is a major consequence of lockdown, there is growing fear that labour shortages (because migrant labourers may not come back after the hardships they faced during lockdown) may affect the agricultural operations in the next few months.

GoI has announced that the first instalment of the PM-Kisan payment to farmers will be paid up front to farmers and that the wages under MGNREGS will be raised from Rs 182 to Rs 202 per day. The Reserve Bank of India (RBI) has announced a moratorium on agricultural term loans (including crop loans) for a period of three months and one more tranche of stimulus package. It is hoped that these will help the supply side of the economy.

Production, transport and marketing of vegetables and fruits and animal food products – milk, poultry, meat and fish have been hit very hard by the lockdown. Food inflation had been rising from August 2019 onwards and by January 2020, reached levels previously attained in 2013-14. In the last few weeks in urban areas there has been scarcity of vegetables and steep rise in cost. Simultaneously there had been reports of vegetables thrown away on the roads or used as cattle feed in rural areas because there was no transport and market. The cyclical phenomena of the glut and distress sale of vegetables in rural areas and urban distress due to unaffordable cost of vegetables have been aggravated in the current period. Consumers, who are also facing financial stringency, reduce the quantity they buy, which again adversely affects the markets.

In order to ensure that the essential micro-nutrient needs of the population are met there has to be a focus on growing inexpensive regional vegetables rich in micro-nutrients, processing and marketing of these with minimal wastage. There had been research projects demonstrating the feasibility of drying vegetables at the site of production, grading, packaging and marketing them in urban areas but these have not been scaled up at the national level. Advocacy and some investment in the sector could alleviate economic distress in rural areas and improve availability of vegetables at affordable cost in urban and rural areas.

Food security

The World Food programme (WFP) has noted that the COVID 19 crisis is “threatening to affect millions of people already made vulnerable by food insecurity [and] malnutrition.” The economic down turn and rising unemployment will inevitably bring about an increase in number of food insecure families. These problems have to be addressed by the government in an environment of reduced revenues, increased expenditure and rising fiscal deficit. Small and marginal farmers will also be badly affected if they are unable to continue working their land, earn remunerative product prices, and gain access to markets for purchase or sale. India in the recent past has faced and overcome major economic upheavals. The resilience of the population, the availability of adequate food stocks, the expected record food-grain harvest and the prediction of normal monsoon are silver linings in a gloomy situation. In the coming months food insecurity levels have to be closely monitored and alleviated by appropriate intervention.

Food safety

There is concern whether COVID 19 could be transmitted through contamination of food. Unlike bacteria, viruses cannot replicate in food, so viral contamination cannot cause deterioration of the food or food product or change organoleptic properties of the food. SARS CoV-2 appears to be stable at low and freezing temperatures on food surfaces. Recent research evaluated the survival of the COVID 19 virus on different surfaces and reported that the virus can remain viable for up to 72 hours on plastic and stainless steel, up to four hours on copper, and up to 24 hours on cardboard. There is no evidence to date that COVID 19 can be transmitted via food or food packaging. The main risk involved in human to human transmission is during food handling by an infected food handler or customer. The FSSAI has notified food hygiene and safety guidelines for food businesses during the COVID 19 pandemic, including personal hygiene and the standard requirements of physical distancing and hand washing.

People as partners in combating COVID 19

The people of India are the foundation on which efforts to combat COVID 19 epidemic rests. The population by and large complied with the lockdown because most essential supplies and services were available. Industry and agriculture have coped with the disruptions and minimised the gaps in supplies. Philanthropists and NGOs as well as ordinary people have reached out to help those less fortunate by donating money and food.

In this knowledge century, support from aware citizens is the key for limiting the adverse impact of COVID 19. In an effort to improve awareness among the public and to ensure their compliance with measures for prevention, early detection and effective management of COVID 19, the State machinery has been using internet and mobile-based applications on an unprecedentedly large scale. However, digital technology is sometimes a double-edged sword because mobile apps can and do spread fake news that either creates undue panic or a false sense of security depending on the nature of the message. These have to be identified and eliminated.

Way ahead in the post lockdown period

India responded to COVID 19 pandemic with commendable speed, evolved and implemented interventions to contain and combat the disease and minimise the health, nutrition and economic consequences. India's proactive lockdown has been credited for preventing a more rapid spread of infection.

The pandemic and the measures to contain and control it have had an adverse impact on livelihoods, economic growth and quality of life of all strata of society especially in India with its vast inter-State migrant population. The next few months will tell us how far we, in India, have succeeded in balancing the interventions to protect lives against COVID 19 with interventions to prevent potentially disastrous deterioration in agriculture production, food security, nutrition, economic growth and the quality of life of people. It is essential to document the progress in productivity in agriculture, industry and how the demand side responds to reduction in burden due to COVID 19 and the economic stimulus package.

After managing the acute phase of the COVID 19 pandemic successfully, the country will have to prepare for a long haul over the next twelve months for containment and control of resurgence of infection. Life can never again be ‘business as usual’ in the pre-COVID era. The country has to understand eternal vigilance, early detection and effective management of problems is the price that we have to pay to remain healthy, regain the economic growth and attain targets for improvement in quality of life. In the next issue of the NFI bulletin, we hope to review the progress in all these in the coming three months.

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Nutrition News and Foundation News will be given in the next issue of the Bulletin